The record on small companies: A review of the evidence

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Tel: +44 (0)20 7477 8635; Fax: +44 (0)20 74778648; e-mail: M.Levis@city.ac.uk

Abstract It is now exactly 20 years since the publication of the two pioneering papers — Banz, R. (1981) 'The Relationship between Return and Market Value of Common Stock', *Journal of Financial Economics*, 9, 3–18, and Reinganum, M. (1981) 'Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market Values', *Journal of Financial Economics*, 9, 19–46 — on the performance of small capitalisation companies. The discovery of the so-called 'small size effect' generated a lively debate on market efficiency and asset pricing and led to a considerable amount of further research that shed light on the nature and market behaviour of this important asset class. The purpose of this paper is to review the empirical evidence on small companies with particular emphasis on the implications relevant to practising fund managers. The weight of the evidence suggests that conventional risk measures (betas) fail to reflect the inherent risks of small firms. Such firms are, however, riskier in terms of higher mortality, lower liquidity, higher short-term borrowings and higher volatility of earnings. The evidence also suggests that the outperformance of small cap stocks, even at the pinnacle of its manifestation, was driven by a relatively limited number of such stocks. Such good performers possess a number of key characteristics. They have lower than average market-to-book and price-earnings ratings, and their market value is higher than the average capitalisation of the small cap sector; they have been listed in the market for longer than a year and have not raised additional equity capital in the last year. They have reasonably stable earnings growth profile, do not belong to sectors with excessive swings in analyst forecasts and current ratings do not depend on hugely over-optimistic analyst forecasts.

Keywords: *performance; size effect; small companies*

Introduction

Small cap stocks, in terms of market value, have a long-established tradition in the investment community as an important and distinct asset class. They have always attracted the following of expert analysts and have formed the basis of specialist funds. Interest in small firms exploded in the early 1980s, when a series of academic papers documented a significant long-run return differential between large and small capitalisation stocks. Small companies continue to attract wide investment interest in spite

of their dramatic performance reversal in recent years. Although they make up only a small proportion of the total market capitalisation, in terms of numbers they constitute a large and vital segment of the market.

From the academic viewpoint, the evidence on small cap outperformance provided a direct challenge to the broad concept of market efficiency and conventional asset pricing models. At the beginning, the bulk of the research endeavour was to document the 'anomaly' and test its robustness under various methodologies and independent datasets. This effort has provided considerable insights into some aspects of small firms' behaviour, and in the process discovered a number of other intriguing empirical irregularities.[1] Nevertheless, it is fair to say that, after almost 20 years of its discovery, the underlying logic and sometimes the practical significance[2] of the so-called 'size effect' still remains a matter of debate. We have, however, gained considerable insights into the pricing of financial assets, the operating characteristics of small companies and the special risk characteristics of such firms. It could be argued that the discovery of the small size effect represents a turning point in the direction of academic thinking on asset pricing.

The purpose of this paper is to review the empirical evidence on small companies. It aims to establish the key facts about the characteristics of this asset class rather than to rehearse old explanations for the small size effect.[3] More specifically, this paper's emphasis is on aspects of small companies' behaviour that appear well substantiated by empirical evidence and have practical implications to practising fund managers. Although the review is based on both the USA and the UK evidence, the emphasis is inevitably on the latter. Given the paucity of studies for the London market, it relies heavily on the author's own published and previously unpublished research.

The performance of small caps

Since the initial discovery of the size effect in the USA by Banz (1981) and Reinganum (1981), a stream of other studies documented broadly similar results for a number of other countries as well. Hawawini and Keim (1999) provide a comprehensive review of the international evidence. Levis (1985) published the first detailed study on the performance of small companies for the London market. The study documents an average 6.5 per cent annual raw premium for the smaller decile of UK firms during the period January 1958 to December 1982; it is based on a sample ranging from around 1,500 in the late 1950s to 2,400 in the mid-1970s. In line with the US evidence, the size premium is consistent across the whole spectrum of market size deciles, suggesting that a significant, albeit lower, size premium could be achieved at levels of market capitalisation more amenable to fund managers' requirements.

This study attracted considerable media[4] attention which eventually led to the 1987 launch of the Hoare Govett Smaller Companies (HGSC), the Hoare Govett 1000 (HG1000) and the FTSE Small Companies indices. The HGSC index is value weighted and defines small companies as the bottom 10 per cent of the London market according to market capitalisation. The index is broadly equivalent to the weighted average of the first nine deciles classification in the Levis (1995) study. It covers an average of about 1,600 companies with a maximum market capitalisation of about £500m. At the same time, the largest company in the HG 1000 index is usually about £100m. The definition of

a small firm has also shifted in recent years. A survey reveals that 63 per cent of investment managers now include businesses with a market capitalisation of more than £350m in their definition of a small company; the proportion of fund managers taking this view has doubled during the past year.[5]

The HGSC index shows a premium of 6.3 per cent over the FTSE All Share for the period 1955–88 but it records a dramatic reversal of small companies' performance in more recent years. Thus, the average return differential for the period 1955–2000 has declined to a mere 3.6 per cent per annum. The turning point for small companies' performance in the UK appears to be in the third quarter of 1988. Before then, small companies enjoyed six consecutive years of strong outperformance. With the exception of the 1957–64 period, this was indeed the longest spell of small company supremacy. Sometimes it is argued that the small company premium disappeared, both in the USA and in the UK, as soon as it became widely publicised. This is a far-fetched interpretation of causality. It is important to note that, at the time of the size effect reversal, the UK economy was undergoing some significant changes. For the record, four key developments can be noted. First, the FTA index lost 5.24 per cent of its value during the single month of August 1988. Secondly, this same month was the first time for a long period that the market witnessed an inverted term structure in interest rates. Treasury bill rates increased from 6.9 per cent in May 1988 to 10.9 in August 1988. Thirdly, in the 12 months to August 1988, the sterling rate strengthened by 6.8 per cent against a basket of main currencies. Fourthly, the CBI business confidence indicator dropped by 67 per cent in the 12 months to August 1988, starting a period of prolonged deterioration in business confidence across the UK manufacturing industry.

The international evidence

The size effect has also ceased to exist in the US markets since the mid-1980s. In fact, Siegel (1994) claims that the entire outperformance by small cap stocks from the end of 1926 to 1996 is due to the nine-year period from 1975 through 1983. More recently, Horowitz *et al.* (1998), in an extension of the pioneering Banz and Reinganum studies, find that during the period 1980–96, the average return for the smallest size decile — across NYSE, AMEX and NASDAQ — is 1.33 per cent per month compared with 1.34 per cent per month for the largest decile.[6] Ibbotson (1997) also reports a negative 1.7 per cent annual size premium during the 1980s and a positive premium of just 1.2 per cent in the period 1990–96.

Figure 1 shows the size effect for seven European countries over the period 1988–98.[7] With the exception of France, where small companies outperformed large ones, and Spain, where the performance of small and large companies is almost identical, the other five countries — Germany, Netherlands, Spain, Sweden and Switzerland — had exactly the same experience as the UK in the last decade: large firms performed better than small firms. Thus, it appears that in the 1990s small companies lagged considerably in market performance across almost all major capital markets.[8] This is again in sharp contrast to evidence relating to earlier periods, suggesting a positive size effect. For example, Hawawini and Keim (1999) report positive size premia of about 6–9 per cent per annum for France,

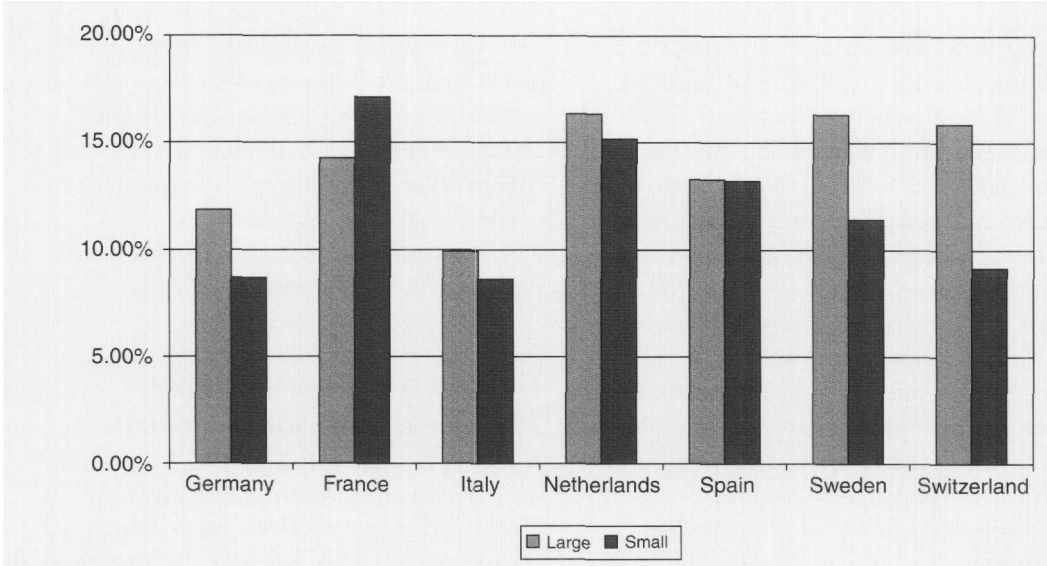

Figure 1 Annual average returns 1988–98

Germany, Spain and Switzerland for long periods before 1989. It is important also to note that in 1998 small companies in Europe generally underperformed their larger counterparts only by a narrow margin. This is in sharp contrast to the disastrous performance recorded by UK small cap stocks.

At this stage two clarification points are in order. The first relates to the robustness of the size effect and its interrelation with other stock characteristics, while the second addresses the definition of firm size. The search for an explanation of the effect revealed a number of other irregularities in asset pricing which appeared not to be completely independent of size. A number of studies, for example, show that the small size effect is concentrated in certain months of the year, while others report that the size spread is related to other stock characteristics. Blume and Stambaugh (1983) and Stoll and Whaley (1983) report a high rank correlation between size and price, while Keim (1988) and Jaffe *et al.* (1989) find similar correlations between size and earnings yield and price-to-book ratios. The main question surrounding these findings is whether these additional effects are independent of or are related to market size. The evidence on this issue is rather controversial. While, for example, Reinganum (1981) and Banz and Breen (1986) argue that the size effect subsumes the PE effect, Basu (1983) maintains quite the opposite, ie size-related anomalies disappear when one controls for the PE effect. Using more recent data covering the period 1962–94, Hawawini and Keim (1999) report pairwise significant correlations between size, E/P, CF/P, P/B and price for NYSE and AMEX stocks. Interestingly, however, the strongest correlation is observed between market size and price (0.78), suggesting that the size effect may be some manifestation of a low price effect.

The evidence for the UK raises even further questions about the robustness of the size effect. Using data for the London Stock Exchange for the period April 1961 to March 1985, Levis (1989a) shows significant differences in risk-adjusted returns for portfolios formed on size, PE, dividend yield and price. It

appears, however, that small firms tend to be firms with low PE ratios and share prices. Hence, when controlling for the possible interactions between the four ranking criteria, it becomes difficult to distinguish among the four effects in general and between size and share price in particular. He concludes that 'the weight of the evidence raises questions about the strength of firm size as an independent determinant of the stock generating process. Its strong dependence with the other firm attributes suggest that it cannot be viewed as either an independent anomaly or a profitable investment strategy on its own' (p. 695).

The second issue relates to the definition of firm size. Although the finance literature almost invariably uses market value as the metric for company size, this is not common practice in other disciplines. The general business literature, for example, tends to define company size using other relevant metrics such as size of assets, volume of sales, book value of assets and number of employees. Berk (1995a) examines the market performance of small firms using various definitions of size. In a sample in which both market value and book-to-market (BM) have a strong cross-sectional relation to average return, he fails to find a similar significant relation between average return and other, non-market, measures of firm size. Thus, although quite often market size is inferred as equivalent to economic size, it is clear that small stocks are different from small firms. Nevertheless, following long-established practice, the terms are used interchangeably in this paper.

These basic observations tend to suggest that the performance of small companies is not isolated from macroeconomic fundamentals, and there is probably a certain cyclicality in the small size premium. These issues are discussed in the following two sections. It is also worth noting that there are some marked differences in the pattern and underlying characteristics of small and large companies. They relate to the risk profiles, underlying fundamentals and market characteristics of small firms. These issues are reviewed in the fourth, fifth and sixth sections.

Time varying performance

The reversal in the fortunes of smaller companies during the period August 1998 to December 1992 and later on from 1995 to the end of 1998 was widespread and dramatic. This was not the first time, however, that smaller companies had gone through a bad spell. Levis (1985) shows noticeable variations in the performance of size decile portfolios during the 1960s and 1970s as well. Such cycles in the size effect are of course not unique to the London market. Reinganum (1992), for example, provides evidence for the period 1926–89 suggesting that the outperformance of smaller firms in the NYSE follow a five-year cycle. He examines the stock returns' behaviour of different size portfolios in period 1926–89 by estimating the autocorrelations of returns over different investment horizons. His results show that, over a one-year horizon, the autocorrelations are positive but not significantly different from zero. The autocorrelations become negative for investment horizons of three-years or longer, peaking in year five. This cyclical pattern of behaviour raises the possibility that the small-firm effect may be driven by economic fundamentals and may be even predictable.

Brown *et al.* (1983) also document considerable variability over time in the performance of small firms. More specifically, it appears that the size effect reverses itself over sustained periods. Fama and French (1988) provide broader and more detailed evidence consistent

Table 1 Autocorrelation of returns

	Return horizon (years)					
	1	2	3	4	5	6
Small	0.217	−0.266	−0.505	−0.573	−0.465	−0.257
	(1.79)	(−1.89)	(−3.89)	(−4.24)	(−1.99)	(−0.68)
Q2	0.098	−0.345	−0.478	−0.510	−0.346	−0.158
	(0.83)	(−2.31)	(−3.65)	(−5.63)	(−2.56)	(−0.73)
Q3	0.085	−0.337	−0.455	−0.475	−0.333	−0.177
	(0.66)	(−2.52)	(−4.14)	(−4.38)	(−2.29)	(−0.95)
Q4	0.002	−0.279	−0.316	−0.344	−0.257	−0.208
	(0.02)	(−2.03)	(−3.32)	(−3.51)	(−1.68)	(−1.08)
Large	−0.067	−0.198	−0.135	−0.174	−0.162	−0.242
	(−0.39)	(−1.49)	(−1.39)	(−2.66)	(−1.11)	(−1.25)
FTA	−0.078	−0.224	−0.101	−0.120	−0.121	−0.261
	(−0.44)	(−1.70)	(−0.91)	(−1.39)	(−0.66)	(−1.06)

Source: Levis and Kalliontzi (1993)

Table 2 Duration of size effect cycles and annualised rates of return for five size portfolios during the cycle

			% Annualised rate of return			
	Months	Cycle	Small	MV2	MV3	Large
May 60–May 62	25	Down	10.5	13.8	12.8	11.5
Jun 62–Mar 64	22	Up	28.6	25.3	17.8	13.0
Apr 64–May 68	50	Down	13.7	14.9	15.1	18.2
Jun 68–Sep 73	64	Up	28.4	20.9	16.9	12.1
Oct 73–Sep 75	24	Down	2.3	−0.8	1.9	9.1
Oct 75–Feb 79	41	Up	54.2	49.6	39.8	28.4
Mar 79–Dec 81	34	Down	19.2	16.5	19.0	20.4
Jan 81–Nov 87	83	Up	40.4	31.0	28.5	26.4
Dec 87–Mar 91	40	Down	2.6	3.8	11.2	17.6

Source: Levis and Kalliontzi (1973)

with the proposition that stock returns are predictable over longer time periods. They test separately various industry returns and size decile portfolios. The estimates for industry portfolios suggest that predictable variation due to mean reversion is about 35 per cent of 3–5-year variances. Returns, however, are more predictable for portfolios of small firms. Predictable variation is estimated to be about 40 per cent of 3–5-year return variances for small-firm portfolios. The equivalent variation falls to around 25 per cent for portfolios of large firms. On the basis of this evidence, they argue that the negative autocorrelations of portfolio returns are largely due to a common macroeconomic phenomenon, and stock returns are related to the business conditions.[9] Poterba and Summers (1988), using an alternative approach that overcomes some of the methodological problems of Fama and French (1988), also find evidence of negative serial correlations over long-term horizons.

To test the mean reversion proposition in the UK context, Table 1 shows slopes in regressions of $r(t,t+12)$ on $r(t-T,t)$ for return horizons from 1 to 6 years, using size quintiles data for the 1956–91 sample period.[10] The slopes are negative for investment horizons of 2–6 years. They peak in the third and fourth year and decline again in years five and six. As in the case of the US, this U-shaped

pattern of regression slopes is particularly pronounced for smaller firms' portfolios.

Table 2 provides descriptive statistics of the size premia during the business cycle in the period 1960–91. The first full cycle covers the period May 1960 to March 1964; the second extends from April 1964 to September 1973, the third from October 1973 to February 1979, while the last full cycle, in the period under consideration in this study, covers the period March 1979 to November 1987. Since then, the downward part of a cycle has been witnessed, which ended in March 1991. The length of a full cycle ranges from 47 months (May 1960 through March 1964) to 117 months (March 1979 through November 1987). The upward half-part of a cycle is always longer than its declining counterpart. The average duration of the down cycle is 34 months, while the equivalent length of the up cycle is 52 months. The irregular length of the small-firm cycle does not lend itself to easy forecasts. This table also reports the annualised rates of return for each of the four size portfolios during each half cycle. The results clearly demonstrate that small companies tend to underperform in economic contractions and outperform during periods of economic expansion.

In spite of the persistent evidence of predictability of long horizon returns, the source of this predictability remains a subject of continuous controversy. Some argue that it is due to some form of irrationality (such as fads, speculative bubbles or noise trading) that forces stock prices to deviate temporarily from their fundamental values and generates negatively autocorrelated and, hence, predictable returns. The irrational type of arguments proposed by Shiller (1984), DeBondt and Thaler (1985 and 1987) and Lakonishok *et al.* (1994) can take a variety of different forms. Although a full discussion of this type of research is outside the scope of this paper, it is worth mentioning that the 'noise trading' story may be of some direct relevance to the size effect. It is argued that small companies, being held predominantly by private investors at least in the US, are more prone to sentiment swings than their larger counterparts. Others maintain that it is a consequence of rational time variation in expected returns as business conditions, investment opportunities and risk aversion change through time. The fact that the variation in expected returns is largely common across assets and is related to business conditions in plausible ways, adds credence to the rational type of explanation.

Small companies and macroeconomic conditions

Modern finance theory suggests that prices of financial assets are determined by the expected changes in future cash flows and the discount rate applied to them. Thus, the observed differences in the returns of different size firms should be related to the different reactions of the cash flows and discount rates for such firms to changes in the economic environment. Such disparate reactions to economic conditions are likely to be due to the differences in the underlying fundamental characteristics of small, medium and large firms.

There is a plethora of anecdotal and *ad hoc* statistical evidence that small companies are more sensitive to hikes in interest rates, changes to monetary policy and recessions in general. Jensen *et al.* (1997, 1998), for example, argue that the relationships between stock returns and firm size varies across monetary periods. The premium for small firms is positive and significant in periods when monetary policy is in an expansive mode, but insignificant or negative in cases when policy is restrictive.[11] Anderson (1997)

also reports that the size premium is positively related to inflation and the term structure of interest rates, while Speidell and Stone (1997) and Levis and Liodakis (1999) find that changes in industrial production lead to small stock returns in all major capital markets.

Chan *et al.* (1985) argue that returns are different because they have different sensitivities to the risk factors determining asset prices.[12] They show that small firms are more exposed to production risk and changes in the risk premium. The significant coefficient for the risk premium factor suggests that smaller firms are more exposed to economic downturns. Thus, firm size proxies for some unmeasured risks not captured by the conventional risk measures.

He and Ng (1994) examine whether size and BM are proxies for risks associated with the Chen *et al.* (1986) macroeconomic factors or are just measures of a stock's sensitivity to relative distress. They find that the macroeconomic risks related to the CRR factors are not able to explain the role of BM in the cross section of average returns on NYSE, AMEX and NASDAQ stocks. Instead, they find that size, BM and relative distress are related. Moreover, their results imply that BM and size do not capture similar risk characteristics important for pricing stocks.

The above studies assume stationarity both in the time series behaviour of the risk coefficients and the equivalent behaviour of risk premiums. Such tests are usually referred to as unconditional tests of asset pricing models because the moments are considered to be independent of any *ex ante* known information. They are generally more popular because they require rather short testing periods, during which betas and risk premia are considered to be time invariant. But unconditional tests of asset pricing models completely ignore the dynamic behaviour of expected returns, which is somewhat inconsistent with the evidence documenting predictable time-variation in returns.

Conditional asset pricing

More recent research has concentrated on the time-series properties of risk premia rather than long-term averages. Conditional asset pricing models are in fact motivated by the empirical evidence reporting the existence of time-series return predictability and by the belief that investors update their expectations using the latest available information in the market. Using this approach, Ferson and Harvey (1991, 1993) and Ferson and Korajczyk (1994) demonstrate that the time variation in expected returns is mostly attributed to changes in risk premia rather than movements in the betas. By averaging the risk premia over time (as done in the unconditional tests), the properties of their dynamic behaviour are missed. Specifically, in some states of the economy, some factors may be rewarded, whereas they may not be priced in some others. Thus, if the risk premium associated with a certain factor is highly volatile, its average may turn out to be statistically insignificant when, in fact, it may be important to explain the cross section of returns in some states of the economy. For example, Ferson and Harvey (1991), using a version of the Fama and MacBeth (1973) methodology, report that the average market risk premium is not statistically significant in a multibeta model. Using a conditional asset pricing model, however, they find that the expected compensation for the stock market is larger at some times and smaller at other times, depending on the economic conditions. In particular, they show that it varies

counter-cyclically. This type of conditional model is better suited for studying the performance of small companies over time.

In sharp contrast to the voluminous research in the USA relating the cross-sectional behaviour of stock returns to the macroeconomy and individual risk characteristics, there is very little work relating to the UK market.[13] In an attempt to account for the differences in risk characteristics between size and value strategies, Levis (1995a) tests a conditional APT model for the period 1970–91 using UK data. Using the standard Fama and McBeth (1973) methodology and 20 market size portfolios, he tests an APT model with the same five macroeconomic factors[14] — market, growth of industrial production, inflation, term structure and default premium — as Chen *et al.* (1985). His results show that the average market betas for small firms are lower than their larger counterparts.[15] The beta coefficients of the other four economic factors are less consistent. Small firms, for example, are more likely to be adversely affected by unexpected increases in inflation and deterioration in credit conditions.

Analysis of the time series pattern of the betas for each of the economic factors suggests large variation for the smallest and largest portfolios and relatively stable exposure coefficients for the intermediate portfolios. It is also worth noting that the market betas of smaller firms have increased consistently since the early 1970s and ended the period considerably higher than those of larger firms; on the contrary the betas of this latter portfolio declined from about 1.1 in the early 1970s to just below 0.9 in 1991. Thus, since the late 1980s betas of smaller firms on the London Exchange appear consistent with the pattern of betas documented in US studies.

Levis (1995a) also documents considerable variability over time in the risk premia for each of the five economic factors. This is particularly pronounced for the market and the growth rate of industrial production premia; they take a wide range of values and can change signs over a relatively short time period. The market risk premium associated with the size procedure increases during economic downturns and peaks near business cycle troughs. This is consistent with the notion that the required rates of return for different types of risk are not constant over time; they vary with economic cycles and certain size companies are more susceptible than others to different types of economic environments.

Risk characteristics of small companies

Although the studies discussed in the previous section suggest that there are risk differences, in terms of exposure to macroeconomic conditions, between small and large companies, they do not suggest why.[16] Smallness by itself does not necessarily imply higher risk, and differences in market capitalisations do not explain why small and large companies have different responses to economic news. Moreover, the traditional beta measure of risk does not appear sufficiently robust to capture the risk exposure of small companies.

Of course the failure to capture the riskiness of the small companies by conventional risk measures could be attributed to some type of beta mis-estimation. Chan and Chen (1988) show that when more accurate estimates of betas are employed, no size-related differences in average returns are observed. In a related paper, Handa *et al.* (1989) argue that the size effect is sensitive to the return measurement intervals used for beta estimation and

present results suggesting that it can be explained by betas estimated with annual returns. Of course it may sometimes be possible to devise some type of beta estimate to accommodate the problem in hand but, in general, Jegadeesh (1992) demonstrates that betas do not explain the cross-sectional differences in average returns.

Chan and Chen (1991), in one of the most important contributions to the literature, explore the fundamental risk characteristics of smaller companies. They argue that small firms are marginal firms in the sense that their prices tend to be more sensitive to changes in the economy and are more exposed to adverse economic conditions. More specifically, small firms are more likely to be inefficient producers, to have high financial leverage and limited access to capital markets, particularly at periods of tight credit conditions. As a result of such fundamental differences with larger (healthier) companies, marginal companies react differently to the same piece of macroeconomic news. The evidence in the previous section is consistent with this interpretation. They also provide a battery of tests that are consistent with the broad underlying rationale of their proposition. More specifically they show: First, a total of 66 per cent of the constituents of the bottom size quintile found themselves in this position as a result of dropping from higher size quintiles, suggesting that this grouping contains a large proportion of firms that have not been doing well. The proportion of companies moving up the quintile ladder is relatively small. Secondly, after controlling for differences in industrial classification, the average return to assets of the bottom quantile firms during 1966–84 is about 5 per cent lower than the equivalent return of the firms in the top quartile. (The operating income before depreciation over total assets for quartile 1 is 12.1 per cent, while the equivalent ratio for quartile 5 is 17.8 per cent.) The differences in the average interest expenses over operating income before depreciation ratio are even more striking; the interest expenses of firms in the first quartile amount to 25 per cent of operating income before depreciation, while those of the top quartile firms are only 14.4 per cent. Thirdly, among the firms that have cut their dividends in half or more the year before, 50 per cent are in the bottom size quintile. Fourthly, the probability that a small company is highly leveraged[17] is almost four times higher than that of a large company.

There is only limited research currently available focusing on these types of risk. This is rather unfortunate, since firm mortality, dividend policy and leverage may have a significant impact on expected cash flows and discount rates. There is, however, some evidence that appears to corroborate the results of Chan and Chen (1991). Queen and Roll (1987), for example, show that there is a strong inverse relation between unfavourable mortality and size. About one-quarter of the smallest firms are halted, delisted or suspended from trading within a decade, and about 5 per cent actually meet this fate within a year. In contrast, less than 1 per cent of the largest firms expire from unfavourable causes even over the longest observation period.

A high mortality rate among small firms is also observed in the UK.[18] A firm, of course, may be delisted for different reasons, such as a straight takeover, suspension or liquidation. Figure 2 shows that the probability of such incidents occurring is significantly higher for small to medium-size companies. On the basis of the record during the period 1958–88, companies in deciles 3–6 are more likely to be the

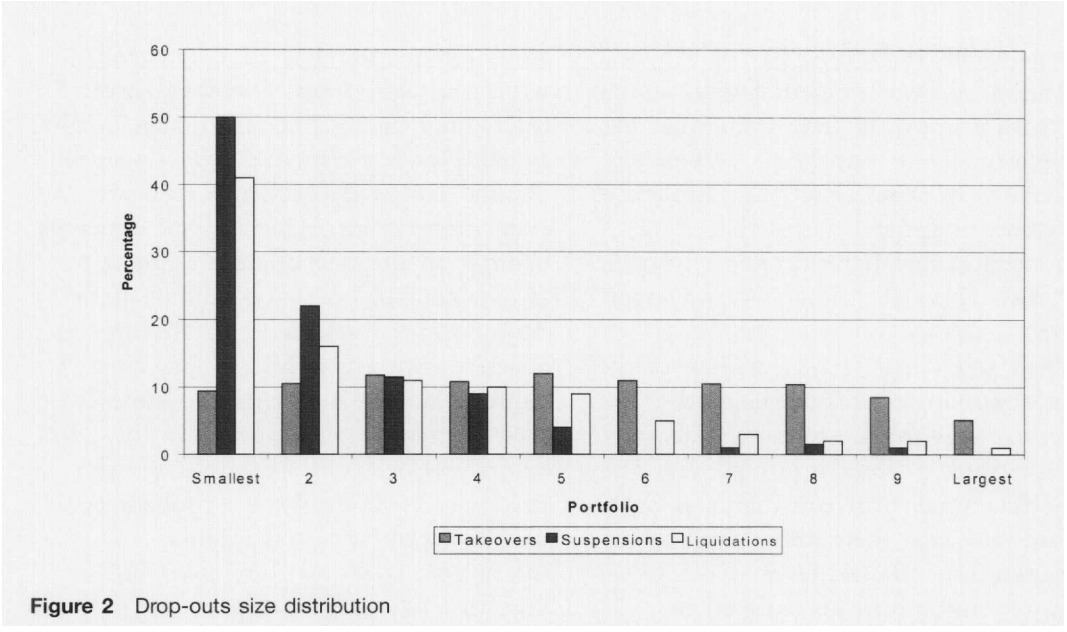

Figure 2 Drop-outs size distribution

targets of takeovers than companies in deciles 9 and 10. During the same period, 95 per cent of the suspended companies belonged to deciles 1–5, with a staggering 50 per cent coming exclusively from the first smallest decile. Liquidations were also heavily concentrated in deciles 1–6 with 45 per cent from the first decile alone. Thus, there is little doubt that smaller companies are more vulnerable than their larger counterparts to some type of event risk.

To access the life-cycle profile of the typical UK small company, Levis (1989b) examines the interquintile movement of quintile size portfolios over a five-year period. Although the analysis has been conducted over a full 10-year period in the 1980s, the basis year 1984 shown in the graph represents a good basis for assessing the life cycle of small companies. During the period 1984–88, the HGSC index outperformed the FTA index by an average of 7.2 per cent per annum. Thus, one would expect to find some substantial upward interquintile movement during this period. In this sense, the results are rather surprising. A remarkable 57 per cent of the smaller companies that started in the smallest quintile in January 1984, excluding those that have dropped out of the sample for various reasons, are still in the same grouping at the end of 1988. Of the total population of companies that started in quintile 4 in January 1984, only 21 per cent moved to the top quintile, while 26 per cent moved down to smaller quintiles. In short, the evidence from the London market is consistent with the proposition that, even at the best of times, the outperformance of small companies is driven by a relatively small number of such companies with exceptional performance. Most of the small cap universe is static and is composed of companies that migrated to this group as a result of past bad performance or are almost permanently stuck in this position following years of indifferent performance.

Table 3 shows three measures of gearing for firms in five market size portfolios: short-term borrowings over assets, long-term borrowings over assets and total borrowing over assets. Short-term borrowings refer to loans

Table 3 Borrowing ratios for five market size portfolios 1971–90

Portfolio	Short loan/total assets	Long loans/total assets	Total loans/total assets
MV1	11.1	4.9	15.9
MV2	10.4	5.8	16.2
MV3	8.5	6.9	15.3
MV4	7.5	9.0	16.4
MV5	6.4	12.5	19.1

Source: Levis and Kalliontzi (1993)

shorter than a year. The data were collected from Datastream, and cover the period 1971–90. The number of firms included in the sample varies from year to year, ranging from 330 in 1971 to 1,232 in 1989. Market size portfolios were constructed in the same way as for rates of return, but they are based on the total number of firms for whom data were available in each of the 20 years. The results reveal significant differences between small and large firms. While all firms appear to use roughly the same amount of total loans as a percentage of their total assets, there are nevertheless significant differences in the composition of these borrowings. Smaller firms rely more on short loans; the average ratio of short loans to assets decreases monotonically with firm size. It starts from 11.1 per cent for MV1 and declines to 6.4 per cent for MV5. In contrast, the ratio of long loans to total assets follows a reverse pattern. The average ratio for MV1 is 4.9 per cent and increases to 12.5 per cent for firms in the largest market size portfolio.

Finally, it is worth mentioning again the liquidity issue that is widely recognised as one of the key impediments to successful small companies' strategies. Liquidity, or the lack of it, is also regarded by the managers of small companies themselves as the key disadvantage for their shares. In a recent survey of 165 companies, 36 per cent cited this as the most detrimental factor to the performance of their shares.[19] Keim (1989) reports that small firms have, on average, 11 times the percentage spread of large firms. The differentials in bid-ask spreads between small and large can be significant, but they are not the only components of the total transaction costs. Bhagat (1993) estimates that the total round-trip trading costs can range from 200 to 300 basis points under normal implementation conditions and could be even higher in the face of unfavourable market impact and/or opportunity costs.[20] These costs detract from overall performance. With an annual turnover of 150 per cent, the performance barrier to simply break even with the passive alternative would be as high as 300 to 450 basis points.

In short, the evidence in both the USA and the UK clearly demonstrates that small companies differ from their larger counterparts in a number of key fundamental characteristics which make them more vulnerable to macroeconomic conditions. The increased riskiness may be reflected directly in their expected earnings or, equally importantly, may affect their valuation by the increased risk premia required for such companies by the investors. The next two sections discuss the earnings record of small companies.

Size and earnings fundamentals

Corporate earnings are normally regarded as a main measure of general

Table 4 Earnings growth profile and PE ratios for size deciles, 1980–89

Market size	% EPS growth	PE ratio	% of total in sample	% in sample with high EPS growth	% in sample with low EPS growth
Small	19.5	13.7	6.3	7.5	5.1
2	14.5	14.4	7.7	7.7	7.6
3	16.0	13.4	8.1	8.7	7.5
4	16.0	13.8	8.9	9.9	8.0
5	14.0	13.9	9.8	10.2	9.4
6	9.4	12.8	10.5	10.3	10.6
7	7.7	12.7	11.8	10.4	13.3
8	7.0	13.4	11.9	11.0	12.8
9	9.4	12.5	12.8	12.8	12.8
Large	5.8	7.5	12.2	11.5	12.9
Market	10.9	12.7	100.0	100.0	100.0

Source: Levis (1991)

macroeconomic activity.[21] They are also essential for most contemporary stock valuation models. There is solid evidence suggesting that over sufficiently long periods, stock performance maps reasonably well on earnings. Easton and Harris (1991) for the USA and Strong (1993) for the UK, among others, show that stock returns are associated with both earnings levels and earnings changes.[22] Probably the most telling evidence is provided by Fama and French (1992, 1993, 1995). Their time-series regressions of annual returns on fundamentals (equity income/book equity, earnings before interest and sales) clearly demonstrate that the size factor in returns is related to the size factor in fundamentals. This is consistent with the hypothesis that the size factor in fundamentals is the source of the size factor in returns.

Ragsdale *et al.* (1993) show that in the period 1975–81 of small-stock market outperformance in the US, the aggregate net income of the small-capitalisation quintile of stocks grew at a compound annual rate of 18.5 per cent, while that of the largest capitalisation quintile grew at only 9.1 per cent. During the 1984–90 period of small-stock market underperformance, the smallest stocks reported negative aggregate net income for the period, while the largest quintile reported positive aggregate net income and grew 4.3 per cent on a compound annual basis. Thus, the reversal of the market performance of small stocks is mapped to the pattern of earnings in the two periods. Ragsdale *et al.* (1993) also show that earnings fundamentals play a significant role in explaining both the strong performance of small stocks during 1974–83 and their underperformance in the 1984–90 period. More specifically, they identified the increased leverage ratio of smaller firms as one of the factors that might have contributed to the shifts of relative earnings performance of small stocks.

The UK evidence on the link between earnings growth, market size and stock valuation remains tenuous. Levis (1991) examines the history of earnings growth for ten market size groups. The results in column 2 of Table 4 show that small companies have outpaced the EPS growth of their larger counterparts by as much as 13 per cent per annum in nominal terms during the period 1980–89. Moreover, the evidence points to a gradual decline in EPS growth as one moves towards the larger size deciles. The remarkable earnings

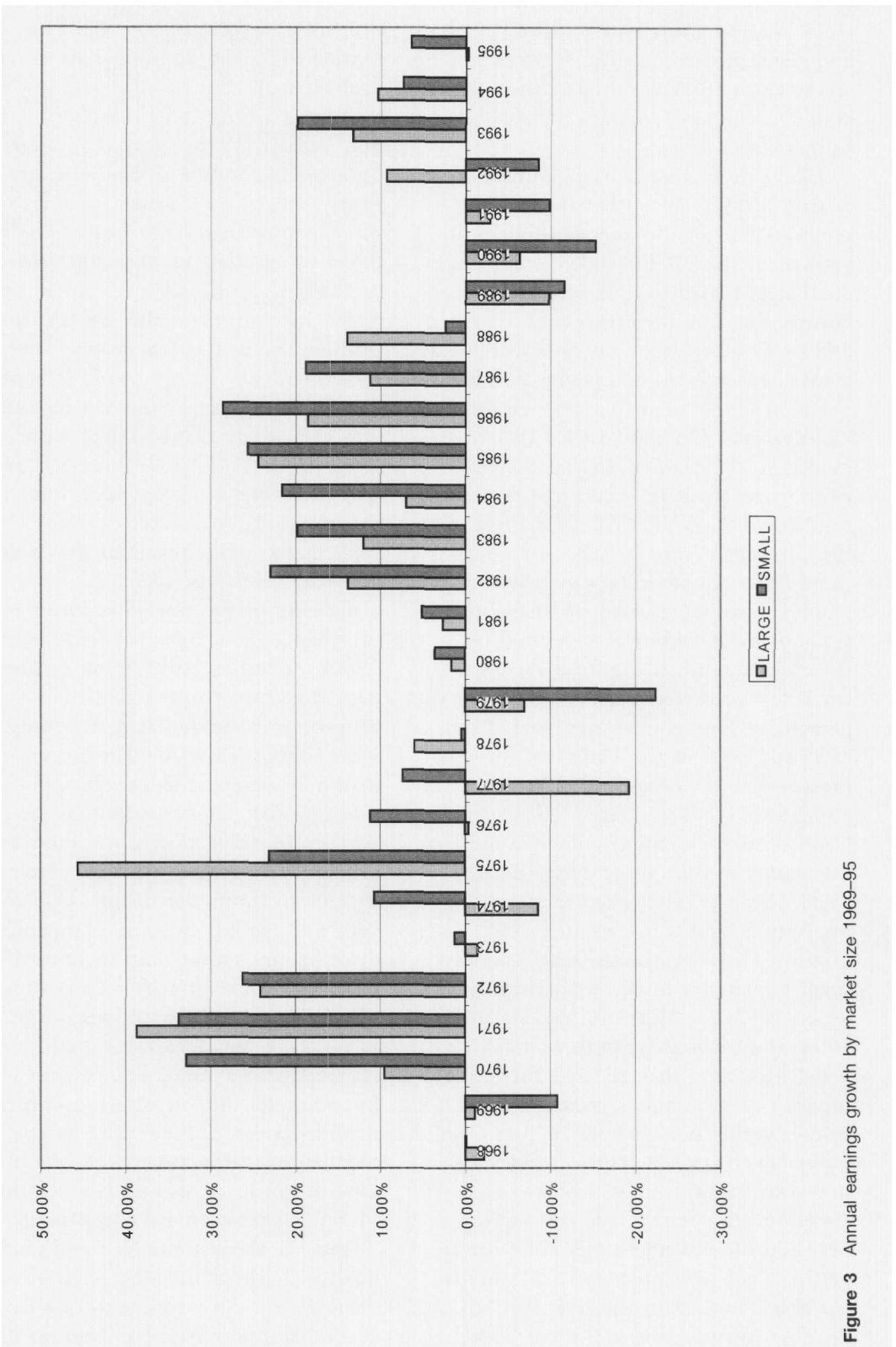

Figure 3 Annual earnings growth by market size 1969–95

outperformance of small firms during this period appears to be reflected in the stock returns. During the 1980s, small and medium-size companies were trading at multiples markedly higher than their very counterparts and still managed to outperform.

Using more recent data, Dimson and Marsh (1999b) show that during the period 1955–88 the average dividend growth of the HGSC index was 1.9 per cent higher than that of non-HGSC companies. The pattern reversed during 1989–97, where the annualised dividend growth for HGSC companies was 3.4 per cent lower than that of their larger counterparts. On the basis of this evidence, they conclude that the reversal of the size effect is linked to the fundamentals. A closer examination of the earnings record of UK firms during the 1990s, however, reveals that the relative earnings growth of small firms was not as disastrous as suggested by their stock returns. Figure 3 shows that small firms suffered negative earnings growth in four consecutive years from 1989 to 1992; at the height of the recession — 1990 and 1991 — large companies have also recorded negative changes in the earnings, albeit somewhat less dramatic than those observed for small firms. What is even more interesting, and to a certain extent puzzling, is the earnings behaviour of small companies in the following three years, 1993–95. With the exception of 1994, the earnings growth of small firms was better than that of large firms. The superiority in earnings growth ranges from about 9 per cent in 1993 to a solid 6 per cent in 1995. Thus it appears that in recent years the UK market experienced a remarkable decoupling between fundamentals and stock returns performance. A similar type of pattern has also emerged in the US. While earnings growth in the Russell 2000 index was almost twice as large as the equivalent growth for the S&P 500 in the first two quarters of 1998, the price performance gap continued to move against small caps.

Taking a long-term perspective, Fama and French (1995) show that, after controlling for BM differences, small firms tend to have lower earnings on book equity than large firms. The size effect in earnings is, however, largely due to the low profits of small stocks after 1980. In contrast to the UK evidence, profitability in the US shows little relation to size before 1981. It appears that the recession in the US in 1981 and 1982 turned to a prolonged depression for small stocks. They observe, however, that 'for some reason, which remains unexplained, small stocks do not participate in the boom of the middle and late 1980s' (p. 132).

In spite of the overall superior earnings growth by small firms in the 1980s, documented in Table 6, however, it is important to note that the proportion of smaller/larger companies with above/below median growth is not markedly different from their proportional representations in the sample. In other words, the high annual average EPS growth of small companies appears to be predominantly due to the very fast growth of some companies in these groups rather than to the universal faster growth record of such companies. Moreover, low growth does not appear to be a unique, across the board, characteristic of large companies. While, for example, the very large companies accounted for 12.2 per cent of the population in the sample, the high EPS growth group contained not less than 11.5 per cent of these companies.

Table 5 sheds some further light into this issue. The standard deviation of earnings growth within the first five size deciles is almost twice as large as the

Table 5 Average EPS growth and within group standard deviation (SD) of EPS growth

	1980–82		1982–84		1984–86		1986–88		1987–89	
	Growth	SD	Growth	SD	Growth	SD	Growth	SD	Growth	SD
Small	2.7	1.17	29.8	1.53	15.7	0.83	24.5	1.24	21.0	1.39
2	6.7	1.19	10.4	1.04	20.6	1.46	26.6	1.46	21.7	1.35
3	3.0	1.00	15.6	1.13	19.1	1.19	25.4	1.12	20.3	1.07
4	−3.5	0.77	15.8	0.94	20.3	0.94	16.4	0.93	21.1	1.04
5	0.1	1.00	9.6	0.89	21.4	1.23	16.7	1.12	19.0	1.15
6	−0.7	0.82	12.7	0.98	9.5	0.70	18.5	1.08	20.5	1.18
7	−3.9	0.59	9.9	0.87	11.9	1.04	19.1	1.15	17.7	0.96
8	−4.4	0.58	6.8	0.86	12.1	0.83	7.4	0.79	7.5	0.77
9	−2.1	0.65	10.2	0.77	10.6	0.73	9.3	0.78	13.5	0.83
Large	−2.2	0.64	6.8	0.65	6.0	0.63	9.1	0.66	11.4	0.74

Source: Levis (1991)

volatility of large companies. It is this particular aspect of risk that is of more concern to investors than volatility in prices. It means the fundamental performance of smaller companies, as a group, is much more difficult to assess and predict than that of large companies. It appears that sometime in 1988 the market suddenly realised that smaller companies could not any more match their past earnings growth; thus it became apparent that their PE ratings were out of step with future prospects. The unavoidable correction was already well under way. Table 5, for example, shows a jump in the earnings volatility and a significant narrowing of the gap in earnings growth between small and large companies during the period 1987–89. Bank of England (1991) reports that large companies were the sole group to experience operating profits growing faster in 1989 than in 1988. This group also saw the most rapid growth in overseas sales. Income gearing rose rapidly for all three groups; for the smallest, this is most likely to have reflected their relative dependence on bank finance combined with some distress borrowing.

The volatile nature of small firms' earnings is another key ingredient in understanding the differences in market performance across different-size firms. We know that there is a significant, albeit modest, association between earnings and stock returns during the same time period, but this says very little about the relation between current earnings and future returns. On the other hand, Ou and Penman (1989) show that financial statement information, applied mechanically across companies can be used to predict subsequent-year earnings changes and systematically earn abnormal investment returns. Thus, the relation between current earnings and future returns may differ across different-size firms depending on how predictable future earnings are.

Ettredge and Fuller (1991) show that a larger number of small firms report negative earnings over any single period; but firms with negative earnings in any one year appear to perform much better in the following year than firms with positive earnings. Firms with negative earnings have better risk-adjusted returns in the following year. They argue that the market appears excessively to discount stocks of firms reporting losses and subsequently corrects for this over-reaction. Alternatively, it might be that the market systematically underestimates subsequent earnings recoveries by firms reporting losses.

The differential performance of small firms is sometimes perceived as being

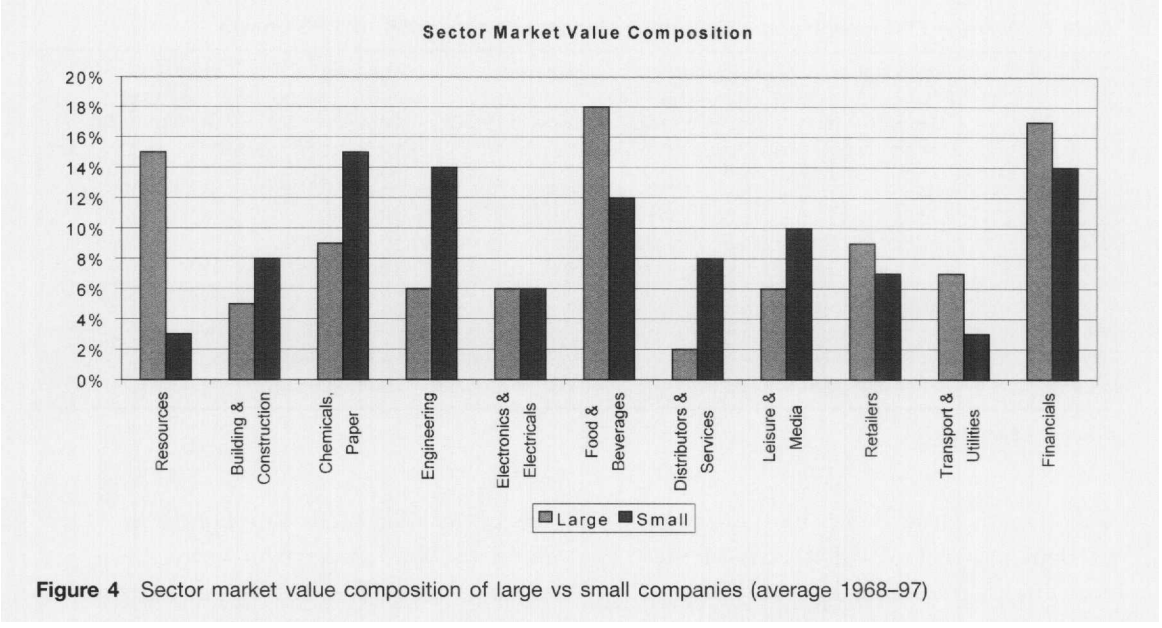

Figure 4 Sector market value composition of large vs small companies (average 1968–97)

linked to the fortunes of certain industries at certain points in time. The argument is based on the fact that small and large firms are not evenly distributed across all industrial sectors. Figure 4 shows the sector market value composition of large and small firms and provides considerable support for this view. In five out of the 11 industrial sectors — building and construction, chemicals, paper and packaging, engineering, distributors and services, and leisure and media — small firms account for a higher proportion of the sector in terms of market capitalisation; in contrast, resources, food and beverages, transport and utilities and financials are dominated by large firms.

Although the uneven distribution of large and small companies may result in sector-related performance differences, the evidence provides very limited support towards this argument. Figure 5, panels A–D, show the performance of small and large companies for 11 industrial sectors for the 30-year period 1968–97 and three 10-year sub-periods. Although there are some differences in the performance of individual sectors in the two 10-year periods of 1968–77 and 1978–87, the size effect is certainly not driven by a single industrial sector. Smaller firms appear to have outperformed their larger counterparts in almost every single sector. In a similar vein, the dramatic underperformance of smaller firms during 1988–97 is widespread across all industries. In some industrial sectors, such as resources, building and construction, chemicals and paper, and retailers, smaller firms suffered an absolute decline in market values. At the same time, it is worth noting that the strong market performance of the FTSE 100 index is to a certain extent driven by the strong performance of utilities and financials, both sectors heavily populated by larger companies. Thus, it is evident that size rather than industry is the key factor in determining market performance.[23] From the perspective of the practising fund manager, this evidence suggests that a small cap strategy based on sector plays is likely to be only of limited value. The size effect is somewhat linked to the industrial performance but it is not determined by it.

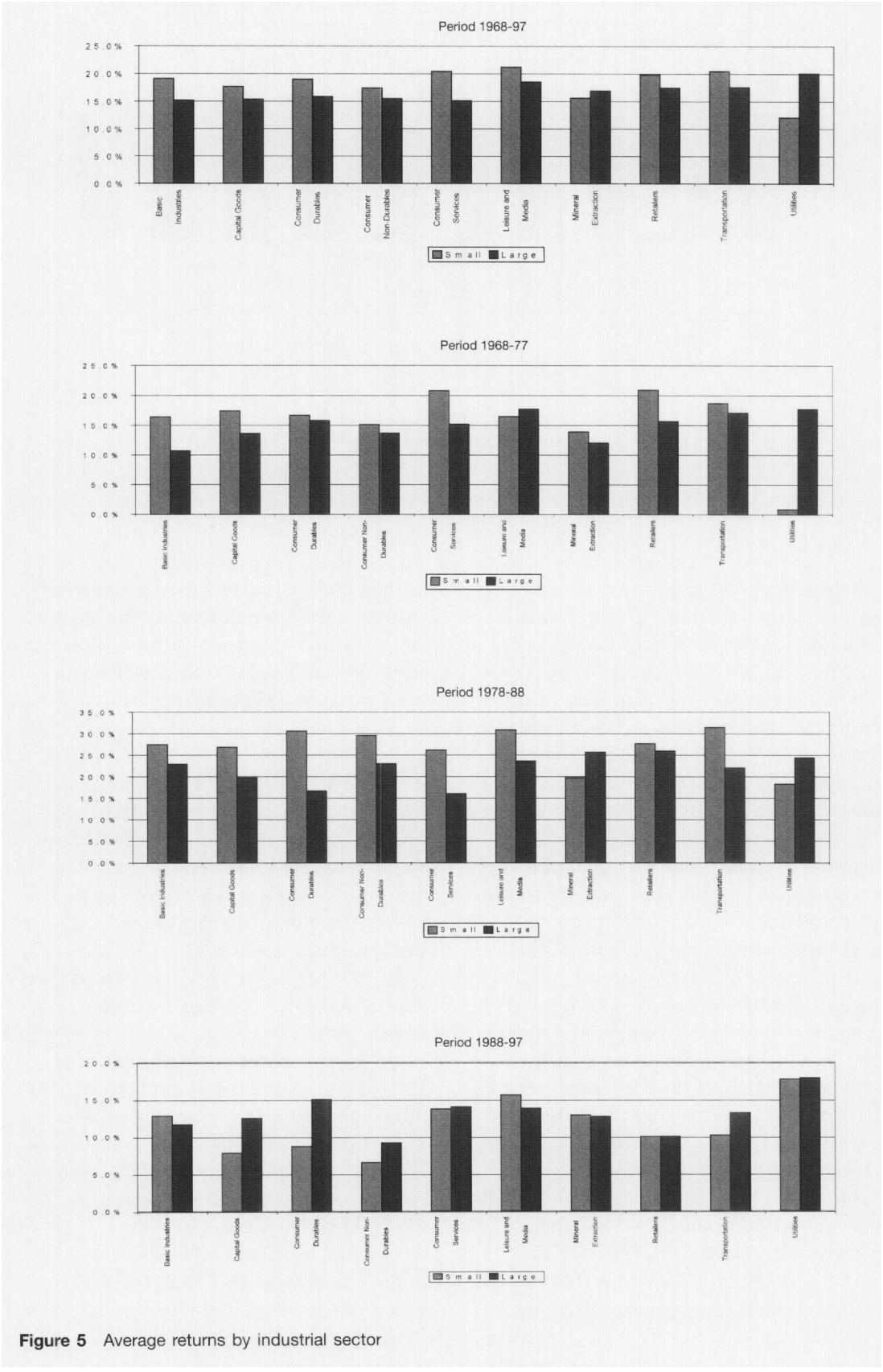

Figure 5 Average returns by industrial sector

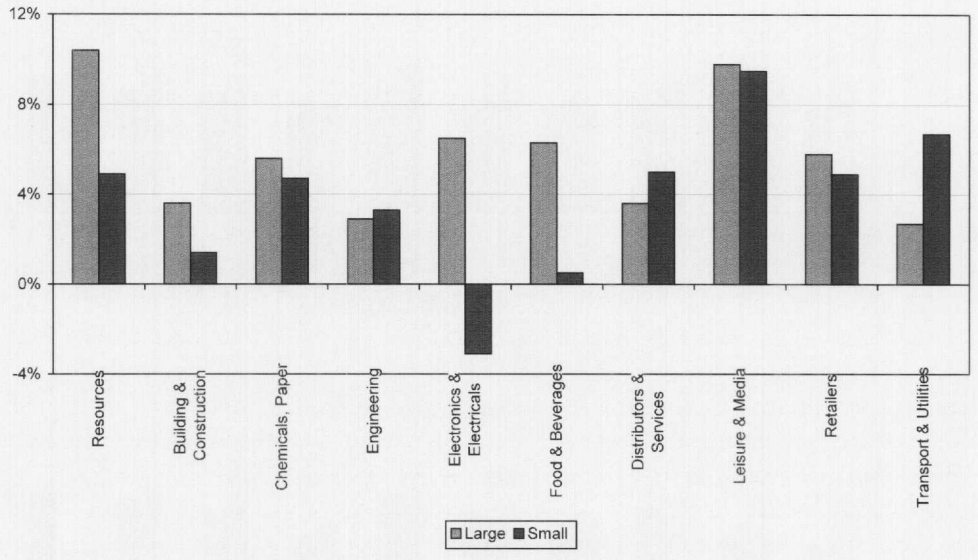

Figure 6 EPS growth by industrial sector (annual average for the period 1968–97)

Figure 6 shows the average annual earnings growth for the 30-year period 1968–97 for the same industries, except for financials, as in Figure 8. Although it is difficult to draw any firm conclusions about the association between earnings and market performance from a visual inspection of the two figures, there appears to be a broad consistency between the two sets of data. It is reassuring, for example, to observe that large companies across almost all industries performed better than smaller ones both in terms of stock price and earnings growth. The notable exception is the case of distributors and services where small companies are superior on both counts. The leisure and media sector is also an interesting example, as it exhibits some of the strongest performances both in price and earnings terms. Of course identifying a broad historical consistency between earnings and prices across large and small firms does not answer the fundamental question concerning the disparity in market performance between the two size groups. Taking this evidence together with our clues on the risk characteristics of small companies and their association with economic conditions, however, leads one to believe that the solution to our puzzle lies in the market's expectations about the path of future earnings.

Earnings forecasts

The mere existence of strong average earnings growth rates in the 1980s and the sluggish earnings performance of small companies in the 1990s is not, in itself, sufficient to explain their corresponding stock market performances in the two decades. First, we saw that, in spite of the lower average earnings growth by the small companies in the 1990s, their year-on-year growth after 1993 outpaced the equivalent growth of large firms. Secondly, earnings growth on its own does not convey the full picture about the true profitability of a company. Return on equity (ROE) is often an equally if not more important component of value.[24] Thirdly, the dramatic and persistent underperformance of small firms in the late 1980s and early 1990s indicates that the deterioration of

earnings must have taken the market by surprise. Earnings growth forecasts, for example, may be biased if analysts fail to incorporate all available information. Anomalous behaviour in earnings forecasts may be associated with anomalous behaviour by market participants in price formation. Even when the available forecasts are efficient, however, the market may be slow or completely fail to incorporate such information into their pricing process.

The evidence of inefficient upwardly biased earnings forecasts, across the whole spectrum of stocks, is now well established.[25] In fact, Dreman and Berry (1995) argue, on the basis of their study of analysts' forecasts for US stocks from 1972 through 1991, that only 'a minority of estimates fall within a range around reported earnings considered acceptable to many professional investors' (p. 30). There is, however, a controversy as to whether analysts under-react or over-react to available information. While, Abarbanell (1991), Abarbanell and Bernard (1992) and Ali *et al.* (1992) report that analysts systematically under-react to new information, DeBondt and Thaler (1990) maintain that analysts systematically over-react. Easterwood and Nutt (1999) provide evidence that appears consistent with both views. They report that analysts systematically react to information in an optimistic manner by under-reacting to negative information and over-reacting to positive news. A third view that is attracting considerable attention maintains that analysts and investors simply observe abnormal earnings and price performance over a relatively short time period and extrapolate these trends to the future.[26]

The apparent differences in the quality of forecasts across different types of firms may have an impact on their valuation. If forecasts for small companies, for example, are less efficient than those associated with large companies, as the evidence tends to suggest, then at least some of the variability in the size effect may be linked to the pattern of these forecasts. In an early study, for example, Givoly and Lakonishok (1984) examine the actual and forecasted earnings of small firms for the 20-year period from 1963 to 1981. They demonstrate that growth of economic fundamentals is inversely related to size, and this relationship is almost monotonic. They document significant differences between large and small firms for a variety of growth measures such as gross margin, net operating income, sales etc. They conclude that the size effect in the USA before 1983 is due to the understatement of the economic growth of such firms.

Earnings of smaller firms may be under/over-estimated because information on small firms is scarce as a result of their shorter histories and/or of their limited analysts' following.[27] This of course is not surprising. Not only are there potentially greater financial gains for investors in the identification of mispriced securities for large firms, but there are also greater economic incentives for analysts' following of large firms. In any case, the end result is that analysts' earnings forecasts for small firms are generally inferior to those produced for large firms. Elgers and Murray (1992), using I/B/E/S consensus financial analyst forecasts and forecasts based upon the anticipatory behaviour of security prices, show that firm size is positively associated with earnings forecasting accuracy. Moreover, Brown *et al.* (1987) find that forecasts based on time series models may be more efficient for small companies than analysts' forecasts.[28] This may be regarded as an opportunity for some active and skilled managers[29] because of its possible implications for the pricing of such stocks. An analysis by Arbel and Strebel (1982) suggests that,

over a 10-year period, the shares of those firms neglected by institutions outperform significantly the shares of firms widely held by institutions. This superior performance persists over and above any small-firm effect. This had led to the widespread belief that the size effect is more likely a 'neglect' effect.

We know that the release of interim and annual earnings is associated with both increased trading volume and increased stock return variability. Forthcoming earnings announcements stimulate private information acquisition by investors in the period prior to announcement. In addition, there is an increase in public available information prior to anticipated announcements. Both private and public information are expected to increase in the pre-announcement period. Freeman (1987) shows that the level of pre-disclosure information available for a firm increases with firm size. More recently, Byard (1998) finds that the average quality of both public and private information increases during the 30 days prior to annual earnings announcement. Firm size is found to have little or no impact upon the average quality of public information available to analysts. The average quality of the private information acquired by analysts is, however, found to be increasing with size, which is consistent with size-related incentives for analysts to engage in private information acquisition.

A variation of this 'neglect' effect is also reported in the early study of Foster *et al.* (1984). They show that small firms are likely to react more negatively (positively) to negative (positive) earnings forecasts[30] in the two days surrounding the announcement. The return differentials between small and large firms are quite marked; while the cumulative abnormal return in the two days around a negative forecast error is only −0.81 per cent for large firms, it rises to −1.83 per cent for the smallest size decile portfolio. The corresponding price reaction differential to positive forecast errors is even more pronounced — a positive 0.5 per cent for large firms against 2.58 per cent for the small firms. The equivalent stock returns around a longer window of 60 days around the announcement provide even further support to the apparent over-reaction of small firms to unexpected earnings announcements. Similar results are reported by Bernard and Thomas (1990) as well. They find that the failure of stock prices to reflect fully the implications of current earnings for future earnings is significantly more pronounced for small companies. Given that there are no significant differences in the predictability of future earnings from a series of historical earnings between large and small firms, the evidence suggests some pattern of excessive over-reaction to earnings announcements of small firms.

Mott and Coker (1993) provide further and more detailed evidence on the asymmetric response between small and large companies earnings' surprises. They show that small cap stocks over the period 1988–93 reported fewer positive surprises than negative ones in any given quarter. An average 19.8 per cent of the companies reported positive surprises over the period, whereas 25.6 per cent of the companies posted earnings disappointments. Furthermore, they show that, on average, a positive surprise results in an increase in stock prices of 2.1 per cent relative to Russell 2000 in the first month after reporting earnings; this figure rises to 12.9 per cent over the ensuing 12 months. In contrast, negative surprises underperform both the universe and the market across all periods. Overall, negative surprises fall 0.9 per cent relative to the Russell 2000 in the

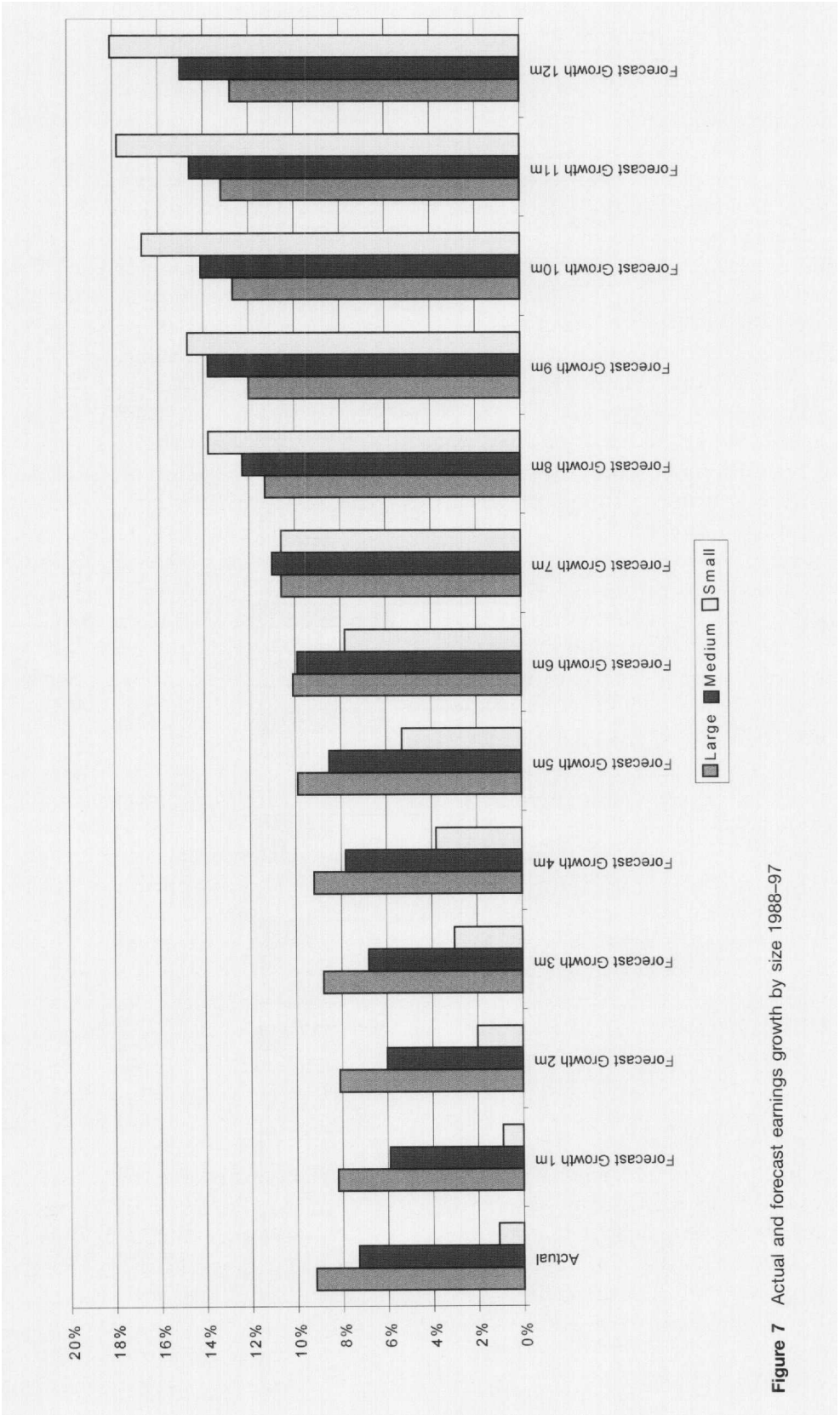

Figure 7 Actual and forecast earnings growth by size 1988–97

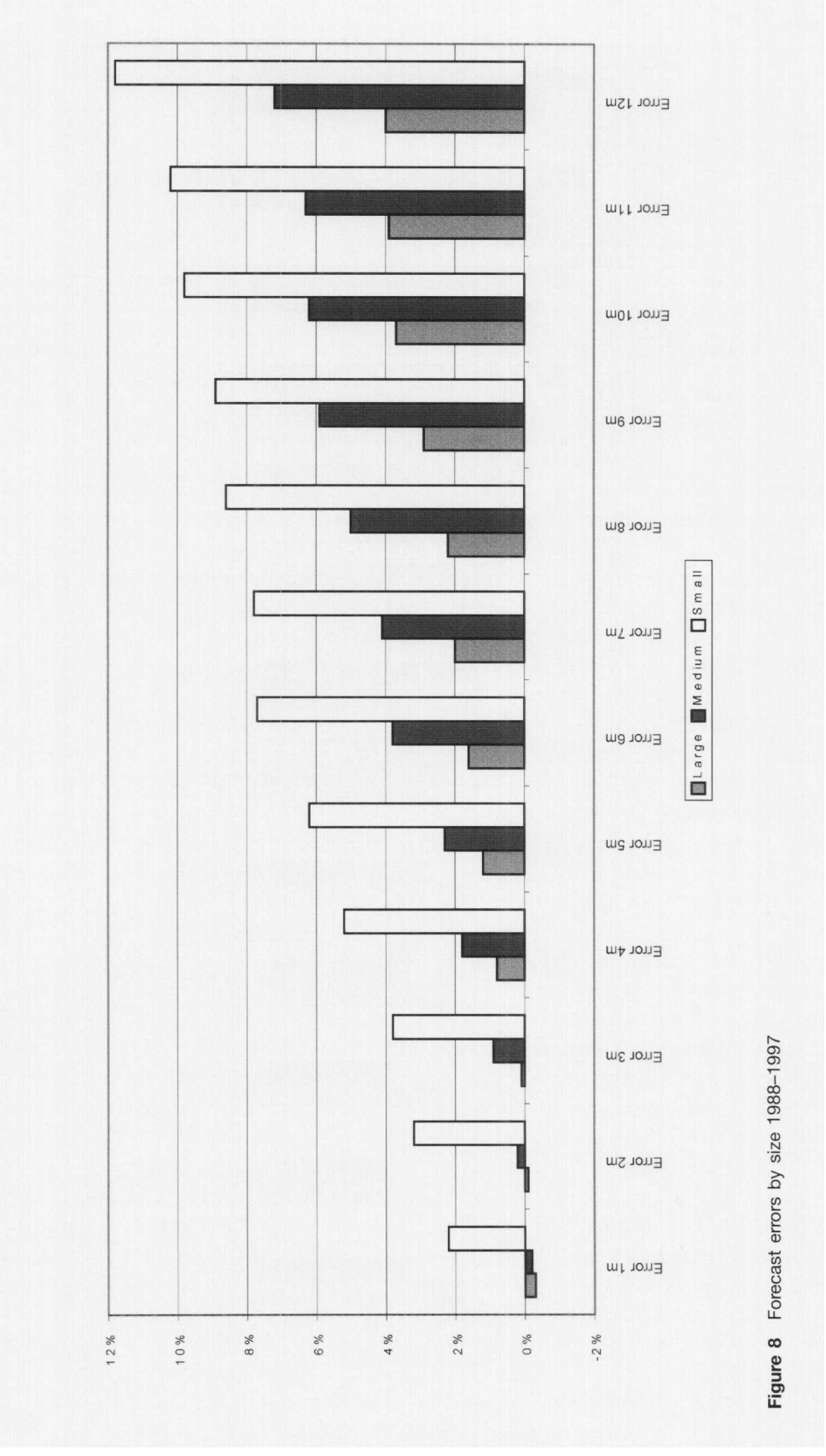

Figure 8 Forecast errors by size 1988–1997

Table 6 One year buy and hold returns for size portfolios with positive and negative surprises (1987–97)

	Small		Large	
	Positive (%)	Negative (%)	Positive (%)	Negative (%)
1987	−1.41	−8.09	−8.47	−17.88
1988	23.33	3.48	23.67	10.89
1989	−3.38	−17.61	10.67	−3.20
1990	12.41	−9.65	7.59	−2.39
1991	41.65	3.77	19.74	2.23
1992	43.26	22.56	22.89	16.27
1993	35.92	9.01	13.21	3.42
1994	13.19	−7.26	12.67	8.98
1995	39.79	15.61	29.18	6.77
1996	9.81	−14.36	14.33	−2.12
Average	21.46	−0.25	14.55	2.30

Source: Levis and Liodakis (1999)

first month after reporting earnings, with the relative decline falling to 3.5 per cent at the end of a 12-month period.

A number of UK studies, such as Patz (1989), Capstaff *et al.* (1995), Hussain (1998) and Levis and Liodakis (2001) also suggest that, at a given horizon, analysts' forecasts for large firms are superior to those of small firms. More specifically, Capstaff *et al.* (1995) find that UK analysts, like their US counterparts, generally over-react to earnings-related news across the whole market size spectrum. This tendency, however, is more pronounced for small companies. Analysts' forecasts of smaller firms appear to impound even less earnings related information and are generally more over-optimistic and overstated than equivalent forecasts for large firms. Unfortunately the extent of the differences in the forecast bias and efficiency for small firms is not known as this study does not provide detailed statistical evidence on this issue. It is not also clear whether the biases in small companies forecasts are consistent across different forecast horizons. Moreover, the Capstaff *et al.* (1995) study is based on the period February 1987 to December 1990. This is a period with relatively narrow coverage for UK small companies in the I/B/E/S universe and it spans over August 1988, the month that has been identified as the turning point for the performance of small companies in UK.

The preliminary investigation on analyst forecasts is based on a longer time period — January 1987 to March 1998 — and covers the entire universe of I/B/E/S forecasts for UK companies, ie an average of about 1,300 companies per year. The evidence provides some relevant insights to the small companies performance record in recent years.

Figures 7 and 8 show that analysts' forecasts in general are optimistic and inefficient; this is particularly pronounced for longer (6–12 months) investment horizons. In fact, for shorter investment horizons, analysts' forecasts for large companies appear to be pessimistic.

The extent of the over-optimism varies across the 10-year period of the analysis. The bias in forecasts is particularly pronounced during the recession in the early 1990s, suggesting that analysts were rather slow to grasp the implications of the economic downturn for corporate profitability.

Analyst forecasts are particularly biased for small companies in general and during the recession period in particular. The

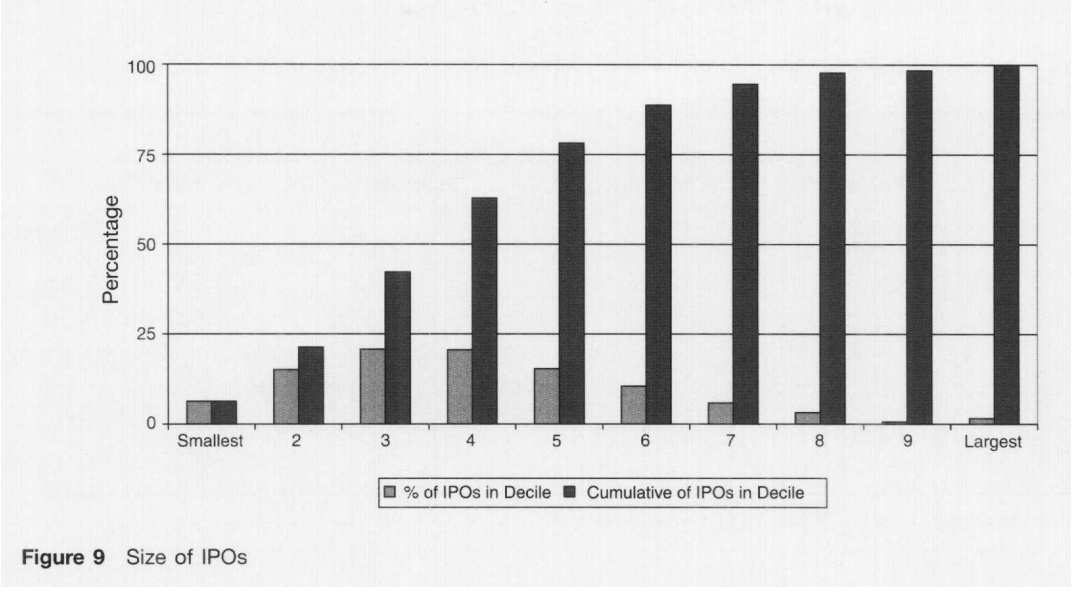

Figure 9 Size of IPOs

evidence suggests a monumental failure by analysts to adjust their expectations for small companies at the end of the 1980s and beginning of the 1990s.

There are significant differences in error forecasts across different industries. It is interesting to note that the largest forecast errors are found in technology stocks, health and household products, while the lowest are in financials and utilities. The mapping of industry loading across small and large stocks and forecast errors is pointing to an obvious pattern, but further analysis is necessary before drawing any definite conclusions.

Table 6 shows that the impact of earnings surprises, both positive and negative, on subsequent stock prices is markedly larger for small companies. The sharp reversal in the small firms performance in 1989 and 1990 are directly related to the huge negative earnings surprises observed for this group of companies at the time.[31]

Support for the over-reaction argument is offered from a surprisingly different stream of literature as well. A number of studies[32] in the USA and UK document significant long-run market and operating underperformance for initial public offerings (IPOs) and seasoned equity offerings. IPOs in the UK, for example, appear to underperform seasoned firms by an average of about 12 per cent in the three years following their initial listing. Figure 9 shows that, during the period 1980–88, about 98 per cent of the IPOs belonged to the first nine size deciles at the time of their listing. Although it may be tempting to infer an association between long-run underperformance of IPOs and small cap underperformance, it is worth bearing in mind that the period 1980–88 was overall a period of good performance for small companies. There is another important piece of evidence, however, that appears to be relevant. In the four-year period 1985–88, there was an unprecedented growth in IPO activity in the London market; a total of 477 new issues were listed in the Main and now defunct Unlisted Securities Markets. In the same four-year period, the London market also experienced a burst of seasoned equity offerings.[33] Levis (1995b) reports a record number of 823 seasoned equity offerings during this period. Thus, it appears that in the three years leading to turning point for the performance of small companies the London market was enduring a glut of

equity issuing activity involving a disproportional number of small to medium-size firms.

The reversal of the size effect is not due to the long-run underperformance of IPO and SEOs. Nevertheless, it is worth noting that Loughran (1993) finds that of the 5.7 per cent difference in returns between NYSE and NASDAQ stocks in the first five deciles (based on NYSE ranking), 60 per cent is due to the poor (long-run) performance of IPOs on NASDAQ. A difference of 2.3 per cent remains after purging NASDAQ returns of an IPO effect; IPOs are much more heavily concentrated on NASDAQ than on NYSE. The link between the size effect and issuing activity lies in the earnings forecasts for IPOs.

In their study of earnings forecasts for IPOs and their relation to long-run performance, Rajan and Servaes (1997) show that analysts are excessively over-optimistic about the earnings and growth performance of IPOs; this over-optimism is not just a reflection of a positive sentiment sweeping across the whole market. Moreover, firms with the highest growth projections at the time of the IPO substantially underperform various benchmarks, whereas firms with the lowest growth projections outperform these benchmarks. The difference in returns between the two extreme quartiles, in terms of growth projections, is more than 100 per cent. Rajan and Servaes (1997) argue that this evidence 'indicates that investors appear to believe the inflated long-term growth' (p. 509). Loughran and Ritter (1995) and Levis and Michailides (2001) for the UK also argue that firms take advantage of such 'windows of opportunity' to issue stock, while Lerner (1994) demonstrates similar patterns for privately held venture-backed biotechnology firms. The high expectations for future earnings growth appears to be fuelled by strong pre-listing performances of these companies. Jain and Kini (1994) analyse the earnings performance of IPO firms. They show that these firms perform very well prior to the IPO, but very poorly afterwards.

In short, there are some good grounds for believing that the reversal of the size effect is related to the issuing activity. If new companies are searching for windows of opportunity to come to the market, their valuations are likely to be optimistic at the time of the flotation and are adjusted downwards when their true potential becomes better understood. The tendency of IPOs and SEOs to populate the small size groupings, stacks heavy odds against the long-term performance of these companies.

Conclusions

The long history of strong outperformance by small cap stocks in the UK ended in the late 1980s. Since then, their average performance has lagged significantly behind their largest counterparts. The size effect is not entirely independent of other firm characteristics such as price-earnings rating, book-to-price ratio and price. It goes through long cycles, which broadly correspond to the general economic cycles, but this cyclical pattern of the size effect was broken in recent years. Tests of conditional asset-pricing models suggest that small firms have different sensitivities to the risk factors determining stock prices. Small firms, for example, are more likely to be adversely affected by unexpected increases in inflation and deterioration in credit conditions. Thus, conventional risk measures (betas) fail to reflect the inherent risks of small firms. Such firms are, however, riskier in terms of higher mortality, lower liquidity, higher short-term borrowings and higher volatility of earnings.

The positive size effect in the 1980s is associated with strong underlying growth in the corresponding earnings of small firms. Although the average earnings growth performance of small firms remained quite robust in the second part of the 1990s, their intra-group volatility increased markedly. The earnings growth of the small cap sector appears to be driven by a relatively small number of companies in this sector. Although there are some differences in market and earnings growth performance across different sectors, the apparent size effect cannot be accounted for by sectoral differences. The analysts' earnings forecasts for small firms are consistently more optimistic than equivalent forecasts for large firms.

The reversal of the size effect may also be associated with large volumes of equity issuing activity. Large volumes of equity issuance activity are associated with high initial prices resulting from over-optimistic prices. Price over-optimism is associated with subsequent long-term underperformance.

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Notes

1 Size interactions with other portfolio formation procedures such as price-earnings ratio, dividend yield and price. For UK evidence on these issues see Levis (1989a).
2 See, for example, Fouse (1989).
3 For a review of the evidence and explanations see Jacobs and Levy (1989), Dimson and Marsh (1989), Dimson and Marsh (1999a) and Hawawini and Keim (1999).
4 See for example, Clive Wolman, 'Thinking Small Can Bring Big Benefits', *Financial Times*, 22nd June, 1985, and Barbara Elis, 'When It Pays to Think Small', *Guardian*, 7th June, 1986.
5 Extel Small Companies Sector Survey 1998.
6 Almost identical results are obtained for the NASDAQ market on its own.
7 See Levis and Steliaros (1999).
8 Speidell and Graves (1998) report a similar pattern of underperformance for small firms across other European and emerging equity markets in recent years.
9 It should be noted that the Fama and French (1988) approach suffers from various econometric problems. The most obvious one arises from the use of overlapping observations in their regressions, which ultimately results in biased regression coefficients. Although they attempt to correct this bias by using a Monte Carlo approach, it is difficult to ascertain to what extent their results are biased owing to the autocorrelation of overlapping returns. Similar results are obtained, however, by Campell *et al.* (1997) using variance ratio tests.
10 The results are based on Levis and Kalliontzi (1993).
11 They classify a restrictive policy environment as a period of increases in Fed discount rates and an expansive one as a period of declines in discount rates.
12 Their approach is based on the standard arbitrage model developed by Chen *et al.* (1983).
13 Taylor and Poon (1991) and Clare and Thomas (1994) are the two known exceptions of unconditional factor models for the UK. Their results are rather ambivalent owing to short time periods and limited data sets.
14 In the absence of a precise asset pricing theory, a number of other economic variables were also tested; they include changes in the exchange rate, monthly changes in retail sales and the CBI confidence indicator.
15 Similar results are documented by Levis (1985), Corhay *et al.* (1987) and Strong (1996).
16 Berk (1995b) argues that the negative relation between market value and return stems directly from the theoretical inverse relation between market value and risk. Accordingly, the size effect should not be regarded as an anomaly.
17 Chan and Chen (1991) define leverage as the ratio of the sum of the book value of current liabilities, long-term debt and preferred stock over the market value of equity as of the end of the previous year.
18 See, for example, Levis (1989b).
19 Extel Small Companies Sector Survey 1998.
20 Market impact is the price dislocation caused by demand for liquidity beyond the size prevailing at the current bid and offered prices. Opportunity costs refer to the costs of unexecuted trades represented by unused cash.
21 Lucas (1977) considers the cyclicality of corporate earnings as one of the seven main features of macroeconomic fluctuations.
22 Although earnings play a key role in understanding the cross-sectional behaviour of stock returns, Lev (1989) argues that they explain only a small percentage (less than 10 per cent) of the contemporaneous change in stock prices.
23 Levis (1987), for example, demonstrates that size is not a determining factor in Investment Trusts performance during the period 1957–80.
24 Bryan *et al.* (1998), on the basis of their analysis of

100 international firms, argue that market-to-book ratios are related more directly to returns on book equity than earnings growth

25 See, for example, Fried and Givoly (1982) and Brous (1992).

26 See Lakonishok *et al.* (1994) and La Porta (1996).

27 See Barry and Brown (1984).

28 For evidence on the superiority of analysts' forecasts over time series forecasts see Brown *et al.* (1987) and Kross *et al.* (1990).

29 According to *The Economist* (1998), fund managers such as Scroders and Fidelity consider smaller companies as 'their most promising hunting ground' (12th December, p. 109).

30 Foster *et al.* (1984) define unexpected earnings (forecast error) using a time series model based on historical earnings rather than analysts' forecasts.

31 See Levis and Liodakis (1999).

32 See, for example, Levis (1993, 1995a), Levis and Gerbich (1999) and Levis and Thomas (1995) for the UK, and Ritter (1991) and Loughran and Ritter (1995, 1997) for the US.

33 See Ritter (1984) for a graphical illustration of 'hot issue' markets.

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