THE VALUE PREMIUM AND METHODOLOGICAL BIASES: EVIDENCE FROM THE UK EQUITY MARKET

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Abstract

We look for the existence of a value premium in the UK equity market for the period of 1987-2002. Previous studies are subject to four methodological biases (1) survivorship bias, (2) look-ahead bias, (3) a *downward* bias in post-formation *growth stock* returns caused by excluding recently listed growth stocks from the data, and (4) an *upward* bias in post-formation *value stock* returns caused by computing long-term returns by cumulating monthly returns (Conrad and Kaul, 1993). We eliminate the first three biases by using a new survivorship bias and look-ahead bias free dataset, which contains a complete history of all UK stocks that were fully listed at any time during 1987-2002. We eliminate the fourth bias by computing post-formation *holding period returns*, as recommended in Conrad and Kaul (1993). Our results indicate that the value effect is far smaller than is reported in previous studies, and is neither economically nor statistically significant.

Key words: Value Premium, UK Market, Contrarian Investments, Market Efficiency.
JEL Classifications: G11, G12, G14.

Introduction

The value/growth literature provides extensive evidence for the existence of a persistent and ubiquitous equity value premium, and moreover one that is both statistically and economically significant. The apparent out-performance of value strategies in the US stock market is well documented (Fama and French, 1992; Lakonishok, Shleifer and Vishny, 1994; Haugen, 1995; De Bondt and Thaler, 1985; Fama, 1998; Davis, Fama and French, 2000). Subsequent studies have reported a value effect in a wide range of developed and less developed stock markets worldwide (Brower, Van Der Put and Veld, 1996; Strong and Xu, 1997; Gregory, Harris and Michou, 2001; Dechow and Sloan, 1997; Bacmann and Dubois, 1998; Dimson, E., Nagel, S. and Quigley, G., 2003). A value effect for markets, as well as for individual stocks has also been identified, with the value market effect being linked to a small country effect (Balvers, Wu and Gilliland, 1999; Richards, 1997). So extensive is the reported evidence that the existence of a value premium appears to be generally accepted, by both proponents of market efficiency and of behavioural finance. The current academic debate is largely focused on competing explanations of its causes.

According to the behavioural finance explanation, company performance mean reverts in a competitive market. However, investors overestimate the length of the mean reversion horizon, leading to the under-pricing (over-pricing) of value (growth) stocks. Subsequent mean reversion of underlying company performance comes as a surprise at which point value (growth) stocks begin to out-perform (under-perform) (Chopra, Lakonishok and Ritter, 1992; Lakonishok, H.J., Shleifer, A. and R. Vishny, 1994). The behavioural explanation of the value anomaly has a second component, based on investors' under-reaction to earnings announcements (La Porta et al., 1997; Lander, Orphanides and Douvogiannis, 1997). According to this view, when a value company with past poor performance begins to revert to the mean, investors fail to recognize the first positive earnings surprise as a signal of more to come, leading to medium term inertia (Bernard, 1990). Thus, value investors enjoy up to around five years of super-normal returns as the market only gradually comes to recognise the improved underlying performance of value companies.

The efficient markets explanation is that the value premium is a risk premium. However, using the standard modern finance risk measures, beta (for individual stocks and portfolios) and standard deviation of returns (for well-diversified portfolios), it appears that value stocks are not more risky than growth stocks (Fama and French, 1992; Fuller, Huberts and Levinson, 1993;

Haugen, 1995; Strong and Xu, 1997; Pontiff and Schall, 1998, Fama and French, 1998; Gregory, Harris and Michou, 2001; Dimson, E., Nagel, S. and Quigley, G., 2003). Thus, the current modern finance defence against the value anomaly focuses on the argument that value out-performance is compensation for bearing elements of risk not captured by classical pricing models (Fama and French, 1992; Peterkort and Nielsen, 2005).

The position taken on the value anomaly has considerable practical implications. The behavioural finance explanation implies that contrarian investors can exploit the value premium to earn supernormal returns. The modern finance position warns that such a strategy exposes the investor to increased risk.

Contribution of this study

In this paper we show that the value premium for the UK stock market during the period of 1987-2002 is considerably smaller than is reported in previous studies, and that it is neither statistically nor economically significant. There are four sources of possible bias in previous studies that we address in this study. The first of these are survivorship bias and look-ahead bias in the data sets used in previous work. We eliminate these biases by using a new survivorship bias- and look-ahead bias-free database of the UK equity market constructed by the authors, the UK equity dataset (*UKED*). Survivorship bias may over-state the size of the value premium through the exclusion of bankrupt or poorly performing value stocks. Look-ahead bias may lead to the overstatement of post-formation returns on stocks classified as value. A third bias is that previous studies, following Lakonishok, Shleifer and Vishny (1994) exclude all stocks first listed in the market within five years of portfolio formation, thus excluding large numbers of young growth companies. The present study includes all such stocks[1]. The fourth source of bias in previous studies is that long-term post-formation returns are computed by cumulating single-period returns. Conrad and Kaul (1993) show that this leads to an upward bias in the long-term returns of small-priced stocks, and recommend that holding period returns be used instead. This is the approach we use in the present study.

We offer two main explanations of our results. The first is that previous studies overstated the value premium, due to the methodological biases discussed above. The second is that the value premium in the UK has largely evaporated during the period covered by the research. Both of these explanations support the modern finance view, and are consistent with semistrong market efficiency.

The Data

The value anomaly was first identified and investigated in US studies. The discovery of an anomaly and its further investigation within the same market raise the issue of data snooping. This criticism is answered by replication of the study over different time periods or in different markets, the UK market being of particular value in this respect, given the strong political, economic, cultural, and business similarities between the UK and the US. However, the quantity and quality of non-US data tend to be significantly poorer than US data. We address the issue of data quality for the UK market using the new data set introduced in this paper.

The data used are obtained from a new survivorship bias-free, look-ahead bias-free data set for the UK equity market (the UK equity dataset, or *UKED*). *UKED* covers all UK stocks that have been fully listed on the London Stock Exchange at any time during the fifteen-year period from June 1987 to April 2002, excluding investment companies and investment trusts. The data for most files cover the period from April 1982 to April 2002, while the Accounts, Number of Issued Shares, Market Capitalization and Industry Sector files cover only the period of June 1987 to April 2002. For each file and each company, data are given for the entire period covered by the file, and not merely for the period when the company was fully listed. The files are complete, except for isolated omissions. The data set is free from survivorship bias, because it includes all stocks. It is

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[1] All previous research in the UK market excluded newly listed securities, *securities with less-than-five years of published data*, as a means of eliminating look-ahead bias. As we explain in a later section this methodology introduces a degree of pre-selection bias in favor of value strategies.

free from look-ahead bias since AGM dates are given for each company for each year, thus providing dates for which the reported financial accounts can be regarded as publicly available.

The authors constructed the new dataset during 1998-2004. It is currently being updated to cover the period up to March 2006. A summary of the content of the key files from which the data were extracted is given in Table 1.

The data used in the present study comprise selected accounting and stock market data covering all companies that have been officially listed in the UK market during the period of December 1987 to December 1996, December 1996 being the last portfolio formation date. These data include monthly closing prices of the securities examined, the number of shares in issue in December of each calendar year, and monthly returns adjusted for capital changes, dividends, and mergers and acquisitions. All stocks fully-listed at the time of portfolio construction are selected, excluding financial trusts, investment trusts, venture capital trusts, banks and insurance companies, as well as all foreign companies listed in the UK market. The main reason behind the exclusion of these securities is the incompatibility of their accounting data with the rest of the data set. In total two thousand and six securities are selected, a number, which represents eighty four percent of the entire universe of fully listed stocks traded in the LSE during the period of examination.

All investment companies that change their activities are included in the data set. Thus an investment trust that becomes a property management company for example, is included at the point where its activities change. The accounting information at the date of the activity change, as well as at least three years of adjusted prior data are recorded in *UKED*, and in the same accounting format as the rest of the examined companies. This information allows these companies to be treated in much the same way as a new listing.

Table 1

Summary of the content of the data files in UKED data set

The **universe** of stocks comprises all UK stocks (excluding investment trusts) that have been fully listed at any time during **June 30 1987** to **April 5 2002**.			
File Name	**Period Covered**	**Universe**	**Content**
Securities Registry	April 6 1982 to April 5 2002	Entire universe	Extensive, detailed and complete records of securities' histories: birth/death details, capital changes and listing details.
Securities Registry Codes			Definitions and explanations of the Event Codes used in the Securities Registry.
Companies Registry	April 6 1982 to April 5 2002	Entire universe	History of company name changes. In each case the full legal name of the company is given.
Companies Registry Codes			Definitions and explanations of the codes used in the Companies Registry.
Monthly Total Returns	May 1982 to March 2002	Entire universe	Monthly total returns written as a decimal number. Returns are computed on the basis of data from the Securities Registry, Monthly Stock Prices and Dividends files.
Monthly Stock Prices	April 1982 to March 2002	Entire universe	End of month stock prices in pence per share.
Dividends	April 6 1982 to April 5 2002	Entire universe	Dividends in pence per share, ex dividend dates, dividend payment dates and type of dividend (interim, final, special). Dividend announcement dates are available for some companies.
Accounts	Latest annual accounts publicly available as at June 30 1987 to latest accounts publicly available as at April 30 2002	Entire universe	Aggregate profit and loss accounts, aggregate balance sheet accounts, final announcement date, balance sheet date and month of AGM. Accounts for non-financial companies are: Sales, Earnings Before Tax, Earnings Per Share (as reported in the accounts), Earnings Per Share according to Financial Reporting Standard 3 (as reported in the accounts), Dividends Per Share (as reported in the accounts), Intangible Fixed Assets, Tangible Fixed Assets, Long-Term Financial Assets, Inventories, Accounts Receivable, Cash and Near-Cash, Shareholders Equity, Long-Term Liabilities, Short-Term Liabilities and Balancing Item. All accounts are in £000,000. Accounts for financial companies are presented in a different format.

Table 1 (continuous)

File Name	Period Covered	Universe	Content
Industry Sectors	July 31 1987 to April 30 2002	Entire universe	History of industry sector classifications for each company on a quarterly basis.
Number of Issued Shares	September 30 1987 to September 30 2001	Entire universe	Number of ordinary shares issued as at the end of September each year.
Market Capitalization	December 30 1987 to September 30 2001	Entire universe	Market capitalization of total ordinary issued capital for each company as at the end of December each year.
Market Listing	April 6 1982 to April 5 2002	Entire universe	Market listing for each security as at the end of each month.
Accounting Ratios and Trends files	June 30 1987 to March 31 2002	Entire universe	All standard accounting and market ratios as at the end of each month, computed on the basis of information publicly available before the end of that month.

All data have been crosschecked against DataStream and the London Business School Share Price Database.

Portfolio Formation

Having defined the sample data of 1933 companies (covering 2006 equity securities) traded in the LSE during the period of 1987-1996, the testing of the value effect is based on a methodology similar to that used in earlier contrarian studies (Lakonishok, Shleifer and Vishny, 1994; Gregory, Harris and Michou, 2001). This allows a more direct comparison with previous studies, and gives some indication of the extent to which data biases may be problematic for this area of research. Consequently, securities are classified as value or growth on the basis of four accounting indicators, Book-to-Market Equity (B/ME), Earnings-to-Price (E/P), Dividend Yield (DY) and Weighted Average Sales Growth Rank (WASG). Previous studies have explained B/ME, E/P and DY, to some extent measuring directly investors' expectations of future performance, while WASG measures the expectations of naïve investors who extrapolate past performance too far into the future, ignoring the mean reversion effect. The first three ratios are thus used as proxies for expected future performance with high ratios for value stocks and low ratios for growth stocks. WASG is a more indirect proxy for future expected performance, with low WASG for value stocks and high WASG for growth stocks (Lakonishok, Shleifer and Vishny, 1994). B/ME is calculated as total assets (fixed and liquid) less long- and short-term creditors divided by the market value of equity. E/P and DY ratios are calculated as the most recently reported earnings per share and dividends per share, divided by the security's closing price at portfolio formation date. Sales growth (SG_{t-1}) for the period t-1 to t is calculated by using the following formula:

$$SG_{t-1} = \frac{S_t - S_{t-1}}{S_{t-1}}. \tag{1}$$

S_t is the most recently reported sales figure for the year ending time t that was publicly available as at the portfolio formation date. WASG is thus calculated as in Lakonishok, Shleifer and Vishny (1994), except that certain adjustments are made in order to take into account the different life spans of the securities examined to accommodate all newly listed securities.

A total weighted average sales growth ratio is estimated after assigning weights to the SG series; a weight of 1 for SG_{t-5}, 2 for SG_{t-4}, up to 5 for SG_{t-1}. The sum of the sales growth figures is then divided by the sum of the weights, or

$$\mathrm{WASG}_t = \frac{\sum_{n=1}^{5} SG_{t-n} * (6-n)}{\sum_{n=1}^{5} (6-n)}. \tag{2}$$

This method allows the assignment of WASG to all companies on a common scale and makes possible their equal treatment in the portfolio formation. For example for a company with five years of sales growth figures, weights are assigned using the above methodology with the sum of sales growth figures divided by fifteen. For a company with only two years of sales growth figures, for companies that are listed for the first time in the market providing only three years of data the sum of sales growth figures is divided by nine. Hence, in contrast to prior studies that tend to follow exactly the Lakonishok, Shleifer and Vishny (1994) methodology, this study avoids the problem of excluding the large number of companies that were listed within the five years prior to portfolio formation. The justification for including such companies in the study is that investors in the market will have formed expectations on the information that was actually available at the time. For many companies the available information was restricted to just three years of past data. It is completely unrealistic to suppose that investors would ignore such companies, an approach adopted in prior UK research.

As far as the portfolio formation periods are concerned, all portfolios are formed at the end of December of each calendar year. In order to ensure that portfolios are formed on the basis of the most recent information that was publicly available at the time of portfolio formation and to avoid possible look-ahead bias, all accounting data were cross-matched against the AGM dates given in the *UKED* database. To be included in the study a company must be active, and all required ratios must be available. There are ten-portfolio formation periods altogether, starting from December 1987 up to December 1996.

Previous studies for the UK market use cumulative single period returns to measure portfolio performance. However, Jensen's inequality, $E\{[1+\theta_{it}]/[1+\theta_{it-1}]\} > 1$, implies that cumulating monthly returns leads to an upward bias in the cumulative abnormal returns of securities that are low priced compared to an average benchmark (Conrad and Kaul, 1993). To avoid this possible upward bias in the generally, relatively low priced value stocks, this paper follows the methodology recommended by Conrad and Kaul (1993). So, performance measurement will be based on a buy and hold strategy, with post-formation portfolio returns taken to be equal to the holding period yield. If a particular stock is de-listed, all returns in the subsequent months for this security are replaced by the average monthly return on the relevant decile. Similarly to Conrad and Kaul (1993), portfolio performance is:

$$AHPR_p(k) = \frac{1}{n}\sum_{i=1}^{n} HPR_{ik} \ . \tag{3}$$

$AHPR_p(k)$ is the holding period return for portfolio P and holding period k months. $HPR_{ik} = (1 + R_1)(1 + R_2)\ldots(1 + R_k) - 1$ is the holding period return for stock i for holding period k months. The index i ranges over all stocks in portfolio P, and n is the number of stocks in P. Where V and G are the value and growth portfolios, we obtain $AHPR_V(k)$ and $AHPR_G(k)$ by taking the averages of (3) across all portfolio formations. The value premium hypothesis is $AHPR_V - AHPR_G > 0$. We present the results for k = 12, 24, 36, 48 and 60.

In order to allow comparison with previous studies, all portfolios are formed using both equal and value weighting. Size adjusted average holding period returns (SAAHPR) are also measured by combining the methodology introduced by Lakonishok, Shleifer and Vishny (1994) with the return measurement methodology developed by Conrad and Kaul (1993). So, in the beginning of January of each calendar year, all securities are assigned to size decile portfolios on the basis of their market capitalizations recorded at the end of the previous month, and annual average holding period returns on these size portfolios are then calculated. At the end of each portfolio formation year, the HPR_{ik} on each security included in the value/growth portfolios are substituted with the corresponding size-portfolio $AHPR_p(k)$, obtaining the size-benchmark portfolios. The annual size-adjusted average holding period returns are then calculated as the difference in the

$AHPR_p(k)$ of the examined value/growth portfolios and the $AHPR_p(k)$ on the corresponding size-benchmark portfolios.

For the two-dimensional classification all securities are initially sorted into three groups, highest 30 percent of the securities, middle 40 percent and lowest 30 percent following the above categorization methodology. This is done for only two of the four factors initially selected, B/ME and WASG. Finally one two-dimensional classification is formed, WASG-B/ME, containing nine portfolios formed from the intersections. These portfolios range from extreme value to extreme growth. Extreme value stocks are those with highest (top 30 percent) B/ME, and lowest WASG (lowest 30 percent). Extreme growth stocks are those with lowest B/ME (lowest 30%) and highest WASG (highest 30%). As in the one-dimensional classification, buy and hold returns are calculated using both AHPR and SAAHPR. Finally, where securities are de-listed from the market, their returns are replaced by the monthly average returns of the relevant portfolio. The exception to this rule is that stocks that become valueless have a return of-100% in the month in which they become valueless and returns of zero in all subsequent months.

In the portfolio construction, all and only those stocks that were fully listed and trading in the market at the time of portfolio formation are eligible for inclusion in the portfolios. Thus, for example, stocks that were fully listed sometime during December 1987 to December 1996 but were not fully listed at the time of portfolio formation are not included. Similarly, fully listed stocks whose shares were temporarily suspended at the time of portfolio formation are also excluded. The study is therefore free from survivorship bias. Furthermore, the classification of stocks is carried out on the basis of the most recent accounting information that was publicly available on the portfolio formation date. The study is therefore free from look-ahead bias.

Performance of Contrarian Strategies

One Dimensional Classification

According to Table 2, Panel A, for equal-weighted portfolios extreme value outperforms extreme growth for three out of the four classifications, with an average annual value premium of 0.038 for B/ME, -0.002 for E/P, 0.082 for DY and 0.178 for WASG. The pattern of these returns is quite mixed. In both the BM/E and WASG classifications, AHPR increases as the portfolios move from growth to value, with the outperformance of value tending to increase steadily as the holding period increases. For the E/P classification however, the outperformance of extreme value portfolios tends to revert after year four, and overall that performance is marginally lower than that of extreme growth. Overall, the results are mostly positive, but the value premium is considerably smaller than that reported in previous studies for the UK stock market.

The results for equal-weighted SAAHPR are presented in Panel B. After controlling for size, value outperformance falls by approximately 100 percent overall, and disappears entirely for the B/ME classification. This reversal is symmetrical across all deciles, and indicates a weak, though persistent small firm effect in the UK market for the period investigated. These results are therefore only partially supportive of the Dimson and Marsh (1999) findings of a reversal of the small-size company effect during the 1990s in the UK.

The results for value-weighted portfolios are reported in Table 3. Compared to the equal-weighted portfolios, except for the case of the BM/E classification, the value premium has been completely eliminated. After adjusting for size, in the case of BM/E value outperforms growth by an average of 17.4 percent. These results are again consistent with persistence of the UK small-size effect during the nineties, with small firms on average marginally outperforming large-size stocks within deciles. The only performance that remains approximately robust is that of the DY classifications where the introduction of a value weighting appears to have a minimal effect on the value premium. The SAAHPR using value weighting again shows a fall in the value premium that ranges from around 55 percent for BM/E to a complete reverse for WASG, -5.5 percent in Panel B.

Table 2

Equally Weighted Average Holding Period Returns, 1988-2002

Panel A. Equally-Weighted Average Holding Period Returns

		Low	2	3	4	5	6	7	8	9	High	DAHPR
BE/ME	R1	0.121	0.103	0.100	0.097	0.121	0.107	0.109	0.137	0.133	0.162	0.041
	R2	0.209	0.203	0.193	0.203	0.228	0.219	0.184	0.284	0.279	0.271	0.062
	R3	0.403	0.337	0.337	0.312	0.397	0.346	0.322	0.467	0.460	0.431	0.029
	R4	0.627	0.514	0.510	0.522	0.575	0.514	0.514	0.694	0.664	0.647	0.019
	R5	0.861	0.695	0.641	0.676	0.769	0.713	0.649	0.826	0.881	0.900	0.040
	μ	*0.444*	*0.370*	*0.356*	*0.362*	*0.418*	*0.380*	*0.355*	*0.482*	*0.484*	*0.482*	*0.038*

		Low	2	3	4	5	6	7	8	9	High	DAHPR
E/P	R1	0.159	0.151	0.159	0.120	0.114	0.108	0.122	0.097	0.097	0.065	-0.094
	R2	0.250	0.252	0.277	0.212	0.219	0.224	0.229	0.199	0.235	0.172	-0.079
	R3	0.372	0.378	0.410	0.381	0.380	0.414	0.376	0.339	0.420	0.330	-0.042
	R4	0.528	0.507	0.625	0.554	0.562	0.572	0.529	0.566	0.685	0.644	0.116
	R5	0.742	0.655	0.831	0.756	0.727	0.751	0.673	0.734	0.893	0.833	0.091
	μ	*0.410*	*0.389*	*0.461*	*0.405*	*0.400*	*0.414*	*0.386*	*0.387*	*0.466*	*0.409*	*-0.002*

Panel B. Equally-Weighted Average Holding Period Returns (Size Adjusted)

		Low	2	3	4	5	6	7	8	9	High	DAHPR
BE/ME	R1	-0.014	-0.029	-0.007	-0.013	0.029	-0.009	0.005	0.034	0.007	-0.002	0.012
	R2	-0.065	-0.051	-0.001	0.009	0.046	-0.011	-0.013	0.070	0.036	-0.008	0.057
	R3	-0.004	-0.070	0.046	-0.008	0.056	-0.042	0.007	0.075	-0.033	-0.017	-0.013
	R4	0.055	-0.095	0.032	0.074	0.031	-0.065	-0.034	0.143	-0.072	-0.047	-0.102
	R5	0.134	-0.110	-0.035	0.003	0.071	-0.025	-0.068	0.150	-0.041	-0.020	-0.154
	μ	*0.021*	*-0.071*	*0.007*	*0.013*	*0.046*	*-0.031*	*-0.021*	*0.094*	*-0.021*	*-0.019*	*-0.040*

		Low	2	3	4	5	6	7	8	9	High	DAHPR
E/P	R1	0.024	0.019	0.052	0.010	0.021	-0.008	0.018	-0.006	-0.029	-0.100	-0.124
	R2	-0.024	-0.002	0.083	0.018	0.036	-0.006	0.032	-0.015	-0.008	-0.107	-0.083
	R3	-0.034	-0.029	0.119	0.061	0.038	0.026	0.061	-0.053	-0.073	-0.118	-0.084
	R4	-0.044	-0.101	0.147	0.106	0.018	-0.007	-0.018	0.014	-0.051	-0.050	-0.006
	R5	0.015	-0.150	0.155	0.083	0.028	0.013	-0.043	0.058	-0.030	-0.088	-0.102
	μ	*-0.013*	*-0.053*	*0.111*	*0.056*	*0.028*	*0.004*	*0.010*	*0.000*	*-0.038*	*-0.092*	*-0.080*

Table 2 (continuous)

		Low	2	3	4	5	6	7	8	9	High	DAHPR
DY	R1	0.112	0.120	0.133	0.127	0.121	0.118	0.128	0.129	0.114	0.091	-0.020
	R2	0.198	0.206	0.250	0.232	0.246	0.216	0.237	0.234	0.258	0.192	-0.006
	R3	0.327	0.331	0.406	0.362	0.432	0.396	0.383	0.378	0.414	0.374	0.047
	R4	0.495	0.497	0.577	0.527	0.596	0.586	0.606	0.603	0.645	0.632	0.137
	R5	0.598	0.725	0.762	0.717	0.795	0.744	0.809	0.774	0.816	0.848	0.250
	μ	*0.346*	*0.376*	*0.426*	*0.393*	*0.438*	*0.412*	*0.433*	*0.424*	*0.449*	*0.427*	*0.082*

		Low	2	3	4	5	6	7	8	9	High	DAHPR
DY	R1	-0.023	-0.012	0.026	0.016	0.028	0.002	0.024	0.026	-0.013	-0.073	-0.050
	R2	-0.077	-0.047	0.056	0.037	0.063	-0.014	0.040	0.020	0.015	-0.087	-0.010
	R3	-0.080	-0.077	0.115	0.041	0.090	0.008	0.068	-0.015	-0.078	-0.074	0.005
	R4	-0.077	-0.112	0.099	0.080	0.052	0.007	0.058	0.051	-0.091	-0.062	0.015
	R5	-0.129	-0.080	0.086	0.044	0.096	0.006	0.093	0.098	-0.107	-0.072	0.057
	μ	*-0.077*	*-0.066*	*0.076*	*0.044*	*0.066*	*0.002*	*0.057*	*0.036*	*-0.055*	*-0.074*	*0.004*

		High	2	3	4	5	6	7	8	9	Low	DAHPR
WASG	R1	0.052	0.071	0.074	0.099	0.129	0.159	0.145	0.151	0.163	0.150	0.098
	R2	0.116	0.140	0.146	0.192	0.270	0.294	0.266	0.283	0.287	0.273	0.157
	R3	0.257	0.295	0.278	0.345	0.459	0.463	0.396	0.436	0.424	0.452	0.195
	R4	0.435	0.526	0.442	0.575	0.642	0.649	0.598	0.609	0.619	0.663	0.228
	R5	0.674	0.772	0.599	0.697	0.822	0.784	0.789	0.764	0.767	0.888	0.213
	μ	*0.307*	*0.361*	*0.308*	*0.382*	*0.464*	*0.470*	*0.439*	*0.449*	*0.452*	*0.485*	*0.178*

		High	2	3	4	5	6	7	8	9	Low	DAHPR
WASG	R1	-0.083	-0.061	-0.033	-0.011	0.036	0.043	0.041	0.048	0.037	-0.015	0.068
	R2	-0.158	-0.113	-0.048	-0.003	0.088	0.064	0.069	0.069	0.044	-0.005	0.152
	R3	-0.150	-0.112	-0.013	0.025	0.118	0.075	0.081	0.044	-0.068	0.004	0.154
	R4	-0.137	-0.083	-0.036	0.127	0.098	0.070	0.050	0.057	-0.117	-0.030	0.106
	R5	-0.053	-0.033	-0.077	0.024	0.123	0.046	0.073	0.088	-0.156	-0.033	0.020
	μ	*-0.116*	*-0.081*	*-0.041*	*0.032*	*0.093*	*0.060*	*0.063*	*0.061*	*-0.052*	*-0.016*	*0.100*

Note: B/ME and E/P are book to market value of equity and earnings to price respectively. DY is Dividend Yield and WASG is the weighted average sales growth ratio. DAHPR is the difference of the average holding period returns between extreme value, high B/ME, E/P, DY and low WASG, and growth, low B/ME, E/P, DY and high WASG.

Table 3

Value Weighted Average Holding Period Returns, 1988-2002

Panel A. Value-Weighted Average Holding Period Returns

		Low	2	3	4	5	6	7	8	9	High	DAHPR
BE/ME	R1	0.159	0.142	0.116	0.121	0.123	0.168	0.126	0.162	0.173	0.229	0.070
	R2	0.285	0.313	0.274	0.272	0.244	0.392	0.240	0.395	0.305	0.434	0.150
	R3	0.460	0.544	0.447	0.371	0.435	0.607	0.360	0.509	0.455	0.673	0.212
	R4	0.686	0.750	0.533	0.620	0.617	0.876	0.513	0.664	0.673	0.873	0.187
	R5	0.946	0.911	0.659	0.775	0.874	1.074	0.689	0.843	0.850	1.195	0.249
	μ	*0.507*	*0.532*	*0.406*	*0.432*	*0.459*	*0.623*	*0.386*	*0.515*	*0.491*	*0.681*	*0.174*

		Low	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	High	DAHPR
E/P	R1	0.176	0.196	0.157	0.107	0.118	0.115	0.116	0.156	0.129	0.097	-0.079
	R2	0.317	0.341	0.302	0.235	0.233	0.257	0.277	0.306	0.341	0.285	-0.032
	R3	0.544	0.493	0.450	0.441	0.370	0.437	0.414	0.450	0.576	0.429	-0.115
	R4	0.767	0.693	0.595	0.598	0.558	0.604	0.575	0.656	0.931	0.720	-0.046
	R5	0.999	0.900	0.798	0.751	0.693	0.831	0.755	0.885	1.076	0.959	-0.039
	μ	*0.560*	*0.525*	*0.460*	*0.426*	*0.394*	*0.449*	*0.428*	*0.491*	*0.611*	*0.498*	*-0.062*

Panel B. Value-Weighted Average Holding Period Returns (Size Adjusted)

		Low	2	3	4	5	6	7	8	9	High	DAHPR
BE/ME	R1	0.024	0.010	0.009	0.011	0.030	0.052	0.022	0.058	0.047	0.065	0.041
	R2	0.011	0.060	0.080	0.078	0.061	0.161	0.043	0.181	0.063	0.156	0.145
	R3	0.054	0.137	0.156	0.051	0.093	0.219	0.046	0.116	-0.038	0.225	0.171
	R4	0.114	0.142	0.055	0.173	0.073	0.297	-0.035	0.112	-0.063	0.179	0.065
	R5	0.219	0.106	-0.018	0.102	0.175	0.336	-0.027	0.167	-0.073	0.274	0.056
	μ	*0.084*	*0.091*	*0.056*	*0.083*	*0.087*	*0.213*	*0.010*	*0.127*	*-0.013*	*0.180*	*0.095*

		Low	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	High	DAHPR
E/P	R1	0.041	0.064	0.051	-0.003	0.025	-0.001	0.013	0.053	0.003	-0.067	-0.108
	R2	0.043	0.088	0.108	0.041	0.050	0.027	0.080	0.092	0.099	0.006	-0.037
	R3	0.138	0.085	0.159	0.120	0.028	0.049	0.099	0.058	0.083	-0.019	-0.157
	R4	0.195	0.085	0.116	0.150	0.015	0.025	0.028	0.104	0.194	0.027	-0.168
	R5	0.272	0.095	0.122	0.077	-0.006	0.092	0.039	0.209	0.153	0.039	-0.233
	μ	*0.138*	*0.083*	*0.111*	*0.077*	*0.022*	*0.038*	*0.052*	*0.103*	*0.106*	*-0.003*	*-0.141*

Table 3 (continuous)

		Low	2	3	4	5	6	7	8	9	High	DAHPR
DY	R1	0.147	0.163	0.158	0.137	0.110	0.165	0.159	0.113	0.105	0.095	-0.052
	R2	0.249	0.308	0.320	0.263	0.241	0.346	0.270	0.251	0.301	0.294	0.045
	R3	0.438	0.472	0.477	0.407	0.407	0.533	0.374	0.392	0.553	0.483	0.044
	R4	0.608	0.701	0.669	0.591	0.526	0.701	0.561	0.655	0.869	0.654	0.046
	R5	0.737	0.994	0.893	0.721	0.722	0.822	0.798	0.826	1.014	1.003	0.266
	μ	*0.436*	*0.527*	*0.504*	*0.424*	*0.401*	*0.514*	*0.432*	*0.447*	*0.568*	*0.506*	*0.070*

		Low	2	3	4	5	6	7	8	9	High	DAHPR
DY	R1	0.012	0.031	0.051	0.027	0.018	0.049	0.055	0.010	-0.021	-0.070	-0.082
	R2	-0.025	0.055	0.126	0.069	0.058	0.116	0.073	0.037	0.058	0.016	0.041
	R3	0.032	0.064	0.186	0.086	0.066	0.145	0.060	0.000	0.060	0.034	0.003
	R4	0.036	0.092	0.191	0.143	-0.018	0.122	0.013	0.103	0.133	-0.040	-0.075
	R5	0.010	0.188	0.217	0.047	0.023	0.084	0.082	0.150	0.091	0.082	0.073
	μ	*0.013*	*0.086*	*0.154*	*0.075*	*0.029*	*0.103*	*0.057*	*0.060*	*0.064*	*0.005*	*-0.008*

		High	2	3	4	5	6	7	8	9	Low	DAHPR
WASG	R1	0.120	0.081	0.115	0.093	0.129	0.154	0.142	0.152	0.177	0.179	0.058
	R2	0.239	0.165	0.288	0.190	0.291	0.342	0.282	0.313	0.369	0.334	0.095
	R3	0.419	0.316	0.466	0.324	0.474	0.503	0.383	0.476	0.580	0.464	0.045
	R4	0.601	0.589	0.665	0.577	0.618	0.630	0.578	0.709	0.746	0.612	0.011
	R5	0.878	0.784	0.880	0.713	0.716	0.858	0.836	0.935	0.835	0.785	-0.093
	μ	*0.452*	*0.387*	*0.483*	*0.379*	*0.445*	*0.497*	*0.444*	*0.517*	*0.541*	*0.475*	*0.023*

		High	2	3	4	5	6	7	8	9	Low	DAHPR
WASG	R1	-0.014	-0.052	0.008	-0.017	0.036	0.038	0.038	0.049	0.051	0.014	0.029
	R2	-0.035	-0.088	0.094	-0.005	0.108	0.111	0.085	0.099	0.127	0.055	0.090
	R3	0.013	-0.091	0.175	0.004	0.132	0.115	0.068	0.083	0.088	0.016	0.003
	R4	0.029	-0.020	0.187	0.129	0.075	0.051	0.030	0.157	0.009	-0.082	-0.111
	R5	0.151	-0.022	0.204	0.039	0.017	0.120	0.120	0.259	-0.088	-0.135	-0.286
	μ	*0.029*	*-0.055*	*0.133*	*0.030*	*0.074*	*0.087*	*0.068*	*0.129*	*0.037*	*-0.026*	*-0.055*

Note: B/ME and E/P are book to market value of equity and earnings to price respectively. DY is Dividend Yield and WASG is the weighted average sales growth ratio. DAHPR is the difference of the average holding period returns between extreme value, high B/ME, E/P, DY and low WASG, and growth, low B/ME, E/P, DY and high WASG.

Two Dimensional Classification

Following earlier examinations of the value premium (Lakonishok et al., 1994; Gregory, Harris and Michou, 2001) the two-dimensional classification aims to combine measures of investors' expectations based on past performance; with more direct measures of expected future performance. Companies' past performance is measured using the WASG ratio using the same methodology followed in the previous section, while direct measures of expected performance are B/ME, E/P and DY. Two different combinations are tested. These are i) BM/E-WASG and ii) DY-WASG. The E/P-WASG combination is excluded as the E/P classification has already shown negative results for value. Overall, the value premium is stronger than in the one-dimensional classification, but has been sharply reduced in comparison with the results reported in earlier UK studies. Again, results are reported for both equal and value weighting.

According to Panel A of Table 4, the value premium in the two dimensional classification WASG-BM/E is stronger than in any of the two strategies alone. The combinations exhibit positive AHPR's with values of 0.203 for equal weighting and 0.050 for value weighting. When the portfolios are adjusted for size in Panel B, the value premium drops considerably. The SAAHPR value premium using equal weighting is 0.128, while for value weighting is reversed to a negative 0.008, Panel D. The positive value premium for both unadjusted and size-adjusted returns persists for the first three years or so, and usually reverses in the last two years of performance measurement, year four and five.

A slightly better picture is presented from the WASG-DY classification. According to Panels E and G, the value premium is 0.176 for equal weighting and 0.058 for value weighting, and is less affected by the size adjustments.

Overall, the value premium is positive but vastly smaller than reported in earlier studies. For example, in the US market the average annual value premium was approximately 10 percent per year with a five-year cumulative difference in returns of approximately 100 percent (Lakonishok, Shleifer and Vishny, 1994, pp. 1552-1555).

Overall, the conclusions of the one-dimensional and two-dimensional tests are that there is weak evidence of a small value premium in the UK stock market during the late 1980s and 1990s. The value premium is larger when stocks are classified using a two-dimensional rather than a one-dimensional classification. The effect is substantially smaller than that reported in previous UK and US studies, and apart from the WASG ratio, it is neither economically nor statistically significant. Since the portfolio formations cover overlapping periods, the returns computed are not independent, and therefore the conditions required for applying the t-test have not been met. However, it does follow that the (unreported) t-statistics give an upper bound for the true significance of the results. The results are not significant at the 5% level. Finally, we show that size adjusted value premiums are, in general smaller than unadjusted premiums. While the reduction in the value premium is considerably smaller than is reported in earlier studies, it does indicate a small but persistent small firm effect in the UK stock market during the late 1980s and 1990s. This conclusion is corroborated by the fact that the value premium for equal-weighted portfolios in the one-dimensional classification is smaller than that for value-weighted portfolios.

Table 4

Two Dimensional Classifications

Panel A. Equally-Weighted Average Holding Period Returns

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	0.076	0.136	0.113	0.064	0.115	0.136	0.060	0.163	0.182	0.107
	R2	0.148	0.249	0.203	0.115	0.239	0.248	0.151	0.304	0.345	0.197
	R3	0.306	0.410	0.341	0.211	0.382	0.408	0.316	0.501	0.517	0.211
	R4	0.504	0.618	0.467	0.392	0.576	0.590	0.493	0.706	0.756	0.252
	R5	0.740	0.777	0.563	0.565	0.739	0.746	0.707	0.860	0.987	0.247
	μ	*0.355*	*0.438*	*0.337*	*0.269*	*0.410*	*0.425*	*0.345*	*0.507*	*0.557*	*0.203*

Panel B. Equally-Weighted Average Holding Period Returns (Size Adjusted)

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	-0.059	0.015	0.006	-0.045	0.013	0.022	-0.043	0.044	0.028	0.087
	R2	-0.119	0.019	0.009	-0.079	0.038	0.043	-0.063	0.070	0.074	0.193
	R3	-0.096	0.047	0.049	-0.110	0.023	0.082	-0.076	0.045	0.062	0.158
	R4	-0.069	0.063	-0.010	-0.059	0.023	0.052	-0.059	0.034	0.057	0.126
	R5	0.003	0.027	-0.113	-0.107	0.031	0.050	0.030	0.025	0.077	0.075
	μ	*-0.068*	*0.034*	*-0.012*	*-0.080*	*0.026*	*0.050*	*-0.042*	*0.044*	*0.060*	*0.128*

Panel C. Value-Weighted Average Holding Period Returns

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	0.134	0.134	0.167	0.079	0.126	0.114	0.101	0.136	0.230	0.097
	R2	0.307	0.272	0.321	0.149	0.283	0.356	0.188	0.315	0.416	0.109
	R3	0.505	0.480	0.461	0.229	0.399	0.640	0.383	0.417	0.571	0.066
	R4	0.774	0.643	0.529	0.399	0.601	0.980	0.631	0.564	0.782	0.009
	R5	0.987	0.804	0.672	0.648	0.814	1.125	0.857	0.749	0.955	-0.032
	μ	*0.541*	*0.467*	*0.430*	*0.301*	*0.445*	*0.643*	*0.432*	*0.436*	*0.591*	*0.050*

Panel D. Value-Weighted Average Holding Period Returns (Size Adjusted)

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	-0.005	0.016	0.061	-0.029	0.023	0.075	-0.002	0.021	0.083	0.088
	R2	0.032	0.041	0.127	-0.043	0.086	0.169	-0.026	0.086	0.160	0.128
	R3	0.096	0.120	0.169	-0.092	0.036	0.294	-0.010	-0.028	0.130	0.034
	R4	0.190	0.094	0.051	-0.052	0.045	0.278	0.079	-0.082	0.088	-0.102
	R5	0.232	0.047	-0.004	-0.026	0.097	0.276	0.181	-0.055	0.045	-0.187
	μ	*0.109*	*0.063*	*0.081*	*-0.049*	*0.057*	*0.218*	*0.044*	*-0.012*	*0.101*	*-0.008*

Table 4 (continuous)

Panel A. Equally-Weighted Average Holding Period Returns

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	0.076	0.136	0.113	0.064	0.115	0.136	0.060	0.163	0.182	0.107
	R2	0.148	0.249	0.203	0.115	0.239	0.248	0.151	0.304	0.345	0.197
	R3	0.306	0.410	0.341	0.211	0.382	0.408	0.316	0.501	0.517	0.211
	R4	0.504	0.618	0.467	0.392	0.576	0.590	0.493	0.706	0.756	0.252
	R5	0.740	0.777	0.563	0.565	0.739	0.746	0.707	0.860	0.987	0.247
	μ	*0.355*	*0.438*	*0.337*	*0.269*	*0.410*	*0.425*	*0.345*	*0.507*	*0.557*	*0.203*

Panel B. Equally-Weighted Average Holding Period Returns (Size Adjusted)

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	-0.059	0.015	0.006	-0.045	0.013	0.022	-0.043	0.044	0.028	0.087
	R2	-0.119	0.019	0.009	-0.079	0.038	0.043	-0.063	0.070	0.074	0.193
	R3	-0.096	0.047	0.049	-0.110	0.023	0.082	-0.076	0.045	0.062	0.158
	R4	-0.069	0.063	-0.010	-0.059	0.023	0.052	-0.059	0.034	0.057	0.126
	R5	0.003	0.027	-0.113	-0.107	0.031	0.050	0.030	0.025	0.077	0.075
	μ	*-0.068*	*0.034*	*-0.012*	*-0.080*	*0.026*	*0.050*	*-0.042*	*0.044*	*0.060*	*0.128*

Panel C. Value-Weighted Average Holding Period Returns

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	0.134	0.134	0.167	0.079	0.126	0.114	0.101	0.136	0.230	0.097
	R2	0.307	0.272	0.321	0.149	0.283	0.356	0.188	0.315	0.416	0.109
	R3	0.505	0.480	0.461	0.229	0.399	0.640	0.383	0.417	0.571	0.066
	R4	0.774	0.643	0.529	0.399	0.601	0.980	0.631	0.564	0.782	0.009
	R5	0.987	0.804	0.672	0.648	0.814	1.125	0.857	0.749	0.955	-0.032
	μ	*0.541*	*0.467*	*0.430*	*0.301*	*0.445*	*0.643*	*0.432*	*0.436*	*0.591*	*0.050*

Panel D. Value-Weighted Average Holding Period Returns (Size Adjusted)

		H/L	2	3	4	5	6	7	8	L/H	DAHPR
WASG & BE/ME	R1	-0.005	0.016	0.061	-0.029	0.023	0.075	-0.002	0.021	0.083	0.088
	R2	0.032	0.041	0.127	-0.043	0.086	0.169	-0.026	0.086	0.160	0.128
	R3	0.096	0.120	0.169	-0.092	0.036	0.294	-0.010	-0.028	0.130	0.034
	R4	0.190	0.094	0.051	-0.052	0.045	0.278	0.079	-0.082	0.088	-0.102
	R5	0.232	0.047	-0.004	-0.026	0.097	0.276	0.181	-0.055	0.045	-0.187
	μ	*0.109*	*0.063*	*0.081*	*-0.049*	*0.057*	*0.218*	*0.044*	*-0.012*	*0.101*	*-0.008*

Note: H/L is the portfolio that includes the intersection of securities that exhibit high WASG and low B/ME or DY past performance (extreme growth), and L/H the portfolio that includes those securities with low WASG and high B/ME or DY (extreme value).

There are two main plausible explanations for the reduction in the value premium reported here. Firstly, it may be that the much larger value effect reported in earlier studies is partly spurious and was caused in part by various biases in the data sets used. Survivorship bias may over-state the size of the value premium through the exclusion of bankrupt or poorly performing stocks, and look-ahead bias may lead to the overstatement of post-formation returns on stocks classified as value. In the present study the use of the AGM dates in conjunction with the accounting closing dates solves the subjective selection of accounting data[1] as only the latest accounts that were publicly available at the December portfolio formation date are used in the annual portfolio formation. A third source of possible bias is that earlier studies excluded stocks listed within five years of portfolio formation, thus excluding a significant number of young growth stocks, while the present study includes these stocks. The final source of possible bias concerns the methodology adopted in computing returns. The use of average holding period returns instead of cumulative single period returns, a methodology followed in prior UK and US studies, removes one source of bias in assessing the performance of value versus growth strategies. The second plausible explanation concerns the period under examination. Most of the previous studies have examined longer time periods, two or three decades and mostly up to 1998. This study focuses mainly on the decade of the nineties. It may be that a previously existing value premium has been exploited away since the publication of research on the value/growth anomaly during the early and mid-1990s. Both of these explanations are consistent with the semistrong form of the efficient markets hypothesis.

Informational Content of Fundamental Ratios

Methodology

We continue with the examination of returns for the selected period using cross sectional regression models. Returns for individual companies are regressed on the different classification factors, B/ME, E/P, DY, WASG and Size. Regression models are examined with dependent variable $AHPR_i$, i=1,…,6, where $AHPR_i$ is the annual holding period return for the stock in year i after portfolio formation. Two separate methodologies are adopted. The first methodology follows the one initially proposed by Fama and French (1992) and later also adopted by Lakonishok et al. (1994). The total explanatory power of the accounting measures used is estimated with a cross sectional multiple regression model. Specifically, for all securities traded during the entire period under examination, average holding period raw returns (AHPRR) and their fundamental indicators at the beginning of the portfolio formation period are calculated. In addition, in order to avoid interpretational problems related to the calculation of E/P when earnings are negative, one dummy variable, DE/P is introduced. The dummy variable takes the value 1 when earnings are negative and 0 when earnings are positive. The variable E/P^+ is equal to E/P when earnings are positive and takes the value zero when earnings are negative. So, the cross-sectional regressions are carried out using the following model:

$$AHPRR_i = \alpha + b_1 B/ME_i + b_2 DY + b_3 WASG_i + b_4 E/P_i^+ + b_5 DE/P_i + b_6 SIZE_i + e_i, \quad (4)$$

where $AHPRR_i$ is the endogenous variable, α is the value of the regression intercept term, b_1, b_2, b_3,…, b_6 are the values of the estimated regression coefficients corresponding to each of the exogenous variables, B/ME, DY, WASG, E/P^+, DE/P, and, SIZE, while e_i is the residual term. In order to determine the explanatory power of the model, all cross-sectional regression coefficients are averaged and the t-test statistic is computed.

With respect to the second methodology used, the main aim is to identify the exact number of variables that can be confidently used in order to improve the strength of the multi-factor regression model. This requires the calculation of all partial correlations between all exogenous

[1] Prior literature uses a six-month lag between balance sheet dates and portfolio formation dates with the objective to minimise possible look-ahead bias. Nevertheless, the lack of a consistent and universally applicable date for British companies to publish their accounts makes it very difficult to ensure that the correct accounts are used at any given date.

variables. This method allows the selection of the most significant variables that can be used in the model, and also eliminates possible multicollinearity between the variables selected. In contrast to the regression model used in the first methodology, where the relationship between the endogenous and exogenous variables is measured by the coefficient of multiple determination, $R^2_{y \cdot x_1, x_2, \ldots, x_n}$, the second methodology proceeds to the examination of each variable's explanatory power through the use of the partial correlation coefficients, $r^2_{y \cdot x_1, x_2, \ldots, x_n}$. By testing all first-order relationships amongst all exogenous variables only the variables that exhibit low correlation compared to the others, and have high explanatory power are selected. For example, consider a two-factor regression that examines the relationship between WASG and DY with dependent variable $AHPRR_i$. This model is formulated as follows:

$$AHPRR_i = a + b_1 WASG_i + b_2 DY_i + e_i . \tag{5}$$

By estimating $\hat{b}_1$, the partial regression coefficient using OLS, as well as the standard error of the estimate denoted as $s^2_{\hat{b}_1}$, the $r^2_{AHPRR_i WASG_i \cdot DY_i}$ is calculated as

$$r^2_{AHPRR_i WASG_i \cdot DY_i} = \frac{t^2_{WASG_i}}{t^2_{WASG_i} + d.f.}, \tag{6}$$

where $t^2_{WASG_i} = \frac{\hat{b}_1}{s^2_{\hat{b}_1}}$, while d.f. is the number of observations minus the number of estimated regression parameters. Similarly, the partial correlation coefficient for DY_i is also calculated. The coefficients $r^2_{yWASG_i \cdot DY_i}$ and $r^2_{yDY_i \cdot WASG_i}$ are then compared between themselves and with the simple correlations of their respective factors, $r^2_{yWASG_i}$ and $r^2_{yDY_i}$ to determine the extent to which their common use in the regression model increases explanatory power. All regressions are independently tested for the total universe of officially listed companies and for all ten-portfolio formation periods, with returns measured using AHPRR. With respect to the financial ratios used in the analysis, these are based on their values as calculated during the last day before the portfolio formation. After all partial correlation coefficients have been estimated a multiple regression model is formulated using a stepwise approach. Starting with the variables that exhibit the strongest correlation with the endogenous variable a first-order regression model is developed. After assessing the explanatory power of this first-order model using the F-values and t-values, the remaining exogenous variables are added to the model one at a time on the basis of whether or not they enhance the models' explanatory power, increase of the F-value and t-value. If these two statistical measures are reduced by the introduction of a new variable, the new variable is excluded. In the end, only those variables whose combination exhibits the highest explanatory power remain in the regression model.

Results

The results for one-year holding period returns using the first methodology are reported in Table 5. When all exogenous variables are introduced as a stand-alone factor in a simple regression model, only WASG appears to have a significant relationship with the endogenous variable.

Furthermore the WASG coefficient is negative. The explanatory power of the variables improves when they are combined with other factors. By combining all variables that stand for proxies of expected future performance, the explanatory power of E/P^+, DE/P and DY improve considerably.

Their relationship with $AHPRR_i$ is statistically significant at the one percent level. It is worth commenting on the sign of the E/P$^+$ coefficient. Even if the variable is statistically significant when combined with the other five factors in the multiple regression models, the negative sign of E/P$^+$ indicates possible multicollinearity in the model. This problem disappears when the variable DY is excluded from the regression, regression output eight, while E/P$^+$ turns back to a positive but not statistically significant factor. This result is expected considering the relationship between earnings and dividends. Apart from the DE/P and WASG, all other variables in the regression model are statistically weak predictors of one-year ahead stock returns. These results generally support the results from the one-dimensional classification tests and demonstrate that the adjusted SG ratio outperforms B/ME.

Following the second methodology, all partial correlations between the explanatory variables are determined. Table 6 gives a summary of these partial correlations. After testing all variables, E/P$^+$ and DY are almost perfectly correlated with each other while for almost all of the remaining relationships the r^2's are very small, even when significant, SIZE is negatively correlated with nearly all of the variables, results that are partially consistent with the over-reaction hypothesis. Large glamour stocks generally have low E/P and B/ME ratios and high past sales growth, and future investment returns on these stocks tend to be below average. Value stocks are generally smaller, have high E/P and B/ME ratios and generate above average future investment returns.

The null hypothesis of all regression slopes equal to zero is accepted for all years, using a five percent significant level criterion for the F-statistic. We provide a summary of the results in Table 7. From all factors, only DE/P and WASG appear to be significant, t-value of 7.592 (p=0.000) and -4.902 (p=0.000) for $AHPRR_1$. Their explanatory power falls slightly from the third year onwards. Therefore, it appears that only these two factors can sustain statistically significant t-values for all five $AHPRR_i$ regressions. Overall, the regression results reinforce again the results of the classification tests. The signs of the coefficients in all the regressions are consistent with the interpretation of the classification test results, while the coefficients are statistically significant in both cases. The factor WASG has the greatest explanatory power overall, and is both statistically and economically significant, a result which corroborates the previous findings of an insignificant value premium using the B/ME, DY and E/P$^+$ classifications.

Table 5

Regression of returns on characteristics for all firms

			Intercept	*B/ME*	*E/P+*	*DE/P*	*DY*	*WASG*	*SIZE*
1	UC	B	0.116	0.000					
		Std. Error	0.004	0.001					
	SC	B		0.005					
		t-statistic	26.389	0.526					
		Sig.	0.000	0.599					
2	UC	B	0.116		0.002				
		Std. Error	0.004		0.003				
	SC	B			0.007				
		t-statistic	26.608		0.790				
		Sig.	0.000		0.430				
3	UC	B	0.116				0.000		
		Std. Error	0.004				0.000		
	SC	B					0.012		
		t-statistic	26.668				1.320		
		Sig.	0.000				0.187		

Table 5 (continuous)

			Intercept	*B/ME*	*E/P+*	*DE/P*	*DY*	*WASG*	*SIZE*
4	UC	B	0.119					-0.008	
		Std. Error	0.004					0.002	
	SC	B						-0.046	
		t-statistic	27.159					-4.929	
		Sig.	0.000					0.000	
5	UC	B	0.153						-0.002
		Std. Error	0.041						0.002
	SC	B							-0.008
		t-statistic	3.749						-0.908
		Sig.	0.000						0.364
6	UC	B	0.157	0.000			0.000	-0.008	-0.002
		Std. Error	0.041	0.001			0.000	0.002	0.002
	SC	B		0.004			0.012	-0.046	-0.009
		t-statistic	3.827	0.456			1.303	-4.944	-0.942
		Sig.	0.000	0.649			0.193	0.000	0.346
7	UC	B	0.120	0.000	-0.168	0.123	0.001		0.000
		Std. Error	0.042	0.001	0.034	0.019	0.000		0.002
	SC	B		0.005	-0.564	0.061	0.574		0.000
		t-statistic	2.847	0.561	-4.940	6.356	5.032		-0.038
		Sig.	0.004	0.575	0.000	0.000	0.000		0.970
8	UC	B	0.097	0.000	0.003	0.143		-0.008	0.001
		Std. Error	0.042	0.001	0.003	0.019		0.002	0.002
	SC	B		0.003	0.009	0.071		-0.045	0.003
		t-statistic	2.336	0.355	0.928	7.542		-4.896	0.316
		Sig.	0.020	0.723	0.353	0.000		0.000	0.752

Table 6

Summary of all partial first-order correlations

	BM/E	E/P+	DE/P	DY	WASG	SIZE
BM/E	1.000	0.004	0.025	0.000	0.001	-0.076
	p.=0.000	*p.=0.6772*	*p.=0.0064*	*p.=0.9629*	*p.=0.9325*	*p.=0.0000*
E/P+	0.004	1.000	-0.017	0.997	0.001	-0.018
	p.=0.6772	*p.=0.000*	*p.=0.0663*	*p.=0.000*	*p.=0.8742*	*p.=0.0523*
DE/P	0.025	-0.017	1.000	-0.001	-0.002	-0.167
	p.=0.0064	*p.=0.0663*	*p.=0.000*	*p.=0.9199*	*p.=0.8352*	*p.=0.000*
DY	0.000	0.997	-0.001	1.000	0.000	-0.013
	p.=0.9629	*p.=0.000*	*p.=0.9199*	*p.=0.000*	*p.=0.9579*	*p.=0.1520*
WASG	0.001	0.001	-0.002	0.000	1.000	-0.018
	p.=0.9325	*p.=0.8742*	*p.=0.8352*	*p.=0.9579*	*p.=0.000*	*p.=0.0498*
SIZE	-0.076	-0.018	-0.167	-0.013	-0.018	1.000
	p.=0.0000	*p.=0.0523*	*p.=0.000*	*p.=0.1520*	*p.=0.0498*	*p.=0.000*

Table 7

ANOVA and Coefficients table / t-test statistics for AHPR, 1988-2002

ANOVA					COEFFICIENTS					
Dependent Variable: AHPR 1 (F=0.95) / Predictors: (INTERCEPT), DE/P, WASG										
						UC		SC		
	Sum of Squares	Mean Sq.	F	Sig.	Predictor	B	Std. Error	Beta	t	Sig.
Regression	17.934	8.967	41.024	0.000	Intercept	0.111	0.005		24.635	0.000
Residual	2533.385	0.219			DE/P	0.142	0.019	0.070	7.592	0.000
					WASG	-0.008	0.002	-0.045	-4.902	0.000
Dependent Variable: AHPR2 (F=0.95) / Predictors: (INTERCEPT), DE/P, WASG										
						UC		SC		
	Sum of Squares	Mean Sq.	F	Sig.	Predictor	B	Std. Error	Beta	t	Sig.
Regression	36.638	18.319	33.008	0.000	Intercept	0.210	0.007		29.229	0.000
Residual	6432.395	0.555			DE/P	0.193	0.030	0.060	6.478	0.000
					WASG	-0.012	0.003	-0.045	-4.870	0.000

Dependent Variable: AHPR3 (F=0.95) / Predictors: (INTERCEPT), DE/P, WASG										
						UC		SC		
	Sum of Squares	Mean Sq.	F	Sig.	Predictor	B	Std. Error	Beta	t	Sig.
Regression	37.011	2.000	18.506	27.906	Intercept	0.264	0.008		33.575	0.000
Residual	7685.923	11590.000	0.663		DE/P	0.193	0.033	0.055	5.932	0.000
					WASG	-0.012	0.003	-0.042	-4.511	0.000

Dependent Variable: AHPR4 (F=0.95) / Predictors: (INTERCEPT), WASG, DE/P										
						UC		SC		
	Sum of Squares	Mean Sq.	F	Sig.	Predictor	B	Std. Error	Beta	t	Sig.
Regression	54.271	27.136	12.254	0.000	Intercept	0.510	0.014		35.520	0.000
Residual	25665.124	2.214			WASG	-0.018	0.005	-0.033	-3.545	0.000
					DE/P	0.204	0.059	0.032	3.438	0.001
Dependent Variable: AHPR5 (F=0.95) / Predictors: (INTERCEPT), WASG, DE/P										
						UC		SC		
	Sum of Squares	Mean Sq.	F	Sig.	Predictor	B	Std. Error	Beta	t	Sig.
Regression	62.249	31.124	9.145	0.000	Intercept	0.646	0.018		36.337	0.000
Residual	39445.882	3.403			WASG	-0.020	0.006	-0.030	-3.188	0.001
					DE/P	0.209	0.074	0.026	2.834	0.005

Note: $AHPR_{1,2,\ldots,5}$ is the average holding period returns after portfolio formation, WASG is the weighted average sales growth ratio, DE/P is a dummy variable used in order to separate all companies with negative earning.

Summary and Conclusions

We examine the degree to which value investing can generate superior returns in the UK stock market using unbiased data from the new *UKED* data set. Following the existing literature on the value effect (Fama and French, 1992; Lakonishok, Shleifer and Vishny, 1994; Gregory, Harris and Michou, 2001) we classify stocks as value or growth on the basis of four accounting ratios, B/ME, E/P, DY and WASG. These accounting ratios are regarded as direct and indirect measures of investors' expectations (Lakonishok, Shleifer and Vishny, 1994). After computing both equally weighted and value weighted portfolios we find evidence of a positive value premium in three out of the four classification methodologies. However, this premium was economically marginal and statistically insignificant for all except the WASG classification.

The results for value-weighted returns are more suitable for comparison with previous UK studies. Most UK research has tended to use value-weighted returns to compensate for the poor liquidity in small capitalization stocks in the UK stock market. However, reporting the results for equal-weighted returns assists comparison with US studies. Furthermore, from the viewpoint of applications, the results for equally weighted returns are useful in determining the returns achievable on a long-term bottom-up value investment strategy, while value weighted returns are more informative for applications to top-down strategies.

The results overall are generally supportive of market efficiency. One explanation of our results is that the value effect is caused, at least in part by methodological biases in previous research. The second is that the value premium in the UK has simply disappeared during the 1990s. Both of these explanations are consistent with semistrong market efficiency.

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