

# Value and Growth Investing: A Review and Update

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## **Abstract**

We provide a selective overview of the academic research literature on value and growth investing. Different explanations for the performance of value versus growth stocks are discussed. Empirical research on the alternative explanations is reviewed, and some new results are provided with an updated sample. The evidence suggests that, even after taking into account the experience of the late 1990s, value investing generates superior returns. Common measures of risk do not support the argument that the return differential is due to the higher riskiness of value stocks. Instead, behavioral considerations and the agency costs of delegated investment management lie at the root of the value-growth spread.

The topic of value and growth investing offers a shining example of the fruitful exchange of ideas between academic research and investment practice. The results from academic studies have formed the basis for investment strategies that are widely applied in equity markets. Going the other way, issues encountered by portfolio managers and consultants such as procedures for identifying value or growth styles, and the design of style-specific benchmark indexes for performance evaluation, have spurred ongoing analysis and extensions in the research literature.

The explosion of academic interest in value and growth investment strategies can be traced back to Fama and French (1992), and Lakonishok, Shleifer and Vishny (1994). The results of Fama and French delivered a stunning blow to the explanatory power of the Capital Asset Pricing Model, and sparked debates about the “death of beta.” In the wake of this study, academics shifted their attention to the ratio of book-to-market value of equity, and firm size as the leading explanatory variables for the cross-section of average stock returns. In turn, this work built on earlier studies of stock market “anomalies.” Basu (1977), for example, showed that stocks with low price-to-earnings ratios subsequently tend to have higher average returns than stocks with high ratios. Chan, Hamao and Lakonishok (1991) study Japanese data and find strong support for the superior performance of value investment strategies.

Based on the accumulated weight of the evidence from studies on the book-to-market effect and related anomalies, the academic community has generally come to agree that value strategies on average outperform growth investment strategies. There is much less consensus, however, on the underlying reasons for the superior returns. On the one hand, Fama and French take the position of the efficient markets hypothesis, and attribute the higher returns of value strategies to their increased risk. On the other hand, Lakonishok, Shleifer and Vishny suggest that cognitive biases underlying investor behavior, and the agency costs of professional investment management are at the root of the rewards to value investing. Yet another explanation for the returns to value investing rests on methodological issues of data selection bias (see Kothari, Shanken and Sloan (1995)). A careful study by Chan, Jegadeesh and Lakonishok (1995), however, suggests that any such bias cannot explain the differential performance of value and growth investing.<sup>1</sup>

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<sup>1</sup>See also Davis (1994), who confirms the book-to-market effect in a sample that is less susceptible to any biases affecting early observations in the Compustat files that are used in many studies.

The academic work on value investing has had a strong impact on professional investment management. Value and growth are now widely recognized distinctive specializations adopted by money managers. Additionally, the research studies have been instrumental in the development of style-specific benchmarks which have proliferated in performance evaluation and attribution analysis. Many such benchmarks are based on a variable that has been extensively used in academic studies, namely the ratio of book to market value of equity, and this has become an important indicator of a portfolio's orientation toward either growth or value.

This paper provides a review of the academic research on value and growth investing. We begin by surveying the evidence on the performance of value investment strategies. The underlying reasons for the performance are more controversial, so we also give an overview of the evidence on various explanations for the returns on value strategies. Finally we provide some updated evidence.

## **1 The returns on value investing**

Table 1 summarizes the results from three key, early studies of the returns from value-growth investment strategies. Panel A of the Table draws from Fama and French (1992), which sorts stocks on the New York, American and Nasdaq markets into ten portfolios based on stocks' book-to-market (panel A1) or earnings-to-price (panel A2) ratios. The top and bottom decile portfolios are each further divided into equal halves.

In the sort by book-to-market, the highest-ranked (value) portfolio generates an average return of 1.83 percent. Compared to the average return on the lowest-ranked (glamour) portfolio of 0.30 percent, value stocks come out ahead by 1.53 percent per month. At the same time, the market betas of the portfolios are very close to each other so systematic risk is not an obvious suspect for explaining the differences in returns. Value stocks with high book-to-market on average tend to be smaller than growth stocks, however: the logarithm of size for the top (bottom) portfolio is 2.65 (4.53). It is thus possible that part of the book-to-market effect reflects the historical premium of small firms over large firms (see Banz (1981)).

Lakonishok, Shleifer and Vishny (1994) provide similar findings based on NYSE and American Exchange stocks. Since they report buy-and-hold returns over several years following portfolio formation, their results are particularly relevant from the perspective of a long-term investor. In panel B1, value stocks

(portfolio 10) out-perform growth stocks (portfolio 1) by 10.5 percent per year on average over the five years following portfolio formation. The superior returns persist even after controlling for the above-noted differences in size. The average size-adjusted return over the five post-formation years for the value portfolio is 3.5 percent compared to -4.3 percent for the growth portfolio, resulting in a spread of 7.8 percent. The book-to-market effect, in other words, is not subsumed by the size effect.

While the book-to-market ratio has garnered the lion's share of attention as an indicator of value-growth orientation, it is by no means an ideal measure. To take an example from market conditions as of mid-2002, a stock such as AOL-Time Warner would generally be classified as a "cheap" stock in terms of book-to-market. By many other yardsticks such as earnings or dividends relative to price, however, the stock would look less attractive from the value standpoint. This suggests that other measures might also serve as the bases for investment strategies. As an illustration, panels A2 and B2 provide results based on the ratio of earnings to price. The return spreads based on earnings-to-price, however, are generally lower than the spreads based on book-to-market. For instance, the sort by this variable in panel A2 of Table 1 yields return spreads of 0.68 percent per month between the extreme portfolios. The spread in size-adjusted average returns over five post-formation years is 5.4 percent per year (see panel B2). Note that in both cases the sorts use only stocks that have positive earnings at the portfolio formation date. The narrower spreads associated with the earnings yield may be due to the noisy nature of earnings. For instance, the category of stocks with low earnings-to-price ratios includes not only stocks that are conventionally deemed to be "growth" stocks (whose current earnings are low but whose future growth prospects are perceived to be high) but also stocks that have stumbled and have temporarily depressed earnings.

Another valuation indicator that has been relatively overlooked in academic research is the ratio of cash flow to price. In its simplest form, cash flow is measured as earnings plus depreciation. Portfolios formed from this investment strategy generate relatively larger return spreads. In panel B3, the portfolio ranked highest by cash flow to price earns on average 20.1 percent per year over five years (3.9 percent after adjusting for size). The difference between the extreme portfolios with respect to average size-adjusted returns over five years is 8.8 percent. To the extent that the different indicators are not too highly correlated, these results suggest that a strategy based on several signals may enhance portfolio performance.

It is possible that these findings are the result of a collective data-snooping exercise by many researchers sifting through the same data. If so, the success of value strategies may not hold up in other periods or other markets. Some comfort that this is not the case is afforded by another early study by Chan, Hamao and Lakonishok (1991). Their contribution is to study the Japanese stock market, which had not previously been examined in depth, even though it was at that time almost as large as the U.S. market in terms of capitalization. Panel C of Table 1 provides some of their key findings. The return differential between the highest and lowest quartile of stocks ranked by book-to-market is 1.1 percent per month. Their results for earning-to-price and cash flow-to-price are similar to the U.S. evidence. Finally, the Japanese evidence does not indicate that value stocks have higher total risk, as measured by the standard deviation of monthly returns, compared to growth stocks.

The Chan, Hamao and Lakonishok findings take on added force in light of the conditions of the Japanese market at the time they conducted their study. In particular the popular sentiment was that, given the spectacular run-up in Japanese stock prices in the 1980s, equity values in Japan could not be analyzed using conventional approaches developed on U.S. data. The fact that the same overall findings emerge in two markets with very different conditions bolsters confidence that data-mining is not the culprit.

Table 2 (adapted from Fama and French (1998)) provides results for a broad sample of countries. Value and glamour are also defined under a variety of indicators, ranging from book-to-market value of equity to ratios of either earnings, cash flow, or dividends, to price. The consistency of the evidence is impressive. In almost every country, the value portfolio generates a higher average return than the glamour portfolio. The results hold up across the variety of value-growth indicators. The table also reports the standard deviations of the returns on each portfolio. In general, the return volatilities of the value portfolios are not notably different from the volatilities of the glamour portfolios. Fama and French also report similar results for emerging stock markets.

The results above indicate that value stocks in general out-perform glamour stocks across all eligible stocks. In practice, however, the investable equity universe for many portfolio managers tends to be limited to larger-capitalization stocks, which tend to be more liquid. Table 3 (from Fama and French (1992)) checks up on whether the performance of value strategies holds up for larger stocks. Portfolios are formed by

sorting first on size (based on NYSE breakpoints) and then, within each size category, by book-to-market. In the category of the smallest firms (size decile 1), the portfolio of value stocks has an average return of 1.92 percent per month, which is 1.22 percent higher than the average return of the glamour stock portfolio. Value stocks still earn higher returns in the category of the largest stocks, but the margin is less substantial (0.25 percent per month). Putting aside risk-based explanations, smaller firms are less widely followed and the costs of arbitrage may be higher for these stocks. As a result, mispricing patterns might be more pronounced in this segment of the market, yielding richer opportunities for a value strategy.

## **2 Explaining the performance of value strategies**

While the evidence on returns is relatively uncontroversial, the situation is far less settled when it comes to providing an explanation for the differences between the performance of value and growth portfolios.

Fama and French (1996) argue that stocks with high ratios of book equity to market value are more prone to financial distress and hence riskier. They employ a version of the Merton (1973) multi-factor asset pricing model to account for value stocks' higher risk exposures to a financial distress factor, and hence their higher returns. This argument, however, stretches credulity. On the basis of the risk argument, it would follow that Internet stocks which had virtually no book value but stellar market values were much less risky than traditional utility stocks which typically have high book values of equity relative to market. It is also noteworthy that the idea that value stocks have higher risk surfaced only after their higher returns became apparent. Data snooping is considered to be a sin, and coming up with ad hoc risk measures to explain returns should be regarded as no less of a sin.<sup>2</sup>

Lakonishok, Shleifer and Vishny (1994) argue against this “metaphysical” approach to risk, whereby higher average returns on an investment strategy must necessarily reflect some source of risk. Instead they follow a more conventional approach and argue that risk does not explain the differences in returns. To develop the point, Table 4 provides the returns and other characteristics of portfolios formed by classifying

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<sup>2</sup>Daniel and Titman (1997) investigate the argument that differences in comovement patterns of value and glamour stocks account for their returns. They find that differences in factor loadings do not explain the return premiums on value stocks.

stocks along two indicators: cash flow to price and past growth in sales.<sup>3</sup> As noted above, using two signals helps to lower the chance of misclassifying stocks into value and growth categories. A stock with high cash flow per dollar of share price, as well low past growth in sales, is more likely to be a value stock with low expected future growth. In comparison investors are more prone to regard a stock with low cash flow relative to price and high past sales growth as having more favorable future growth prospects.

Panel A of Table 4 covers familiar ground: the portfolio of value stocks on average out-performs the glamour stock portfolio by 7.8 percent per year, or 8.7 percent on a size-adjusted basis. These differences in returns are not accompanied by notable differences in traditional measures of risk, including beta and volatility.

It is possible, however, that these are crude proxies that do not capture all the relevant risks of the two portfolios. Panel B of the table provides a more direct evaluation of the risk-based explanation. If the value strategy is fundamentally riskier, then it should under-perform relative to the growth strategy during undesirable states of the world when the marginal utility of wealth is high. The key to the risk argument, then, is to identify such undesirable states. One natural choice is to look at months where the overall stock market does poorly. Down-market months generally correspond to periods where aggregate wealth is low so the utility of an extra dollar is high. The approach of examining portfolio performance during down-markets also corresponds to the notion of downside risk that has gained popularity recently in the investment community. Along the same lines, periods where the economy suffers downturns and growth shrinks could also be singled out as low-wealth states.

Lakonishok et al. (1994) follow both approaches to assess the risk of their value strategies. In particular, they isolate the 25 months with the worst stock market performance (the lowest return on the equally-weighted market index), the other 88 months with negative market returns remaining after the worst 25, the 122 months with positive market returns excluding the best 25, and the 25 months with the best market performance. Returns on the value and glamour portfolios over the corresponding months are reported in panel B of table 4. In “bad” states of the world, where the market return is negative, value stocks do better

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<sup>3</sup>In each year prior to portfolio formation, the growth rate of sales is calculated for each firm and ranked. The sales growth classification is based on a firm’s sales growth ranks over the previous five years.

than glamour stocks. Over all months where the market return is negative but excluding the worst 25, the return advantage to value stocks is 1.4 percent on average. The improvement in returns to value stocks is somewhat more pronounced in the worst 25 months, where the value portfolio out-performs the glamour portfolio by 1.8 percent. In “good” states where the market earns a positive return, the value portfolio at least matches the performance of the glamour portfolio. When the experiment is repeated, only using quarterly growth in real GNP as the indicator of “good” or “bad” states, the results are similar. Notably, the value portfolio does not suffer more during down-periods of poor GNP growth: rather, it does better than the glamour portfolio by 5 percent per quarter.<sup>4</sup> All in all, the evidence does not support the view that the superior returns on value stocks reflect their higher fundamental risk.

A competing explanation for the returns on value stocks draws on behavioral and agency cost considerations. Studies in psychology suggest that individuals tend to use simple heuristics for decision-making, opening up the possibility of judgmental biases in investment behavior (see Kahneman and Riepe (1998) and Shleifer (2000) for examples and further elaboration). In particular, investors may extrapolate past performance too far into the future. As panel C of Table 4 indicates, value stocks tend to have a past history of poor performance with respect to growth in earnings, cash flow and sales. Conversely, glamour stocks have out-shone their value counterparts in terms of past growth. Insofar as investors and brokerage analysts overlook the lack of persistence in growth rates (see Chan, Karceski and Lakonishok (2002)) and instead project past growth into the future, favorable sentiment is created for glamour stocks. Furthermore, analysts have a self-interest in recommending successful stocks in order to generate trading commissions as well as investment banking business. Typically, growth stocks come from exciting industries and hence are easier to tout in terms of analyst reports and media coverage. All these considerations play into the career concerns of professional money managers and pension plan executives (see Lakonishok, Shleifer and Vishny (1992)). Such individuals may feel vulnerable holding a portfolio of companies that are tainted by lackluster past performance, so they gravitate toward successful growth-oriented stocks. The upshot of all these considerations is that value stocks become under-priced, and glamour stocks over-priced, relative to their

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<sup>4</sup>Since stock returns tend to lead the real economy, the performance of the value and glamour portfolios is measured in the quarter preceding growth in GNP.

fundamentals. Due to limits of arbitrage (Shleifer and Vishny (1997)), the mispricing patterns can persist over long periods of time.

Chan, Karceski and Lakonishok (2002) provide some evidence on the existence of extrapolative biases in the pricing of value and glamour stocks. The common presumption is that the book-to-market ratio is a measure of a firm's future growth opportunities relative to its accounting value. Accordingly a low ratio of book equity relative to market value suggests that investors expect high future growth prospects compared to the value of assets in place. If these expectations are correct, there should be a negative association between the book-to-market ratio and future realized growth. To check whether the ratio predicts future growth, Chan, Karceski and Lakonishok rank stocks by growth in income before extraordinary items over a five-year horizon (only stocks with positive income in the base year enter the sample). Based on the ranking, stocks are placed into one of ten deciles. Within each decile, they find the median book-to-market ratio at the beginning of the five-year horizon, and also at the end. The procedure is repeated at the beginning of each year from 1951 to 1998.

The association between book-to-market ratios and future growth is weak. The stocks ranked in the top decile by growth in net income typically have a book-to-market ratio of 0.880 at the beginning. This is higher than the average book-to-market ratio across all stocks of 0.96, so investors do not anticipate these firms' future success. Typically, then, stocks fetching high valuation ratios of book-to-market or price-to-earnings wind up falling short of investors' hopes. On the other hand the ex post book-to-market ratio tracks growth closely. Investors are quick to jump on the bandwagon and chase stocks with high past growth. After the period of high growth, the top decile of companies trade at a book-to-price ratio of 0.560 (the lowest across the deciles). Conversely, investors punish the companies with the lowest realized growth. In decile portfolio 1, the median ex post book-to-market ratio is 1.115 (the highest across the deciles).

If investors incorrectly anchor on past growth as a basis for growth forecasts and for valuation, prices should subsequently adjust as actual growth materializes. Evidence on whether such corrections take place is provided by La Porta (1996) and La Porta, Lakonishok, Shleifer and Vishny (1997). La Porta et al. look at returns around earnings announcements for value and glamour portfolios based on sorts by book-to-market. Table 5 reports some of their findings. An additional benefit of working with announcement

returns is that over short intervals differences in risk are less likely to be an issue. In the first year after portfolio formation investors tend to be disappointed as news emerges about the earnings of glamour stocks. The cumulative event return is -0.5 percent for the glamour portfolio. Conversely investors are pleasantly surprised around announcements of value stocks' earnings; the cumulative event return for these stocks is 3.5 percent in the first year. The contrast between the market's response to the subsequent earnings performance of the two portfolios is large and statistically significant in the second and third years as well. This evidence supports the argument that expectational errors are at least part of the reason for the superior returns on value stocks. Specifically, investors have exaggerated hopes about growth stocks, and end up being disappointed when future performance falls short of the unrealistically high hurdle. By the same token they are unduly pessimistic about value stocks and wind up being pleasantly surprised.

### **3 The evidence updated**

The bulk of the academic evidence on the returns to value and glamour strategies covers the period ending in the mid-1990s. In this section we update the evidence to 2001. This is an interesting exercise on several fronts. First it provides an out-of-sample check on the profitability of value strategies. To the extent that investors became aware of the benefits to value strategies and adjusted their portfolios, the rewards to value investing may have been arbitrated away. In a similar vein, such a response may have been responsible for the demise of the "small firm effect" after the 1980s. More notably, the late 1990s witnessed the stunning boom in growth stocks and "dot-com" mania. Investors' ardor for technology, media, and telecommunications issues reached feverish heights, and propelled prices of such stocks to stellar levels. Growth stocks in general earned returns far outstripping those on value stocks.

Table 6 presents returns on benchmark indexes from Frank Russell Company that capture the performance of various equity asset classes: large, medium and small-capitalization stocks, subdivided into growth and value categories. The later part of the 1990s were harsh on value stocks. From 1996 to 1999 the geometric mean annual return on the Russell 1000 index of large growth stocks is 31.2 percent compared to 19.5 percent for the Russell 1000 large value index. The performance is particularly striking for the largest

stocks. The Top 200 growth index posted an average return of 33.3 percent over this period, while the Russell 2000 index of small value stocks languished and earned only 10.2 percent. These trends prompted analysts and journalists to speculate on the emergence of a new paradigm in equity investing which would make the value-oriented investor an endangered species.

Chan, Karceski and Lakonishok (2000) sort out the competing explanations for the relative stock-price performance of the various equity asset classes over the late 1990s. They do this by examining whether changes in the relative valuations of the equity classes and their returns are accompanied by changes in operating profitability. Under a rational pricing model, for example, the sizzling performance of growth stocks in the late 1990s could be explained by a sequence of unanticipated positive shocks to cash flows (assuming there is no shift in relative risks so discount rates are unaltered). A “new paradigm” perspective would further posit that these shocks have yet to be fully absorbed in equity values, so the returns to growth investing will persist for some time in the future.

Table 7 excerpts some of the findings in Chan, Karceski and Lakonishok (2000). Since the main contrast concerns the performance of the largest stocks, we only provide the results for the largest 200 stocks each year classified as either growth or value on the basis of book-to-market ratios. To get a robust picture of operating performance, we focus on the behavior of operating income before depreciation, which is less noisy than net income.<sup>5</sup>

Panel A of Table 7 highlights the rapid ascent in the ratio of price to operating income for large growth stocks. At the beginning of 1999, the price-to-income multiple for this category stood at 17.60, an unprecedented level relative to its historical average value of 7.42. Large value stocks also fetched a relatively high multiple in 1999, but the break from its historical average is much less eye-catching. The overall effect is a sharp expansion of price-to-income multiples for growth stocks relative to value stocks. The widening was further exacerbated in the remainder of 1999 and the first quarter of 2000.

To justify the record-shattering level of the multiple for large growth stocks within a rational pricing framework, there must have been a dramatic rise in their operating performance in the recent period. Yet

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<sup>5</sup>Chan, Karceski and Lakonishok (2000) also provide results on several performance indicators, under different methodologies for calculating profitability growth.

growth in operating income before depreciation shows no dramatic differences between large growth and large value stocks over 1996–98 (see panel B).

Hence, although large growth stocks earned returns wildly in excess of their historical average, they did not enjoy a parallel boom in operating performance.<sup>6</sup> Rather, the rich pricing of these stocks reflected investors' rosy expectations of future growth and firms' ability to sustain growth. This belief would appear to be at odds with the increasing competitiveness of world markets, and the extreme difficulty of maintaining market position in the rapidly changing features of the modern environment. Conversely small and mid-cap value stocks have fallen out of favor with investors, even though their recent operating performance has not been poor.

Even with the experience of the late 1990s factored in, the historical results are still favorable for value investing. From the inception of the broad Russell indexes in 1979 to the end of April 2002, value outperforms growth (see Table 6). The margin of performance is wider in the smaller stocks: returns for the Russell 2000 value and growth indexes are 16.42 and 10.71 percent respectively. In the case of the larger stocks in the Russell 1000, however, the advantage to value stocks is not especially striking. The geometric mean return over 1979 to 2002 is 15.22 percent for the value stocks in the Russell 1000, compared to 13.24 percent for the Russell 1000 growth stocks. Nonetheless, the value indexes have lower standard deviations than the growth benchmarks, so they should be appealing on this account as well.

One caveat about the Russell benchmarks used in Table 6 bears mention. The indexes do not represent extreme bets on growth or value compared to, say, the extreme decile portfolios in sorts by book-to-market. Moreover, the underlying stocks are value-weighted in the index and rely on just two indicators of value-growth orientation, namely book-to-market and analysts' long-term growth forecasts. There is, however, no reason not to use more comprehensive measures of value orientation in order to diversify across signals of expected return. The results from this exercise are reported in Table 8.

In Table 8 portfolios are formed by sorting stocks on a composite indicator. The composite includes

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<sup>6</sup>It is always possible that future growth in profitability will differ radically from past patterns, and its effects have not shown up yet in the historical record. This argument, however, would require very bold assumptions to rationalize the stellar valuations witnessed in 1999 and early 2000. See Asness (2000), and Chan, Karceski and Lakonishok (2000,2002) for further discussion.

variables such as the book-to-market value of equity, cash flow relative to price, earnings yield and the sales-to-price ratio. The composite pools information from several valuation measures so as to do a better job in identifying stocks that are undervalued relative to their fundamentals. In panel A of the table the investable universe comprises large capitalization stocks, while in panel B small stocks make up the universe. Buy-and-hold returns over the first year following portfolio formation are reported for the bottom two deciles (the glamour portfolios) and for the top two deciles (the value portfolios).

From 1979 when returns on the Russell 1000 index become available to 2001, the geometric mean return on the deep value portfolio (decile 10) for large stocks is 20.4 percent. This exceeds the return on the Russell 1000 value index (15.4 percent), so the use of multiple measures in the composite indicator boosts the performance of the value strategy. Similarly, when applied to the small stock universe, the strategy on average yields a better return for the top decile portfolio than the return on the Russell 2000 value benchmark.

In the last column of each panel in Table 8, returns are averaged over the top and bottom two deciles and the spread in returns is calculated. Over the full sample period 1969–2001, the return differential averages 10.4 percent in favor of value investing for the large stock universe. In panel A the value-growth spread is positive in 23 out of 33 years, or seventy percent of the cases. Echoing the results in Table 3, the gap is more pronounced for small stocks (panel B), where the return spread is 18.8 percent. Value earns a positive return spread over growth seventy six percent of the time (in 25 out of 33 years). Taking the more recent years into account, the large value portfolios fall behind the growth portfolios in 1998 and 1999, but the average spread over the entire decade of the 1990s is still substantial. From 1990 to 2001 the difference amounts to 12.2 percent for large stocks and 19.4 percent for small stocks. In short, value investing appears to be alive and well.

## **4 Conclusion**

A large body of empirical research indicates that value stocks on average earn higher returns than growth stocks. The reward to value investing is more pronounced for small stocks but it is also present in the larger stocks. The value premium also exists in equity markets outside the U.S.

The bulk of the empirical research documenting the superiority of value investing stops short of the late 1990s, which have not been kind for value stocks. Growth stocks rocketed in value, prompting speculation that value investors were an endangered species. A more careful examination, however, suggests that the differences across the performance of equity classes in the late 1990s were not grounded on fundamental patterns of profitability growth. Instead, the most plausible interpretation of the events of the late-1990s is that investor sentiment reached exaggerated levels of optimism about the prospects for technology, media and telecommunications stocks. The resulting valuations were hard to reconcile with economic logic.

Similarly, the sharp rise and decline in recent years of technology and other growth-oriented stocks calls into question the argument that growth stocks are less risky investments. Rather, the evidence suggests that value stocks are not more risky than growth stocks, based on a variety of indicators including beta and return volatility. Indeed, using one popular risk indicator which focuses on performance in down markets, value stocks suffer less severely than growth stocks when the stock market or the overall economy does poorly. Under any but a metaphysical definition of risk, therefore, the superior performance of value stocks cannot be attributed to their risk exposures. Instead a more convincing explanation for the value premium rests on features of investor behavior as well as the agency costs of delegated investment management. Several studies provide evidence in support of extrapolative biases in investor behavior.

The argument that the value premium is an artifact of data-snooping poses a tougher challenge. In this respect, however, two features of the debate about value investing are crucial. In particular, a logically coherent account exists that can explain the returns to value stocks, and there is empirical support for the extrapolation hypothesis. These features distinguish the value premium from many other anomalous patterns that have been documented on stock returns. Many apparent violations of the efficient markets hypothesis, such as day-of-the-week patterns in stock returns, lack a convincing logical basis. In the absence of a plausible rationale, there is a legitimate concern that the anomalous pattern is merely a statistical fluke that has been uncovered through data-mining. Instead, the value premium reflects ingrained patterns of investor behavior or the incentives of professional investment managers. As in the case of numerous past episodes in financial history, investors will continue to extrapolate from the past and get excessively excited about promising new technologies. They will overbid the prices of growth stocks, and conversely, beat down

value stocks too low. As a result, patient investing in value stocks will continue to be a rewarding long-term investment strategy.

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Table 1  
Returns (in percent) and characteristics for value-growth investment strategies

Results in part A are from Fama and French (1992). The sample is all NYSE, Amex and Nasdaq stocks with data on returns and accounting information. Monthly returns on equally-weighted portfolios are measured from July 1963 to December 1990. Results in part B are from Lakonishok, Shleifer and Vishny (1994), using all NYSE and Amex stocks with data on returns and accounting information. Buy-and-hold returns on equally-weighted portfolios are measured annually from April each year, starting from 1968 to 1989. Part C is from Chan, Hamao and Lakonishok (1991), based on all stocks in the first and second sections of the Tokyo Stock Exchange. Monthly equally-weighted portfolio returns are measured from June 1971 to December 1988. In the sorts by earnings-to-price and cash flow-to-price ratios, results are provided only for stocks with positive earnings or positive cash flow at the portfolio formation date.

**A. Fama and French (1992)**

Variable	1A	1B	2	3	4	5	6	7	8	9	10A	10B
<i>(1): Sorted by book-to-market</i>												
Monthly return	0.30	0.67	0.87	0.97	1.04	1.17	1.30	1.44	1.50	1.59	1.92	1.83
Beta	1.36	1.34	1.32	1.30	1.28	1.27	1.27	1.27	1.27	1.29	1.33	1.35
Log Size	4.53	4.67	4.69	4.56	4.47	4.38	4.23	4.06	3.85	3.51	3.06	2.65
<i>(2) Sorted by earnings-to-price</i>												
Monthly return	1.04	0.93	0.94	1.03	1.18	1.22	1.33	1.42	1.46	1.57	1.74	1.72
Beta	1.40	1.35	1.31	1.28	1.26	1.25	1.26	1.24	1.23	1.24	1.28	1.31
Log Size	3.64	4.33	4.61	4.64	4.63	4.58	4.49	4.37	4.28	4.07	3.82	3.52

**B. Lakonishok, Shleifer and Vishny (1994)**

Variable	1	2	3	4	5	6	7	8	9	10
<i>(1): Sorted by book-to-market</i>										
Annual return	11.0	11.7	13.5	12.3	13.1	15.4	15.4	17.0	18.3	17.3
Average annual return over 5 years	9.3	12.5	14.6	15.4	15.8	16.6	18.4	18.9	19.6	19.8
Size-adjusted average annual return	-4.3	-2.0	-0.30	0.4	0.6	1.2	2.4	2.8	3.3	3.5
<i>(2) Sorted by earnings-to-price</i>										
Annual return	12.3	12.5	14.0	13.0	13.5	15.6	17.0	18.0	19.3	16.2
Average annual return over 5 years	11.4	12.6	14.3	15.2	16.0	16.7	18.8	19.1	19.6	19.0
Size-adjusted average annual return	-3.5	-2.4	-0.9	-0.1	0.5	1.3	2.6	2.6	2.9	1.9
<i>(3) Sorted by cash flow-to-price</i>										
Annual return	8.4	12.4	14.0	14.0	15.3	14.8	15.7	17.8	18.3	18.3
Average annual return over 5 years	9.1	12.2	14.5	15.7	16.6	17.1	18.0	19.2	19.9	20.1
Size-adjusted average annual return	-4.9	-2.5	-0.6	0.5	1.3	1.9	2.5	3.4	3.7	3.9

**C. Chan, Hamao and Lakonishok (1991)**

Variable	1	2	3	4
<i>(1): Sorted by book-to-market</i>				
Monthly return	1.3	1.7	1.9	2.4
Monthly standard deviation	4.3	4.3	4.3	4.6
<i>(2) Sorted by earnings-to-price</i>				
Monthly return	1.5	1.7	1.8	1.9
Monthly standard deviation	4.3	4.1	4.1	4.3
<i>(3) Sorted by cash flow-to-price</i>				
Monthly return	1.4	1.7	1.9	2.2
Monthly standard deviation	4.1	4.1	4.3	4.6

Table 2  
Annual U.S. dollar returns (in excess of U.S. T-bill rate)  
for value and glamour portfolios, by country

Results are from Fama and French (1998). In each market stocks are sorted at the end of each year by book-to-market, earnings-to-price, cash flow to price, and dividend to price ratios. The value portfolio in each market comprises the top thirty percent of stocks when ranked by the corresponding ratio; the glamour portfolio comprises the bottom thirty percent of ranked stocks. The market return in each country is the capitalization-weighted average across all stocks. The numbers in parentheses below each portfolio average return gives the standard deviation of annual returns. The sample period is 1975–1995.

	Market	Sorted by:							
		Book-to-market		Earnings-price		Cash flow-price		Dividend-price	
		Value	Glamour	Value	Glamour	Value	Glamour	Value	Glamour
U.S.	9.57 (14.64)	14.55 (16.92)	7.75 (15.79)	14.09 (18.10)	7.38 (15.23)	13.74 (16.73)	7.08 (15.99)	11.75 (13.89)	8.01 (17.04)
Japan	11.88 (28.67)	16.91 (27.74)	7.06 (30.49)	14.14 (26.10)	6.67 (27.62)	14.95 (31.59)	5.66 (29.22)	16.81 (35.01)	7.27 (27.51)
U.K.	15.33 (28.62)	17.87 (30.03)	13.25 (27.94)	17.46 (32.32)	14.81 (27.00)	18.41 (35.11)	14.51 (26.55)	15.89 (32.18)	12.99 (26.32)
France	11.26 (32.35)	17.10 (36.60)	9.46 (30.88)	15.68 (37.05)	8.70 (32.35)	16.17 (36.92)	9.30 (31.26)	15.12 (30.06)	6.25 (33.16)
Germany	9.88 (31.36)	12.77 (30.35)	10.01 (32.75)	11.13 (24.62)	10.58 (34.82)	13.28 (29.05)	5.14 (26.94)	9.99 (24.88)	10.42 (34.42)
Italy	8.11 (43.77)	5.45 (35.53)	11.44 (50.65)	7.62 (42.36)	12.99 (54.68)	11.05 (43.52)	0.37 (38.42)	10.07 (38.28)	12.68 (56.66)
Netherlands	13.30 (18.81)	15.77 (33.07)	13.47 (21.01)	14.37 (21.07)	9.26 (20.48)	11.66 (33.02)	11.84 (23.26)	13.47 (21.38)	13.05 (30.81)
Belgium	12.62 (25.88)	14.90 (28.62)	10.51 (27.63)	15.12 (30.47)	12.90 (27.88)	16.46 (28.84)	12.03 (25.57)	15.16 (26.47)	12.26 (29.26)
Switzerland	11.07 (27.21)	13.84 (30.00)	10.34 (28.57)	12.59 (31.44)	11.04 (28.81)	12.32 (36.58)	9.78 (27.82)	12.62 (31.00)	10.44 (27.83)
Sweden	12.44 (24.91)	20.61 (38.31)	12.59 (26.26)	20.61 (42.43)	12.42 (24.76)	17.08 (30.56)	12.50 (23.58)	16.15 (29.55)	11.32 (25.13)
Australia	8.92 (26.31)	17.62 (21.03)	5.30 (27.32)	15.64 (28.19)	5.97 (28.89)	18.32 (29.08)	4.03 (27.46)	14.62 (28.43)	6.83 (28.57)
Hong Kong	22.52 (41.96)	26.51 (48.68)	19.35 (40.21)	27.04 (44.83)	22.05 (40.81)	29.33 (46.24)	20.24 (42.72)	23.66 (38.76)	23.30 (42.05)
Singapore	13.31 (27.29)	21.63 (36.89)	11.96 (27.71)	15.21 (29.55)	13.12 (34.68)	13.42 (26.24)	8.03 (28.92)	10.64 (22.01)	13.10 (33.92)

Table 3  
 Monthly returns (in percent) for value and glamour  
 portfolios by market capitalization categories

Results are from Fama and French (1992). The sample is all NYSE, Amex and Nasdaq stocks with data on returns and accounting information. Monthly returns on equally-weighted portfolios are measured from July 1963 to December 1990. Portfolios are formed in June each year by ranking stocks on size into ten portfolios based on breakpoints from NYSE stocks. Within each size category stocks are further classified into one of ten portfolios based on book-to-market ratio. The column labelled "All" reports equally-weighted portfolio average returns for each size category; the row labelled "All" reports equally-weighted average returns for all stocks classified in the specified book-to-market category.

Sorted by size	Sorted by book-to-market										
	All	1 (Glamour)	2	3	4	5	6	7	8	9	10 (Value)
All	1.23	0.64	0.98	1.06	1.17	1.24	1.26	1.39	1.40	1.50	1.63
1 (Small)	1.47	0.70	1.14	1.20	1.43	1.56	1.51	1.70	1.71	1.82	1.92
2	1.22	0.43	1.05	0.96	1.19	1.33	1.19	1.58	1.28	1.43	1.79
3	1.22	0.56	0.88	1.23	0.95	1.36	1.30	1.30	1.40	1.54	1.60
4	1.19	0.39	0.72	1.06	1.36	1.13	1.21	1.34	1.59	1.51	1.47
5	1.24	0.88	0.65	1.08	1.47	1.13	1.43	1.44	1.26	1.52	1.49
6	1.15	0.70	0.98	1.14	1.23	0.94	1.27	1.19	1.19	1.24	1.50
7	1.07	0.95	1.00	0.99	0.83	0.99	1.13	0.99	1.16	1.10	1.47
8	1.08	0.66	1.13	0.91	0.95	0.99	1.01	1.15	1.05	1.29	1.55
9	0.95	0.44	0.89	0.92	1.00	1.05	0.93	0.82	1.11	1.04	1.22
10 (Large)	0.89	0.93	0.88	0.84	0.71	0.79	0.83	0.81	0.96	0.97	1.18

Table 4  
Returns (in percent), risk and past performance  
for value and glamour portfolios

	Glamour	Value	Difference (Value - Growth)
Panel A: Post-formation returns and risk measures			
Average annual return over 5 post-formation years	11.4	22.1	10.7
Size-adjusted average annual return	-3.3	5.4	8.7
Beta	1.25	1.32	
Standard deviation of return	21.6	24.1	
Standard deviation of size-adjusted return	6.1	6.5	
Panel B: Post-formation returns over good and bad states			
Return during worst 25 stock market months	-10.3	-8.6	1.8
Return during months with negative market return, excluding 25 worst	-2.9	-1.5	1.4
Return during months with positive market return, excluding 25 best	3.8	4.0	0.2
Return during best 25 stock market months	11.0	12.4	1.4
Return during worst 10 quarters of GNP growth	-0.9	4.1	5.0
Return during next worst 34 quarters of GNP growth	1.1	2.7	1.6
Return during next best 34 quarters of GNP growth	2.6	4.6	2.0
Return during best 10 quarters of GNP growth	10.3	13.9	3.6
Panel C: Pre-formation performance and returns			
Average growth rate of earnings from five years before to portfolio formation	14.2	8.2	-6.0
Average growth rate of cash flow from five years before to portfolio formation	21.0	7.8	-13.2
Average growth rate of sales from five years before to portfolio formation	11.2	1.3	-9.9
Cumulative stock return from three years before to portfolio formation	139.0	22.5	-116.5

Results are from Lakonishok, Shleifer and Vishny (1994). The sample is all NYSE and Amex stocks. Monthly returns on equally-weighted portfolios are measured from May 1968 to April 1990. Portfolios are formed in April each year by sorting stocks into three groups by cash flow relative to market equity, and independently by average growth rate of sales over five pre-formation years. The glamour portfolio comprises the intersection of the lowest-ranked category by cash flow to price and the highest-ranked by past sales growth. The value portfolio is the intersection of the highest-ranked category by cash flow to price and the lowest-ranked by past sales growth. Panel A reports average annual buy-and-hold returns over the five post-formation years, as well as the average annual size-adjusted returns. Betas with respect to the value-weighted CRSP index, standard deviations of the raw and size-adjusted returns, based on the annual post-formation returns are also reported. Panel B reports average returns on the two portfolios averaged over the 25 months with the lowest return on the equally-weighted market index; over the remaining months with a negative market return excluding the worst 25 months; over months with a positive market return excluding the best 25 months; and over the 25 months with the highest market return. Calendar quarters are also ranked into the worst 10, next worst 34, next best 34 and best 10 by growth in real GNP. Returns in each of the preceding quarters for the growth and value portfolios are then averaged. Panel C reports geometric mean growth rates for earnings, cash flow and sales for each portfolio from five years before to the portfolio formation date, as well as the cumulative stock return over the three years preceding portfolio formation.

Table 5  
Returns around post-formation period earnings announcements  
for value and glamour portfolios

Results are from LaPorta, Lakonishok, Shleifer and Vishny (1997). The sample is all NYSE, Amex and Nasdaq stocks with data on returns and accounting information. The sample period is 1971–1992. Portfolios are formed in June each year by ranking stocks on book to market value of equity into ten portfolios based on breakpoints from NYSE stocks. For every stock, buy-and-hold returns are measured over a window beginning one day before and ending one day after each earnings announcement over the twenty quarters following portfolio formation. Stock returns are summed over the four quarters in each post-formation year, and the equally-weighted portfolio return is reported. The *t*-statistic for the mean difference between the returns on the value and glamour portfolios is based on the time-series of post-formation returns.

Event returns cumulated over	Sorted by book-to-market				Mean Difference	<i>t</i> -statistic for difference
	1 (Glamour)	2	9	10 (Value)		
First post-formation year	-0.472	0.772	3.200	3.532	4.004	5.65
Second post-formation year	-0.428	0.688	2.828	3.012	.3.440	7.14
Third post-formation year	0.312	0.796	2.492	3.136	2.824	5.12
Fourth post-formation year	0.804	0.812	2.176	2.644	1.840	3.67
Fifth post-formation year	0.424	1.024	1.368	2.432	2.008	4.49

Table 6  
Annual returns for value and growth indexes, 1979–2001

Annual returns on the Russell indexes are from the Frank Russell Company. Returns on the S&P 500 are from Ibbotson Associates.

Year	Russell 3000 Growth Value	Russell Top 200 Growth Value	Russell Mid-Cap Growth Value	Russell 1000 Growth Value	Russell 2000 Growth Value	S&P 500		
1979	26.20	21.85		23.91	20.55	50.83	35.38	18.44
1980	40.74	24.52		39.57	24.41	52.26	25.39	32.42
1981	-11.09	2.49		-11.31	1.26	-9.24	14.85	-4.91
1982	20.51	20.83		20.46	20.04	20.98	28.52	21.41
1983	16.29	29.24		15.98	28.29	20.13	38.64	22.51
1984	-2.75	9.28		-0.95	10.10	-15.83	2.27	6.27
1985	32.69	31.48		32.85	31.51	30.97	31.01	32.16
1986	14.25	18.78	13.99	17.55	17.87	3.58	7.41	18.47
1987	3.92	-0.13	6.45	2.76	-2.19	-10.48	-7.11	5.23
1988	12.00	23.63	10.88	12.92	24.61	20.37	29.47	16.81
1989	34.68	24.22	37.68	31.48	22.70	20.17	12.43	31.49
1990	-1.31	-8.85	1.37	-5.13	-16.09	-17.41	-21.77	-3.17
1991	41.66	25.41	39.41	47.03	37.92	51.19	41.70	30.55
1992	5.22	14.90	3.89	8.71	21.68	7.77	29.14	7.67
1993	3.69	18.65	-0.07	11.19	15.62	13.36	23.84	9.99
1994	2.20	-1.95	4.85	-2.17	-2.13	-2.43	-1.55	1.31
1995	36.57	37.03	38.65	33.98	34.93	31.04	25.75	37.43
1996	21.88	21.60	25.57	17.48	20.26	11.26	21.37	23.07
1997	28.74	34.83	33.73	22.54	34.37	12.95	31.78	33.36
1998	35.02	13.50	45.09	17.86	5.08	1.23	-6.45	28.58
1999	33.82	6.64	29.68	51.29	-0.11	43.10	-1.49	21.04
2000	-22.42	8.02	-24.51	-11.75	19.19	-22.44	22.82	-9.11
2001	-19.63	-4.33	-20.50	-20.16	2.33	-9.24	14.02	-11.88
Jan – Apr 2002	-10.10	1.46	-11.32	-6.97	7.82	-4.08	13.44	-5.80
Geometric mean (from 1979)	13.00	15.30		13.24	15.22	10.71	16.42	14.15
Standard deviation (from 1979)	18.53	14.16		18.33	14.22	24.07	16.27	15.13
Geometric mean (from 1986)	11.18	12.96		11.59	13.05	7.11	12.55	12.75
Standard deviation (from 1986)	20.15	13.58		20.64	13.83	20.17	16.94	15.93
Percent of years value exceeds glamour		54			50		67	

Table 7  
Price-to-income multiples and profitability growth  
for large growth and large value portfolios

Results are from Chan, Karceski and Lakonishok (2000). The sample period is 1968–1998, and the sample includes all NYSE, Amex and Nasdaq domestic firms. At the end of June each year the largest 200 companies (by equity market value) are selected and ranked by the ratio of book to market value of equity. Moving from the lowest ranked to the highest ranked, stocks are classified as large growth until fifty percent of the ranked stocks' market capitalization is reached; the remainder are classified as large value. After leaving a window of 18 months, value-weighted portfolios are formed from the stocks in each category. At the beginning of a calendar year each portfolio's ratio of price to operating income before depreciation is measured. Growth in operating income before depreciation is also measured for the stocks in a portfolio relative to the same firms' operating income before depreciation from the prior year. Results are reported for 1996 to 1999, as well as means for price-to-income ratios, and geometric average growth rates, for selected periods.

**Panel A: Price-to-income ratio**

Year	Large Growth	Large Value
1996	8.42	4.57
1997	10.60	4.89
1998	12.67	6.06
1999	17.60	7.27
1970–98	7.42	3.51
1970–79	8.82	3.31
1980–89	5.26	2.83
1990–98	8.27	4.47
1994–98	9.01	4.88
1996–98	10.56	5.17

**Panel B: Portfolio income growth rate**

Year	Large Growth	Large Value
1996	5.5	11.1
1997	13.9	14.2
1998	9.7	3.9
1970–98	10.6	7.1
1970–79	14.0	10.5
1980–89	8.4	5.1
1990–98	9.3	5.5
1994–98	11.6	10.9
1996–98	9.6	9.6

Table 8  
Results for deep value investment strategies, 1969–2001

Annual buy-and-hold returns (in percent) are reported for equally-weighted decile portfolios formed on the basis of multiple fundamental indicators. Returns are also provided for benchmark indexes.

**Panel A: Large stocks**

Year	Portfolio				Russell 1000		9,10 - 1,2
	1 (Glamour)	2	9	10 (Value)	Value	S&P500	
1969	-1.5	-8.3	-21.0	-21.6		-8.5	-16.4
1970	-16.6	-15.7	9.5	2.2		4.0	22.0
1971	37.2	28.4	14.8	12.0		14.3	-19.4
1972	23.8	11.6	11.3	10.8		19.0	-6.7
1973	-32.2	-26.2	-10.2	-21.2		-14.7	13.5
1974	-42.1	-38.6	-18.6	-14.3		-26.5	23.9
1975	19.3	38.5	62.9	61.2		37.2	33.1
1976	6.9	21.0	50.1	54.7		23.8	38.5
1977	-2.4	-4.7	6.2	7.2		-7.2	10.2
1978	11.6	7.9	12.7	16.8		6.6	5.0
1979	41.7	28.9	34.2	30.7	20.6	18.4	-2.8
1980	68.3	48.3	16.8	22.9	24.4	32.4	-38.5
1981	-16.3	-8.0	10.0	14.1	1.3	-4.9	24.2
1982	9.2	14.7	24.8	29.8	20.0	21.4	15.4
1983	16.3	16.7	31.5	39.0	28.3	22.5	18.7
1984	-22.5	-5.1	11.9	15.5	10.1	6.3	27.4
1985	22.8	35.9	35.5	38.3	31.5	32.2	7.6
1986	12.6	8.6	21.9	21.6	20.0	18.5	11.2
1987	-5.4	5.4	1.2	-3.1	0.5	5.2	-1.0
1988	6.9	9.4	33.2	32.7	23.2	16.8	24.8
1989	32.6	27.3	19.1	19.5	25.2	31.5	-10.7
1990	-5.7	-8.7	-15.6	-21.8	-8.1	-3.2	-11.5
1991	62.0	34.4	47.5	55.9	24.6	30.6	3.5
1992	-8.0	3.2	24.0	26.1	13.8	7.7	27.5
1993	16.6	12.9	12.6	20.3	18.1	10.0	1.7
1994	-13.6	-0.1	-0.7	3.1	-2.0	1.3	8.0
1995	29.8	21.7	40.5	39.0	38.4	37.4	14.0
1996	12.0	14.5	22.4	21.5	21.6	23.1	8.7
1997	0.3	19.8	33.1	34.4	35.2	33.4	23.7
1998	19.7	12.8	6.2	-2.0	15.6	28.6	-14.1
1999	62.3	24.7	7.5	12.3	7.4	21.0	-33.6
2000	-34.9	-18.6	14.4	21.6	7.0	-9.1	44.7
2001	-40.0	-26.1	16.8	26.2	-5.6	-11.9	54.5
<b>Geometric means</b>							
1969–2001	4.5	6.7	15.6	16.4		11.4	10.4
1979–2001	7.9	10.4	18.6	20.4	15.4	15.1	10.4
1990–2001	3.8	6.0	16.1	18.0	12.9	12.9	12.2

**Panel B: Small stocks**

Year	Portfolio				Russell 2000 Value	Russell 2000	9,10 - 1,2
	1 (Glamour)	2	9	10 (Value)			
1969	-30.2	-13.8	-20.5	-25.0			-0.7
1970	-35.9	-24.3	-2.4	10.1			33.9
1971	29.0	18.9	14.1	15.9			-8.9
1972	13.5	-0.4	12.7	6.5			3.1
1973	-35.1	-40.1	-30.0	-25.8			9.7
1974	-42.5	-39.1	-19.3	-11.6			25.3
1975	46.4	50.6	69.8	62.1			17.4
1976	28.0	41.8	54.9	49.9			17.5
1977	9.0	13.6	17.0	18.4			6.4
1978	18.3	21.7	19.2	19.8			-0.5
1979	56.1	59.8	28.0	32.6	35.4	43.1	-27.7
1980	65.3	57.6	23.2	28.6	25.4	38.6	-35.5
1981	-38.5	-16.8	20.0	25.7	14.9	2.0	50.5
1982	5.3	13.2	33.5	44.7	28.5	24.9	29.9
1983	3.4	16.2	41.3	52.3	38.6	29.1	37.0
1984	-30.0	-19.7	15.0	19.3	2.3	-7.3	42.0
1985	23.2	29.6	41.0	41.0	31.0	31.1	14.6
1986	-0.9	7.0	13.7	24.7	7.4	5.7	16.1
1987	-18.7	-10.3	-6.1	4.0	-7.1	-8.8	13.5
1988	-5.2	13.3	39.2	37.2	29.5	24.9	34.1
1989	26.3	19.3	17.5	12.8	12.4	16.2	-7.7
1990	-24.0	-14.6	-19.3	-22.0	-21.8	-19.5	-1.4
1991	51.0	38.8	48.4	46.0	41.7	46.1	2.3
1992	-21.3	-2.2	28.0	29.4	29.1	18.4	40.4
1993	-5.9	10.0	18.5	18.3	23.8	18.9	16.3
1994	-35.2	-11.3	2.8	4.0	-1.6	-1.8	26.7
1995	27.8	35.4	32.9	32.0	25.8	28.4	0.9
1996	-7.5	13.9	29.3	28.6	21.4	16.5	25.7
1997	-11.7	3.6	40.1	39.3	31.8	22.4	43.7
1998	-6.5	1.2	-0.7	-2.4	-6.5	-2.5	1.1
1999	52.8	26.2	14.3	6.4	-1.5	21.3	-29.1
2000	-38.9	-23.8	5.7	12.5	22.8	-3.0	40.5
2001	-7.8	-13.5	40.9	41.3	14.0	2.5	51.7
<b>Geometric means</b>							
1969–2001	-2.8	4.8	16.6	18.3			16.5
1979–2001	-1.8	7.8	20.8	22.8	16.0	13.8	18.8
1990–2001	-6.2	3.6	18.4	17.7	13.4	11.0	19.4