Testing Benjamin Graham's Net Current Asset Value Strategy in London

Ying Xiao and Glen Arnold

Centre for Economics and Finance Research
Salford Business School
University of Salford
Salford
Manchester
M5 4WT, UK

e-mail: y.xiao@pgr.salford.ac.uk
      G.C.Arnold@salford.ac.uk

31 January 2007

Testing Benjamin Graham's Net Current Asset Value Strategy in London

Ying Xiao and Glen Arnold

*Centre for Economics and Finance Research, Salford Business School,
University of Salford, Salford, Manchester, M5 4WT, UK.*

Abstract

It is widely recognized that value strategies - those that invest in stocks with low market values relative to measures of their fundamentals (e.g. low prices relative to earnings, dividends, book assets and cash flows) - tend to show higher returns. In this paper we focus on the early value metric devised and employed by Benjamin Graham - net current asset value to market value (NCAV/MV) - to see if it is still useful in the modern context. Examining stocks listed on the London Stock Exchange for the period 1981 to 2005 we observe that those with an NCAV/MV greater than 1.5 display significantly positive market-adjusted returns (annualized return up to 19.7% per year) over five holding years. We allow for the possibility that the phenomenon being observed is due to the additional return experienced on smaller companies (the 'size effect') and still find an NCAV/MV premium. The profitability of this NCAV/MV strategy in the UK cannot be explained using Capital Asset Pricing Model (CAPM). Further, Fama and French's three-factor model (FF3M) can not explain the abnormal return of the NCAV/MV strategy. These premiums might be due to irrational pricing.

Key words: Market efficiency; Net asset value; Benjamin Graham.

The interpretation of the excess returns to value strategies is controversial and has been explained in two ways. First, the excess return associated with value stocks is due to the propensity of value portfolios to be disproportionately small firms, and so what is really being observed is a low market capitalisation effect. Second, value strategies are fundamentally riskier. For example, Fama and French (1993, 1996) created their three-factor pricing model (market factor, small minus big size factor and high minus low book-to-market factor) in an attempt to provide a risk compensation explanation of value premiums. However, many other researchers, particularly behavioural finance adherents, dispute whether the FF3M really measures risk induced equity return premiums. According to this view high returns to small companies and high returns to low market-to-book ratio companies are caused by investors being less than completely rational, leading to neglected, under-researched stocks and temporary under-pricing, followed by a convergence to intrinsic value.

Amongst the array of value strategies the net current asset value (NCAV/MV) approach has been successfully used in practice, most famously by Benjamin Graham in the early twentieth century, bringing high profits from the 1930s to 1956. There have been very few studies examining the NCAV/MV strategy. Graham's NCAV/MV strategy calls for the purchase of stocks at a price 2/3 or less of the NCAV. Per share NCAV, as defined by Graham (Graham and Dodd (1934), Graham (1976)), is the balance sheet current assets minus all the firm's (current and long-term) liabilities divided by the number of shares outstanding. Long-term assets (e.g. intangible assets and fixed assets) values are not counted. Graham found that companies satisfying the NCAV/MV strategy were often priced at significant discounts to estimates of the value that stockholders could receive in an actual sale or liquidation of the entire corporation. Thus, the NCAV/MV rule, in theory, not only protects capital from significant permanent loss but also generates a portfolio of stocks with excellent prospects for advance in price.

> 'It is clear that these issues were selling at a price well below the value of the enterprise as a private business. No proprietor or majority holder would think of selling what he owned at so ridiculously low a figure…In various ways practically all these bargain issues turned out to be profitable and the average annual result proved much more remunerative than most other investments' Graham (2003).

An adherent to the efficient markets hypothesis would advance the argument that investors rationally push down a stock's price to below NCAV in anticipation of the corporation continuing to invest its resources in wasteful ways, gradually draining the company of much of its shareholder wealth. However, Graham reasoned that the majority of these value stocks will survive and produce good returns because of the potential for one of a number of developments to occur preventing management from continuing on a path of value destruction through the gradual dissipation of assets:

- Earning power would be lifted to the point where it was commensurate with the company's asset level. This could come about in two ways: a general improvement in the industry – entry and exit dynamics mean that low industry profitability is frequently not as persistent as many market pessimists believe - and; a change in the company's operating policies – management running a company with such a low stock price relative to assets either respond voluntarily to take corrective action or they (or their replacements) are forced to by stockholders, such as adopting more efficient methods or abandonment of unprofitable lines.
- A sale or merger with another corporation that could employ the firm's assets would take place. It would pay at least the liquidation value.
- Complete or partial liquidation could release value. The management of a corporation selling at below liquidation value need to provide a frank justification for continuing to operate.

Graham used the NCAV/MV criterion extensively in the operations of the Graham-Newman Corporation and report that shares selected on the basis of the NCAV/MV rule earn, on average, about 20percent per year over the 30-year period to 1956 (Graham and

Chatman (1996)). More recently, Oppenheimer (1986) tested returns of NCAV/MV portfolios with returns on both the NYSE-AMEX value-weighted index and the small-firm index from 1971 through 1983. He found that returns are rank-ordered: securities with the smallest purchase price as a percentage of NCAV show the largest returns. Over the 13-year period, the Graham criteria NCAV/MV portfolios on average outperformed the NYSE-AMEX index by 1.46percent per month (19 percent per year) after adjusting for risk. When compared to the small-firm index, these portfolios earned an excess return of 0.67% per month (8 percent per year). In the first study outside of the USA, Bildersee, Cheh and Zutshi (1993)'s paper focuses on the Japanese market from 1975 to 1988. In order to maintain a sample large enough for cross-sectional analysis, Graham's criterion was relaxed so that firms are required to merely have an NCAV/MV ratio greater than zero. They found the mean market-adjusted return of the aggregate portfolio is around 1 percent per month (13 percent per year).

The objective of this paper is to study NCAV/MV strategy in London since we are not aware of any work done on the UK market.

The Study

The research period is from January 1980 to December 2005 (company data prior to 1980 is unreliable and incomplete Nagel (2001)). Two databases are used: monthly return data and general information is from the London Share Price Database (LSPD), and; annual accounting data is from Datastream. In order to calculate NCAV, current assets, current liabilities, long-term debt and preferred stock are downloaded from balance sheet entries on Datastream[i].

Because of potential problems defining accounting variables and equity capitalisation, we exclude companies with more than one class of ordinary share and foreign companies. Also excluded are companies on the lightly regulated markets and companies belong to the financial sector. We include companies that have been de-listed from the exchange due to merger, liquidation or any other reason in the holding period, thus avoiding survivorship bias. Returns for each company, including dividends, are adjusted for changes in stock splits, rights issues and stock repurchases. The total number of companies in the full sample is 2438, which covers 90 percent of all corporations in LSPD (i.e. 90 percent of the London main market), and the number in the market index is 3086 (this includes financial companies). The average number of companies at the 20 portfolio formation dates is 1109.

Portfolios of stocks are formed annually in July. To be included in the sample for year t, firms must have data for NCAV in December of t-1, and at least one return observation in the post-formation period. The six-month lag between the measurement of NCAV and return data allows for the delay in publication of individual companies' accounts, thus ensuring that the financial statements are public information before the returns are recorded. Only those stocks with NCAV/MV higher than 1.5 are included in the NCAV/MV portfolios. Buy-and-hold portfolios held for one, two, three, four or five years are constructed; the first formation is in July 1981 and the last formation is in July 2000. The numbers of companies fulfilling Graham's NCAV/MV criteria are listed in table 1. Clearly, a potential difficulty in this area of

research is the low number of firms that can be included in the portfolios in recent times. However, in this work there are a sufficient number to provide meaningful results overall.

Results

Within each of portfolios stocks are first weighted equally and then value weighted (which means that each stock is weighted in proportion to its market capitalisation at the date of portfolio formation). To examine the sensitivity of the results to the choice of a market index, firstly, the results are presented using an equally weighted market index, then they are presented with a value-weighted index. The market index, used to adjust returns, comprises all of companies in Official list. Panel A of table 2 presents raw returns, together with the market index returns. Panel B shows the market-adjusted returns together with tests of statistical significance.

We find that Graham's NCAV/MV stocks substantially outperform the stock market over holding periods of up to five years. The average 60-month buy-and-hold raw return is 254 percent with equal weighting within the NCAV/MV portfolio and 216 percent with value weighting, which are much higher than market indices of only 137 percent and 108 percent. One million pounds invested in a series of NCAV/MV (equal weighted) portfolios starting on 1st July 1981 would have increased to £432 million by June 2005 based on the typical NCAV/MV returns over the study period. By comparison £1,000,000 invested in the entire UK main market would have increased to £34 million by end of June 2005.

For almost all post-formation lengths, and regardless of within portfolio weighting, the NCAV/MV portfolio outperforms either equal weighted or value weighted market indices with high statistical significance. Market-adjusted returns rise to 117 percent and 146 percent after five years if the stocks are equally weighted; and 78 percent and 108 percent after five years if the stocks are value weighted. Inspection of table 2 clearly shows that there are substantial benefits from selecting high NCAV/MV stocks.

Risk analysis

If NCAV/MV stocks bear risk, their average returns may be simply compensation for this. We examine risk from a number of perspectives:

- Consistency
  If the NCAV/MV strategy performs badly against the market index regularly then the investor may be faced with a form of risk that may be unacceptable. Table 3 shows the number NCAV/MV portfolios (out of 20) that failed to pay-off (compared with an investment in the market). We find that in only 20 percent -25 percent of cases (4 or 5 out of 20 years) do the NCAV/MV portfolios under perform the market index over the five-year holding period. Few of the formations under-perform the market in the 1980s: if equal weighting is used in portfolio formation and benchmark construction, the NCAV/MV strategy consistently outperforms the market for 8 of 10 years. This would have looked a good strategy if the

investor had downside constraints. The results for the 1990s are not quiet so encouraging, but, at least when equal weights are given to NCAV/MV stocks outperform on most occasions. We conclude, therefore, the strategy is fairly, but not completely, reliable.

● Deletions and liquidations

Another concern for investors is the likelihood of liquidation. Table 4 presents average percentage of stocks remaining during the test period and the cause of deletions. Panel A shows that a higher percentage of NCAV/MV companies remain on the market after five years than is the case for companies generally. The removal rate of the NCAV/MV portfolio is 26.82 percent while for the market index it is 31.57 percent for 60-month holding periods. The reason for removal from the portfolio is important because, for example, mergers have a different impact on portfolio than liquidations. A higher liquidation rate provides a significant downward push to portfolio test period performance. Panel B shows that within 60 months 2.6 percent of the NCAV portfolio on average failed (deleted due to liquidation) compared with 4.2 percent of the companies in the market index. This evidence does not support a risk-based explanation for the out-performance of NCAV/MV stocks, based on distress (Fama and French (1996) refer to financial distress risk).

● Beta and standard deviation

We also conducted risk analyses based on traditional beta and standard deviation calculations. The test for CAPM-beta risk does not provide support for the view that the NCAV/MV strategy is fundamentally riskier – see table 5. The intercepts of regressions (alpha-'a') are positive with statistical significance in the whole period and the betas ('b') are relatively low up to five years postformation. For example, the average beta of NCAV/MV portfolios for 20 formations is only 0.507 if buy-and-hold for first 12 months regressions. CAPM provides low explanatory power of the time series variation in returns for NCAV/MV portfolios because R^2 is very low (less than 20 percent) for the holding periods. The standard deviations of monthly returns for NCAV/MV portfolios are slightly higher than the market, but we need to consider the fact that these portfolios contain a small number of companies and so would be expected to exhibit greater volatility.

The size effect

Firm size has been shown to be inversely related to future returns. If NCAV/MV stocks are generally small companies the size effect may explain their extra returns.
To construct table 6, at each formation date, 1981-2000, all London listed UK shares in the sample are sorted according to size and allocated to one of ten portfolios. Separately, stocks are allocated to an NCAV/MV portfolio if their ratio is higher than 1.5. The numbers shown are the percentage of the average NCAV/MV portfolio falling into each size decile. For Benjamin Graham's NCAV/MV portfolio, nearly 79 percent number of companies are very small (belong to size 1 and size 2). The size effect may therefore be causing the abnormal performance of the NCAV/MV strategy.

Table 7 confirms the presence of a size effect over the study period. It records the value

weighted returns for all main market London shares after sorting by market capitalisation 1981 – 2005[ii]. The raw return for the smallest size portfolio is 209 percent over 60 months, while that for the largest is only 105 percent. The results are consistent with Levis (1989) and show that there is a strong size effect in the UK stock market.

To investigate the relationship between the NCAV/MV effect and the small firm effect, we use size-control portfolios. To generate these we first select shares that qualify by Benjamin Graham's criteria. Then for each NCAV/MV portfolio in each year we observe the size of each company. This provides a profile for each NCAV/MV portfolio in terms of the distribution of the component shares with respect to size deciles. Once the size profile of an NCAV/MV portfolio is known, the returns over the subsequent 1 to 5 years is calculated on the assumption that return is due only to size-decile make up of the portfolio. Size-control portfolios are constructed to have the same size composition as the corresponding NCAV/MV portfolio. The size-adjusted return of an NCAV/MV portfolio is computed as the average raw return on the portfolio (value weighting of shares within portfolios) minus the average return on the value weighted size-control portfolio. (The results of equal weighting are similar to value weighted returns.) This procedure is carried out for each of the portfolio formations and the reported numbers are averages over 20 test periods.

Controlling for size reduces the return premium of NCAV/MV portfolios considerably for all holding periods (see table 8). The five year size-adjusted return of NCAV/MV stocks reduce to 71 percent compared to 108 percent market-adjusted returns (as shown in table 2). For holding periods of one, two and three years we find evidence that it is possible that the NCAV/MV effect is subsumed within the size effect (given the poor statistical significance of the size-adjusted returns). However, with the four and five holding periods we can observe statistical significance at the 95 percent level. Then the abnormal buy-and-hold performance controlled by size is 50 percent for four years and 71 percent for five years. Thus even after allowing for size effects in returns, there is an average NCAV/MV premium of 11.3 percent per annum for five years holding. The size effect does not fully explain the abnormal return of the NCAV strategy.

Using Fama and French's three factor model

We now ask whether the differences in the returns of NCAV/MV portfolios can be explained by the loadings that these portfolios have on the three common factors identified by Fama and French (1993), namely the market factor, and the mimicking portfolios for the book-to-market and size factors. Fama and French (1993) argued that if assets are priced rationally, variables that are related to average returns, such as size and book-to-market equity, must proxy for sensitivity to risk factors in returns. The FF3M factors serve as independent variables in the following regression:

$$R_{it} - R_{ft} = a_i + b_i(R_{Mt} - R_{ft}) + s_i SMB + h_i HML + e_{it}$$

The market factor (R_{Mt}-R_{ft}) is the equity market premium and is defined as the monthly

return of the average of all London main market companies minus the monthly Treasury bill rate. Following Gregory, Harris and Michou (2001), the mimicking portfolios for the size and book-to-market factors are constructed. At the end of June each year t from 1981 to 2000, stocks are allocated into two groups, small (S) and big (B) by the median of the largest 350 companies in the sample[iii]. Stocks are also allocated in an independent sort to three book-to-market groups, low (L), medium (M) or high (H). These groups reflect the breakpoints for the bottom 30 percent, middle 40 percent, and top 30 percent of the values of BM recorded for the largest 350 companies at the end of year t-1. Six size-BM portfolios (S/L, S/M, S/H, B/L, B/M, B/H) are created from the intersections of the two size and three BM groupings. Monthly value weighted returns for the portfolios are calculated for 12 months from July of year t to June of year t+1. In respect of the size factor, the small-minus-big (SMB) return is defined as the difference each month between the average of the returns on the three small portfolios (S/L, S/M, S/H) and the average of the returns on the three big-stock portfolios (B/L, B/M, B/H). In relation to the book-to-market factor, the high-minus-low (HML) return is defined as the difference between the average of the returns on the two high BM portfolios (S/H, B/H) and the average of the returns on the two low BM portfolio (S/L, B/L).

Fama and French (1993, 1996) estimate three-factor models for portfolios by regressing excess returns for each portfolio on the excess market return and the returns to the most recently formed HML and SMB portfolios up to 12 months. In respect of each portfolio, we estimate five separate regression models corresponding to each of the post-formation years. Using Gregory, Harris and Michou (2001)'s method, for the one year horizon, we regress monthly excess returns on the portfolio for July of year t to June of year t+1 on the contemporaneous excess market return and the returns to the HML and SMB portfolios formed in December of year t-1 and June of year t respectively. The one-year horizon regression is estimated using the 240 monthly returns for the period July 1981 to June 2000. For the second test period year, we regress monthly excess return on the portfolio thirteen months to twenty-four months after portfolio formation on the contemporaneous excess return on the market factor and on the HML and SMB portfolios formed in the first test period year. The method used for three-, four- and five-year horizons is analogous.

The slopes and R^2 value show whether mimicking portfolios for risk factors related to size and B/M capture shared variation in stock returns not explained by other factors. And the estimated intercepts provide a simple return metric and a formal test of how well different combinations of the factors capture the cross-section of average returns. The results (shown in table 9) display intercepts, 'a', that are significantly different from zero for each of the first five years following portfolio formation. Further, low figures of R^2 (less than 35 percent for all years) represent a market factor and proxies for risk factors related to size and B/M seem not to explain NCAV/MV stock returns well, i.e. SMB, HML and the market premium do not capture the variation in NCAV stock returns. Fama and French claim that these factors represent risk premium demanded by investors, but this is much disputed (see Lakonishok, Shleifer and Vishny (1994), Daniel and Titman (1997)) who are prepared to accept market inefficiency due to investor error.

Conclusion

Graham defined a bargain issue as one which appears to be worth considerably more than it is selling for. He suggested that an issue is not a true "bargain" unless the indicated value is at least 50 percent more than the price. The type of bargain issue that can be most readily identified is a stock that sells for less than the company's net working capital alone, after deducting all prior obligations. We find evidence that buying stocks in companies with a per share net current asset value greater than 1½ times the current share price has produced returns superior to those of the market. Although the NCAV strategy exhibits a small firm effect, when we delve deeper into the out performance we find that the phenomenon is not fully explained by the fact that these types of stocks tend to be smaller companies and exhibit high book-to-market ratios.

References

Bildersee, J. B., Cheh, J. J. and Zutshi, A. (1993). "The performance of Japanese common stocks in relation to their net current asset values." Japan and the World Economy 5: 197-215.

Daniel, K. and Titman, S. (1997). "Evidence on the characteristics of cross-section variation in stock returns." Journal of Finance 52(1-33).

Fama, E. F. and French, K. R. (1993). "Common risk factors in returns on stocks and bonds." Journal of Financial Economics 33: 3-56.

Graham, B. (1976). "A conversation with Benjamin Graham." Financial Analyst Journal Sep./Oct.

Graham, B. (2003). The intelligent investor, New York: HarperCollins World.

Graham, B. and Chatman, S. (1996). Benjamin Graham: The memoirs of the dean of wall street. New York, the McGraw-Hill companies.

Graham, B. and Dodd, D. (1934). Security analysis. New York, McGraw-Hill.

Gregory, A., Harris, R. D. F. and Michou, M. (2001). "An analysis of contrarian investment strategies in the UK." Journal of Business Finance & Accounting 28 (9) & (10)(Nov./Dec.): 1193-1228.

Lakonishok, J., Shleifer, A. and Vishny, R. W. (1994). "Contrarian investment, extrapolation, and risk." The Journal of Finance XLIX(5): 1541-1578.

Levis, M. (1989). "Stock market anomalies a re-assessment based on the UK evidence." The Journal of Banking and Finance 13: 675-696.

Nagel, S. (2001). "Accounting information free of selection bias: A new UK database 1953-1999." working papers London Business School.

Oppenheimer, H. R. (1986). "Ben Graham's net current asset values: a performance update." Financial Analysts Journal: 40-47.

Table 1 Number of companies included in NCAV/MV portfolios at formation date

Year	Number of companies
1981	74
1982	76
1983	57
1984	32
1985	28
1986	18
1987	14
1988	12
1989	10
1990	20
1991	26
1992	25
1993	15
1994	7
1995	9
1996	8
1997	4
1998	7
1999	11
2000	7

Table 2 Raw returns and market-adjusted returns for NCAV/MV portfolios

London Stock Exchange listed UK shares are allocated to NCAV portfolios if their NCAV/MV ratios are higher than 1.5 at the beginning of July 1981 and all subsequent July to 2000. Average raw and market-adjusted returns for shares within a portfolio are calculated for periods of 1,2,3,4 and 5 years post-formation. The market indices include all listed shares except investment trusts and overseas companies. All numbers presented are averages over the 20 test periods computed for corresponding portfolios. One sample t-tests based on annually excess returns over the market are shown.

Panel A. Average raw buy-and-hold test period returns

	Months after portfolio formation				
	12	24	36	48	60
Equally weighted NCAV/MV return	0.3119	0.7511	1.2627	1.9162	2.5402
Equally weighted market index return	0.2051	0.4598	0.7328	1.0497	1.3718
Value weighted NCAV/MV return	0.2661	0.6065	1.0084	1.6448	2.1564
Value weighted market index return	0.1707	0.3662	0.5671	0.8057	1.0803

Panel B. Average market-adjusted buy-and-hold test period returns

	Months after portfolio formation				
	12	24	36	48	60
Portfolio equal weights, index equal weights	**0.1068**	**0.2913**	**0.5299**	**0.8665**	**1.1684**
t-test	3.10	3.51	3.61	3.58	3.46
p-value	0.006	0.002	0.002	0.002	0.003
Portfolio equal weights, index value weights	**0.1412**	**0.3849**	**0.6956**	**1.1105**	**1.4598**
t-test	2.65	3.47	3.98	3.76	3.79
p-value	0.016	0.003	0.001	0.001	0.001
Portfolio value weights, index equal weights	**0.0610**	**0.1467**	**0.2756**	**0.5951**	**0.7846**
t-test	1.15	1.70	2.26	2.78	3.03
p-value	0.263	0.105	0.036	0.012	0.007
Portfolio value weights, index value weights	**0.0954**	**0.2403**	**0.4413**	**0.8391**	**1.0760**
t-test	1.63	2.41	2.96	2.91	3.35
p-value	0.119	0.026	0.008	0.009	0.003

Note: a figure of 0.1068 indicates a return of 10.68%

Table 3 Number of occasions when the NCAV/MV strategy produces negative market-adjusted returns when portfolios are held for five years

Portfolio weighting	Market index weighting	1981-1990 Out of 10 years	1991-2000 Out of 10 years	1981-2000 Out of 20 years
Equal	Equal	2	2	4
Equal	Value	2	2	4
Value	Equal	2	3	5
Value	Value	1	4	5

Table 4 Average percentage of stocks remaining during the test period and the reason for deletion of companies

Panel A: The percentage of shares remaining after 1,2,3,4 and 5 years averaged for the 20 portfolio formations

	Months after formation					
	0	12	24	36	48	60
NCAV/MV >1.5	100%	96.33%	89.91%	84.14%	78.22%	73.18%
Market index	100%	93.63%	86.79%	80.28%	74.18%	68.43%

Panel B: Percentage of companies deleted (cumulative) due to mergers, liquidations and other reasons.

Li = percentage of companies deleted due to liquidation compared to sample in this portfolio
M = percentage of companies deleted due to being acquired in merger/takeover compared to sample in this portfolio
O = percentage of companies deleted due to other reasons compared to sample in this portfolio

	12-month			24-month			36-month			48-month			60-month		
	M	**Li**	O	M	**Li**	M	M	**Li**	M	M	**Li**	M	M	**Li**	M
NCAV/MV>1.5	2.6	**0.2**	0.9	8.2	**0.6**	1.3	11.6	**1.8**	2.5	15.4	**2.2**	4.2	19.6	**2.6**	4.7
Market index	5.0	0.8	0.5	10.4	1.7	1.1	15.4	2.6	1.7	20.1	3.4	2.3	24.6	4.2	2.9

Table 5 Beta and standard deviation for NCAV/MV portfolios

For the first test period year following portfolio formation we observe the raw returns of the portfolio relative to the Treasury bill rate and the return on a value-weighted market portfolio relative to the Treasury bill rate. The regressions are based on the 12 monthly observations for portfolios, drawing on all 20 portfolio formations. The analysis is repeated for each of the test years. Using the 20 formation periods, we also compute the standard deviation of returns in the 12 months after formation and in each of the test years. R_{ft} is the Treasury bill (30 days) rate at the beginning of the month, t. R_{mt} is the monthly return of the all companies in the sample.

$$R_{it} - R_{ft} = a_i + b_i(R_{Mt} - R_{ft}) + e_{it}$$

	1-12 months	13-24 months	25-36 months	37-48 month	49-60 months
a	0.0122	0.0130	0.0132	0.0111	0.0073
b	0.507	0.634	0.566	0.491	0.597
t(a)	3.39	3.11	2.46	2.59	1.98
t(b)	6.62	6.93	5.00	5.37	7.55
R^2	15.5%	16.8%	9.5%	10.8%	19.3%
St de (NCAV/MV)	0.0600	0.0703	0.0869	0.0696	0.0625
St de (market)	0.0466	0.0454	0.0474	0.0465	0.0460

Table 6 Percentage of firms within the NCAV/MV portfolios falling in size deciles

	Size1(smallest)	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7	Size 8	Size 9	Size 10 (biggest)
NCAV/MV>1.5	63.23%	15.43%	7.31%	4.03%	3.81%	1.20%	2.66%	2.25%	0.07%	0.00%

Table 7 Returns for Official list companies following allocation to size deciles

London Stock Exchange listed UK shares are ranked and assigned to deciles annually on the basis of their market capitalizations from end June 1981 and all subsequent Junes to 2000. Starting at the beginning of July each year 1981 to 2000 average raw returns for shares within a value-weighted deciles portfolio are calculated for periods of 1, 2, 3, 4 and 5 years post-formation. The returns in the ranking period are raw returns with no market adjustment. All numbers presented are averages over the 20 test periods computed for corresponding portfolios.

	12-month	24-month	36-month	48-month	60-month
Size 1 (smallest)	0.3060	0.7068	1.1416	1.6663	2.0922
Size 2	0.2481	0.6161	1.0477	1.5382	1.9861
Size 3	0.2154	0.5071	0.8490	1.2092	1.5614
Size 4	0.1929	0.4074	0.6297	0.9125	1.2208
Size 5	0.1951	0.4331	0.6874	0.9578	1.2844
Size 6	0.1726	0.3939	0.6125	0.8640	1.1508
Size 7	0.1624	0.3538	0.5678	0.8052	1.1112
Size 8	0.1653	0.3470	0.5408	0.7660	1.0592
Size 9	0.1633	0.3609	0.5660	0.8119	1.0545
Size 10 (biggest)	0.1717	0.3654	0.5604	0.8006	1.0736

Table 8 Average test period returns for NCAV/MV portfolio, size control portfolios and size-adjusted returns

London Stock Exchange listed UK shares are allocated to NCAV portfolios if their NCAV/MV ratios is higher than 1.5. Average raw returns with value weighting for shares within NCAV/MV portfolio are calculated for periods of 1,2,3,4 and 5 years post-formation. In order to compute size-control portfolio, London Stock Exchange listed UK shares are ranked and assigned to deciles annually on the basis of their market capitalizations from end June 1981 and all subsequent Junes to 2000. Average raw returns for shares within a value-weighted deciles portfolio are calculated up to five years. Size-control portfolios are constructed to have the same size composition as the corresponding NCAV/MV portfolio. The size-adjusted return of an NCAV/MV portfolio is computed as the average raw return on the portfolio minus the average return on the value weighted size-control portfolio. One sample t-tests based on annually excess returns over the market are shown under returns.

NCAV/MV Portfolio	Raw returns	Size-control portfolio returns	Size-adjusted returns	t-test	p-value
12-month	0.2661	0.2124	0.0537	1.03	0.315
24- month	0.6065	0.4857	0.1208	1.41	0.175
36- month	1.0084	0.8001	0.2079	1.70	0.106
48- month	1.6448	1.1424	0.5024	2.37	0.028
60- month	2.1564	1.4459	0.7105	2.89	0.009

Table 9 Three-factor regressions for monthly excess returns for portfolios

$$R_{it} - R_{ft} = a_i + b_i(R_{Mt} - R_{ft}) + s_i SMB + h_i HML + e_{it}$$

R_{ft} is the monthly Treasury bill rate. R_{Mt} is the monthly return of all London Stock Exchange listed UK shares. One-sample t-tests for each coefficient provided in t( ). The construction of SMB and HML is explained in the main text.

	1-year	2-year	3-year	4-year	5-year
a	0.0080	0.0070	0.0087	0.0099	0.0061
b	0.546	0.658	0.541	0.538	0.569
s	0.543	0.439	0.398	0.404	0.520
h	0.287	0.318	0.397	0.345	0.556
t(a)	2.1	2.3	2.32	2.63	1.83
t(b)	6.68	9.97	6.82	6.72	8.31
t(s)	4.29	4.31	3.11	3.16	4.59
t(h)	2.45	3.26	3.32	2.84	4.65
R^2	19.7%	32.7%	19.4%	18.8%	30.0%

---

[i] Cross-reference lists of LSPD company numbers and Datastream codes to SEDOL numbers provide a starting point of matching two databases. Then LSPD and Datastream are matched using time series unadjusted stock prices. To check the matching, company name, base date, end date, previous name and date of last name change are also used.

[ii] We also tried equal weighting for size effect (and FF3M) in the UK market and found similar results to value weighting.

[iii] The use of the largest 350 companies rather than the whole sample to define the breakpoint for the size split reduces the imbalance on the market capitalization of small and large groups. This is consistent with Gregory, Harris and Michou (2001) and Levis and Liodakis (1999).