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# Earnings Growth: The Two Percent Dilution

William J. Bernstein and Robert D. Arnott

*Two important concepts played a key role in the bull market of the 1990s. Both represent fundamental flaws in logic. Both are demonstrably untrue. First, many investors believed that earnings could grow faster than the macroeconomy. In fact, earnings must grow slower than GDP because the growth of existing enterprises contributes only part of GDP growth; the role of entrepreneurial capitalism, the creation of new enterprises, is a key driver of GDP growth, and it does not contribute to the growth in earnings and dividends of existing enterprises. During the 20th century, growth in stock prices and dividends was 2 percent less than underlying macroeconomic growth. Second, many investors believed that stock buybacks would permit earnings to grow faster than GDP. The important metric is not the volume of buybacks, however, but net buybacks—stock buybacks less new share issuance, whether in existing enterprises or through IPOs. We demonstrate, using two methodologies, that during the 20th century, new share issuance in many nations almost always exceeded stock buybacks by an average of 2 percent or more a year.*

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**T**he bull market of the 1990s was largely built on a foundation of two immense misconceptions. Whether their originators were knaves or fools is immaterial; the errors themselves were, and still are, important. Investors were told the following:

1. With a technology revolution and a “new paradigm” of low payout ratios and internal reinvestment, earnings will grow faster than ever before. Real growth of 5 percent will be easy to achieve.

Like the myth of Santa Claus, this story is highly agreeable but is supported by neither observable current evidence nor history.

2. When earnings are not distributed as dividends and not reinvested into stellar growth opportunities, they are distributed back to shareholders in the form of stock buybacks, which are a vastly preferable way of distributing company resources to the shareholders from a tax perspective.

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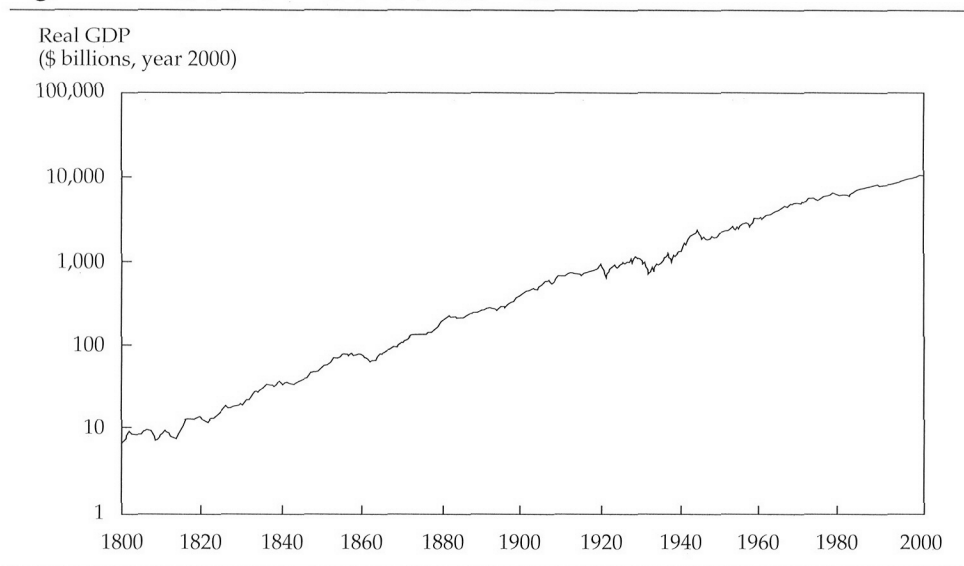
True, except that over the long term, net buybacks (that is, buybacks minus new issuance and options) have been reliably negative.

The vast majority of the institutional investing community has believed these untruths and has acted accordingly. Whether these tales are lies or merely errors, our implied indictment of these misconceptions is a serious one—demanding data. This article examines some of the data.

## Big Lie #1: Rapid Earnings Growth

In the past two centuries, common stocks have provided a sizable risk premium to U.S. investors: For the 200 years from 1802 through 2001 (inclusive), the returns for stocks, bonds, and bills were, respectively, 8.42 percent, 4.88 percent, and 4.21 percent. In the most simplistic terms, the reason is obvious: A bill or a bond is a promise to pay interest and principal, and as such, its upside is sharply limited. Shares of common stock, however, are a claim on the future dividend stream of the nation's businesses. While the investor in fixed-income securities is receiving a modest fixed trickle from low-risk securities, the shareholder is the beneficiary of the ever-increasing fruits of innovation-driven economic growth.

Viewed over the decades, the powerful U.S. economic engine has produced remarkably steady growth. **Figure 1** plots the real GDP of the United States since 1800 as reported by the U.S. Department

**Figure 1. Real U.S. GDP Growth, 1800–2000**

of Commerce. From that year to 2000, the economy as measured by real GDP, averaging about 3.7 percent growth a year, has grown a thousandfold. The long-term uniformity of economic growth demonstrated in Figure 1 is both a blessing and a curse. To know that real U.S. GDP doubles every 20 years is reassuring. But it is also a dire warning to those predicting a rapid acceleration of economic growth from the computer and Internet revolutions. Such extrapolations of technology-driven increased growth are painfully oblivious to the broad sweep of scientific and financial history, in which innovation and change are constant and are neither new to the current generation nor unique.

The impact of recent advances in computer science pales in comparison with the technological explosion that occurred between 1820 and 1855. This earlier era saw the deepest and most far reaching technology-driven changes in everyday existence ever seen in human history. The changes profoundly affected the lives of those from the top to the bottom of the social fabric in ways that can scarcely be imagined today. At a stroke, the speed of transportation increased tenfold. Before 1820, people, goods, and information could not move faster than the speed of the horse. Within a generation, journeys that had previously taken weeks and months involved an order of magnitude less time, expense, danger, and discomfort. Moreover, important information that previously required the same long journeys could now be transmitted instantaneously.

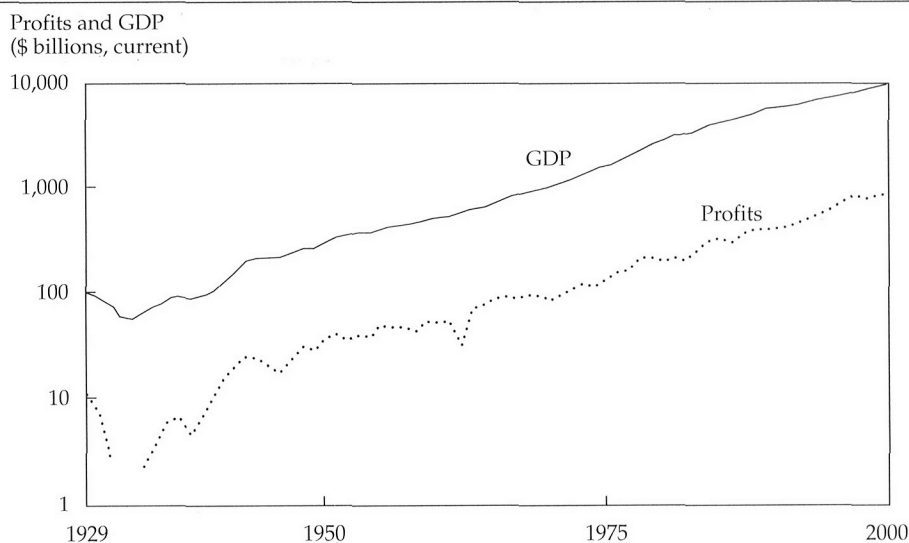
The average inhabitant of 1820 would have found the world 35 years later incomprehensible, whereas a person transported from 1967 to 2002 would have little trouble understanding the inter-

vening changes in everyday life. From 1820 to 1855, the U.S. economy grew sixfold, four times the growth seen in the “tech revolution” of the past 35 years. More importantly, a close look at the right edge of Figure 1—the last decade of the 20th century—shows that the acceleration in growth during the “new paradigm” of the tech revolution of the 1990s was negligible when measured against the broad sweep of history.

The relatively uniform increase in GDP shown in Figure 1 suggests that corporate profits experienced a similar uniformity in growth. And, indeed, **Figure 2** demonstrates that, except for the Great Depression, during which overall corporate profits briefly disappeared, nominal aggregate corporate earnings growth has tracked nominal GDP growth, with corporate earnings remaining constant at 8–10 percent of GDP since 1929. The trend growth in corporate profits shown in Figure 2 is nearly identical, within a remarkable 20 bps, to the trend growth in GDP.<sup>1</sup>

Cannot stock prices also, then, be assumed to grow at the same rate as GDP? After all, a direct relationship between aggregate corporate profits and GDP has existed since at least 1929. The problem with this assumption is that per share earnings and dividends keep up with GDP *only if* no new shares are created. Entrepreneurial capitalism, however, creates a “dilution effect” through new enterprises and new stock in existing enterprises. So, per share earnings and dividends grow considerably slower than the economy.

In fact, since 1871, real stock prices have grown at 2.48 percent a year—versus 3.45 percent a year for GDP. Despite rising price-earnings ratios, we observe a “slippage” of 97 bps a year between stock

**Figure 2. Nominal U.S. Corporate Profits and GDP, 1929–2000**

prices and GDP. The true degree of slippage is much higher because almost half of the 2.48 percent rise in real stock prices after 1871 came from a substantial upward revaluation. The highly illiquid industrial stocks of the post-Civil War period rarely sold at more than 10 times earnings; often, they sold for multiples as low as 3 or 4 times earnings. These closely held industrial stocks gave way to instantly and cheaply tradable common shares, which today are priced nearly an order of magnitude more dearly.

Until the bull market of 1982–1999, the average stock was valued at 12–16 times earnings and 20–25 years' worth of dividends. By the peak of the bull market, both figures had tripled. Although the bull market was compressed into 18 years of the total period under discussion, this tripling of valuation levels was worth almost 100 bps a year—even when amortized over the full 130-year span. Thus, per share earnings and dividends grew 2 percent a year slower than the macroeconomy. If aggregate earnings and dividends grew as quickly as the economy while per share earnings and dividends were growing at an average of 2 percent a year slower, then shareholders have seen a slippage or dilution of 2 percent a year in the per share growth of earnings and dividends.

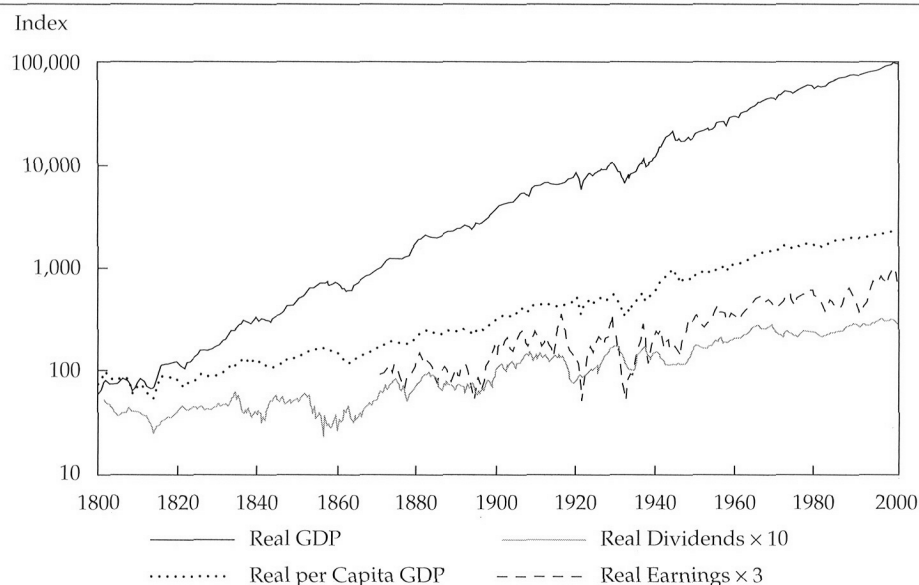
The dilution is the result of the net creation of shares as existing and new companies capitalize their businesses with equity. An often overlooked, but unsurprising, fact is that more than half of aggregate economic growth comes from new ideas and the creation of new enterprises, not from the growth of established enterprises. Stock investments can participate only in the growth of estab-

lished businesses; venture capital participates only in the new businesses. The same investment capital cannot be simultaneously invested in both.

"Intrapreneurial capitalism," or the creation of new enterprises within existing companies, is a sound engine for economic growth, but it does not supplant the creation of new enterprises. Nor does it reduce the 2 percent gap between economic growth and earnings and dividend growth.

Note also that earnings and dividends grow at a pace very similar to that of per capita GDP (with some slippage associated with the "entrepreneurial" stock rewards to management). Consider that per capita GDP is a measure of productivity (with slight differences for changes in the work force) and aggregate economic wealth per capita can grow only in close alignment with productivity growth. Productivity growth is also the key driver of per capita income and of per share earnings and dividends. Accordingly, no one should be surprised that *per capita GDP, per capita income, per share earnings, and per share dividends—all grow in reasonably close proportion to productivity growth.*

If earnings and dividends grow faster than productivity, the result is a migration from return on labor to return on capital; if earnings and dividends grow more slowly, by a margin larger than the stock awards to management, then the economy migrates from rewarding capital to rewarding labor. Either way, such a change in the orientation of the economy cannot continue indefinitely. **Figure 3** demonstrates the close link between the growth of real corporate earnings and dividends and the growth of real per capita GDP; note that all of these measures exhibit growth far below the growth of real GDP.

**Figure 3. Link of U.S. Earnings and Dividends to Economic Growth, 1802–2001**

Note: Real GDP, real per capita GDP, and real stock prices were all constructed so that the series are on a common basis of January 1802 = 100.

## A Global Laboratory

Is the United States unique? For an answer, we compared dividend growth, price growth, and total return with data on GDP growth and per capita GDP growth for the 16 countries covered by Dimson, Marsh, and Staunton (2002) spanning the 20th century.<sup>2</sup> The GDP data came from Maddison's (1995, 2001) world GDP survey for 1900–1998 and International Finance Corporation data for 1998–2000. The interrelationships of the data shown in **Table 1** are complex:

- The first column contains the real return (in U.S. dollars) of each national stock market.
- The second is real per share dividend growth.
- The third is real aggregate GDP growth for each nation (measured in U.S. dollars).
- The fifth is growth of real per capita GDP (measured in U.S. dollars).
- Thus, the fourth column measures the gap between growth in per share dividends and aggregate GDP—an excellent measure of the leakage that occurs between macroeconomic growth and the growth of stock prices.
- The last column represents the gap between the growth in per share dividends and per capita GDP.

For the full 16-nation sample in Table 1, the average gap between dividend growth and the growth in aggregate GDP is a startling 3.3 percent. The annual shortfall between dividend growth and per capita GDP growth is still 2.4 percent.

The 20th century was not without turmoil. Therefore, we divided the 16 nations into two groups according to the degree of devastation visited upon them by the era's calamities. The first group suffered substantial destruction of the countries' productive physical capital at least once during the century; the second group did not.

The nine nations in Group 1—Belgium, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, and the United Kingdom—were devastated by one or both of the two world wars or by civil war. The remaining seven—Australia, Canada, Ireland, South Africa, Sweden, Switzerland, and the United States—suffered relatively little direct damage. Even in this fortunate group, Table 1 shows dividend growth that is 2.3 percent less than GDP growth and 1.1 percent less than per capita GDP growth, on average. These gaps are close to the 2.7 percent and 1.4 percent figures observed in the United States during the 20th century.

The data for nations that were devastated during World Wars I and II and the Spanish Civil War are even more striking: The good news is that the economies in Group 1 repaired the devastations wrought by the 20th century; they enjoyed overall GDP growth and per capita GDP growth that rivaled the growth of the less-scarred Group 2 nations. The bad news is that the same cannot be said for per share equity performance; a 4.1 percent slippage occurred between the growth of their economies and per share corporate payouts. The

**Table 1. Dilution of GDP Growth as It Flows Through to Dividend Growth: 16 Countries, 1900–2000**

Country	Constituents of Real Stock Returns		Real GDP Growth	Dilution in Dividend Growth (vis-à-vis GDP growth)	Real per Capita GDP Growth	Dilution in Dividend Growth (vis-à-vis per capita GDP growth)
	Real Return	Dividend Growth				
Australia	7.5%	0.9%	3.3%	-2.4%	1.6%	-0.7%
Belgium	2.5	-1.7	2.2	-3.9	1.8	-3.5
Canada	6.4	0.3	4.0	-3.7	2.2	-1.9
Denmark	4.6	-1.9	2.7	-4.6	2.0	-3.9
France	3.6	-1.1	2.2	-3.3	1.8	-2.9
Germany	3.6	-1.3	2.6	-3.9	1.6	-2.9
Ireland	4.8	-0.8	2.3	-3.1	2.1	-2.9
Italy	2.7	-2.2	2.8	-5.0	2.2	-4.4
Japan	4.2	-3.3	4.2	-7.5	3.1	-6.4
Netherlands	5.8	-0.5	2.8	-3.3	1.7	-2.2
South Africa	6.8	1.5	3.4	-1.9	1.2	0.3
Spain	3.6	-0.8	2.7	-3.5	1.9	-2.7
Sweden	7.6	2.3	2.5	-0.2	2.0	0.3
Switzerland	5.0	0.1	2.5	-2.4	1.7	-1.6
United Kingdom	5.8	0.4	1.9	-1.5	1.4	-1.0
United States	6.7	0.6	3.3	-2.7	2.0	-1.4
Full-sample average	5.1	-0.5	2.8	-3.3	1.9	-2.4
War-torn Group 1 average	4.0	-1.4	2.7	-4.1	1.9	-3.3
Non-war-torn Group 2 average	6.4	0.7	3.0	-2.3	1.8	-1.1

creation of new enterprises in the wake of war was an even more important engine for economic recovery than in the Group 2 nations.

Thus, in Group 2 “normal nations” (i.e., those untroubled by war, political instability, and government confiscation of wealth), the natural ongoing capitalization of new technologies apparently produces a net dilution of outstanding shares of slightly more than 2 percent a year. The Group 1 nations scarred badly by war represent a more fascinating phenomenon; they can be thought of as experiments of nature in which physical capital is devastated and must be rebuilt. Fortunately, destroying a nation’s intellectual, cultural, and human capital is much harder than destroying its economy; within little more than a generation, the GDP and per capita GDP of war-torn nations catch up with, and in some cases surpass, those of the undamaged nations. Unfortunately, the effort requires a high rate of equity recapitalization, which is reflected in the substantial dilution seen in Table 1 for the war-torn countries. This recapitalization savages existing shareholders.

In short, the U.S. experience was not unique. Around the world, every one of these countries except Sweden experienced dividend growth sharply slower than GDP growth, and only two countries experienced dividend growth even slightly faster than per capita GDP growth. The U.S. experience was better than most and was

similar to that of the other nations that were not devastated by war.

The data for the individual countries in Table 1 show that the average real growth in dividends was negative for most countries. It also shows that dilution of GDP growth (the fourth column) was substantial for all the countries studied and that dilution of per capita GDP growth (the last column) was substantial for most countries but fit dividend growth with much less “noise” than did the dilution of overall GDP growth.

This analysis has disturbing implications for “paradigmistas” convinced of the revolutionary nature of biotechnology, Internet, and telecommunications/broadband companies. A rapid rate of technological change may, in effect, turn “normal” Group 2 nations into strife-torn Group 1 nations: An increased rate of obsolescence effectively destroys the economic value of plant and equipment as surely as bombs and bullets, with the resultant dilution of per share payouts happening much faster than the technology-driven acceleration of economic growth—if such acceleration exists. How many of the paradigmistas truly believe that the tech revolution will benefit the shareholders of existing enterprises remotely as much as it can benefit the entrepreneurs creating the new enterprises that make up the vanguard of this revolution?

Whatever the true nature of the interaction of technological progress and per share earnings, dividends, and prices, it will come as an unpleasant surprise to many that even in the Group 2 nations, average real per share dividend growth was only 0.66 percent a year (rounded in Table 1 to 0.7 percent); for the war-torn Group 1 nations, it was disturbingly negative.

In short, the equity investor in a nation blessed by prolonged peace cannot expect a real return greatly in excess of the much-maligned dividend yield; the investor cannot expect to be rescued by more rapid economic growth. Not only is outsized economic growth unlikely to occur, but even if it does, its benefits will be more than offset by the dilution of the existing investor's ownership interest by technology-driven increased capital needs.

### Big Lie #2: Stock Buybacks

Stock buybacks are attractive to companies and beneficial to investors. They are a tax-advantaged means of providing a return on shareholder capital and preferable to dividends, which are taxed twice. Buybacks have enormous appeal. But contrary to popular belief, they did not occur in any meaningful way in the 1990s.

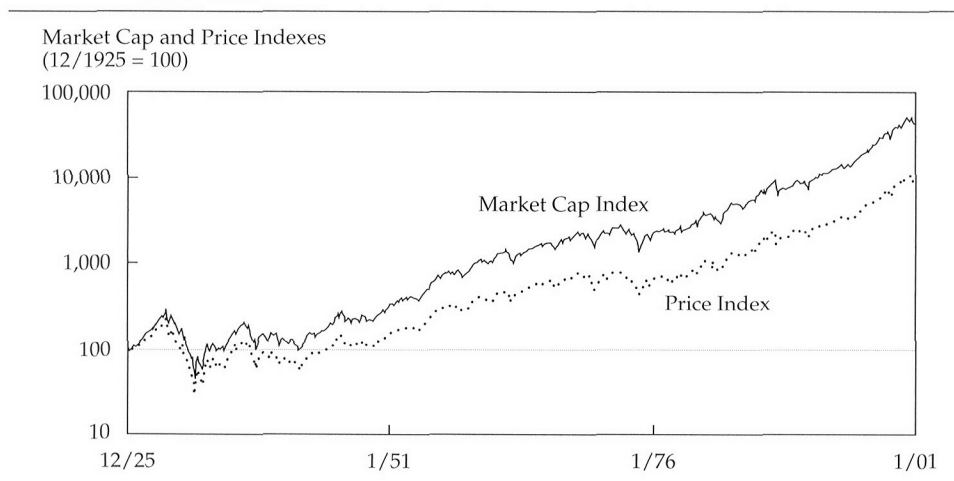
To support this contention, we begin with a remarkably simple measure of slippage in per share earnings and dividend growth: the ratio of the proportionate increase in market capitalization to the proportionate increase in stock price. For example, if over a given period, the market cap increases by a factor of 10 and the cap-weighted price index increases by a factor of 5, a 100 percent net share issuance has taken place in the interim. Formally,

$$\text{Net dilution} = \left( \frac{1+c}{1+r} \right) - 1,$$

where  $c$  is capitalization increase and  $r$  is price return. This relationship has the advantage of factoring out valuation changes, which are embedded in both the numerator and denominator, and neutralizing the impact of stock splits. Furthermore, it holds only for universal market indexes, such as the CRSP 1-10 or the Wilshire 5000, because less inclusive indexes can vary the ratio simply by adding or dropping securities. **Figure 4** contains plots of the total market cap and price indexes of the CRSP 1-10 beginning at the end of 1925.

The CRSP data contained NYSE-listed stocks until 1962. Even the CRSP data, however, can involve adding securities: CRSP added the Amex stocks in July 1962 and the Nasdaq stocks in July 1972, which created artificial discontinuities on those dates. The adjustment for these shifts is evident in **Figure 5**, for which we held the dilution ratio constant during the two months in question.<sup>3</sup> Note how market cap slowly and gradually pulls away from market price. The gap does not look large in Figure 4, but by the end of 2001, the cap index had grown 5.49 times larger than the price index, suggesting that for every share of stock extant in 1926, 5.49 shares existed in late 2001. The implication is that net new share issuance occurred at an annualized rate of 2.3 percent a year. Note that this rate is identical to the average dilution for non-war-torn countries during the 20th century given in Table 1. To give a better idea of how this dilution has proceeded over the past 75 years, Figure 5 provides a dilution index, defined as the ratio of capitalization growth to price index growth.

**Figure 4. CRSP 1-10 Market Cap and Price Indexes, 31 December 1925-June 2002**



**Figure 5. Cumulative Excess Growth of Market Cap Relative to Price Index, 31 December 1925 through June 2002**

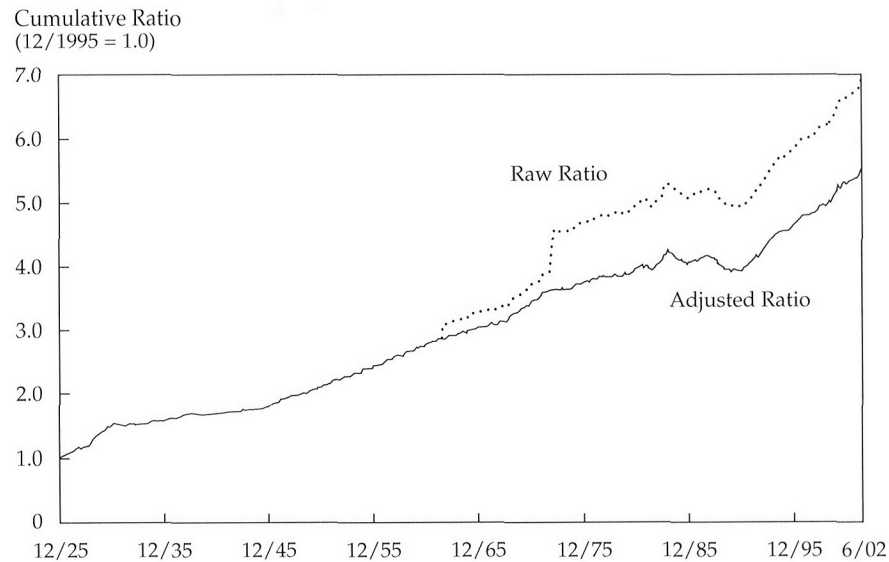
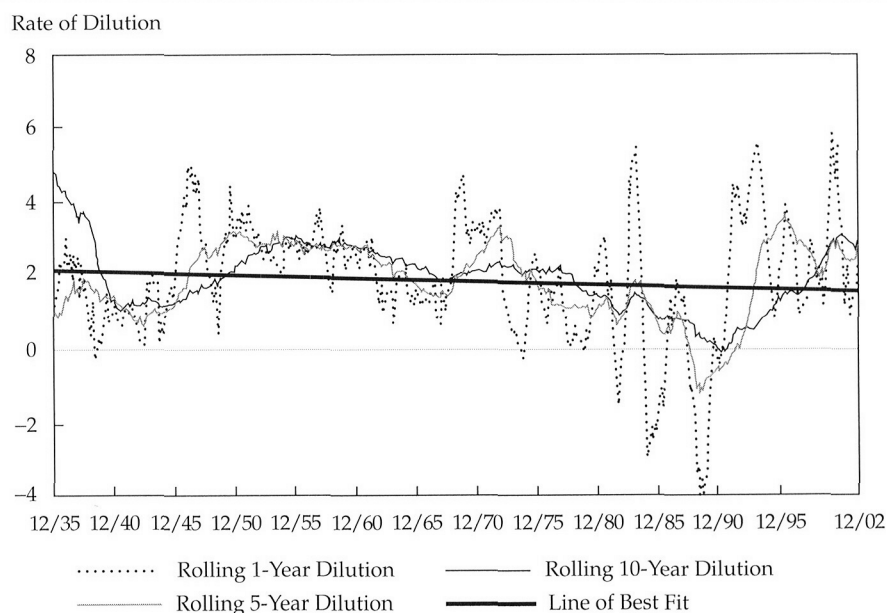


Figure 5 traces the growth in the ratio of the capitalization of the CRSP 1–10 Index as compared with the market-value-weighted price appreciation of these same stocks. The fact that this line rises nearly monotonically shows clearly that new-share issuance almost always sharply exceeds stock buybacks. The notable exception occurred in the late 1980s, when buybacks modestly outpaced new share issuance (evident from the fact that the line falls slightly during these “Milken years”). This

development probably played a key role in precipitating the popular illusion that buybacks were replacing dividends. For a time, they did. But that stock buybacks were an important force in the 1990s is simply a myth. And belief in the myth may have been an important force in the bull market of the 1990s.

Figure 6 shows the rolling 1-year, 5-year, and 10-year dilution effect on existing equity shareholders as a consequence of a growth in the aggregate

**Figure 6. Annualized Rate of Shareholder Dilution, 31 December 1935 through June 2002**



supply of equity shares. Keep in mind that every 1 percent rise in equity capital is a 1 percent rise in market cap in which existing shareholders did not (could not) participate. Aside from the 1980s, this dilution effect on shareholders was essentially never negative—not even on a one-year basis. One can see how the myth of stock buybacks gained traction after the 1980s; even the 10-year average rate of dilution briefly dipped negative in the late 1980s. But then, during the late 1990s, stock buybacks were outstripped by new share issuance at a pace that was only exceeded in the IPO binge of 1926–1930. These conclusions hold true whether one is looking at net new share issuance on a 1-year, 5-year, or 10-year basis.

Those who argue that stock buybacks will allow future earnings growth to exceed GDP growth can draw scant support from history. Investors did see enormous earnings growth, far faster than real economic growth, from 1990 to 2000. But Figure 3 shows how tiny that surge of growth was in the context of 130 years of earnings history. Much of the earnings surge of the 1990s was dubious, at best.

## The Eye of the Storm?

The big question today is whether the markets are likely to rebound into a new bull market or have merely been in the eye of the storm. We think the markets are in the eye.

The rapid earnings growth of the 1990s, which many pointed to as “proof” of a new paradigm, had several interesting characteristics:

1. A trough in earnings in the 1990 recession transformed into a peak in earnings in the 2000 bubble. Measuring growth from trough to peak is an obvious error; extrapolating that growth is even worse. This decade covered a large chunk of the careers of most people on Wall Street, many of whom have come to believe that earnings can grow very fast for a very long time. Part of conventional wisdom now is that earnings growth can outstrip macroeconomic growth.
2. Influenced by the new paradigm, analysts frequently ignored write-offs to focus increasingly on operating earnings. This practice is acceptable if write-offs are truly “extraordinary items,” but it is not acceptable if write-offs become a recurring annual or biannual event, as was commonplace in the 1990s. Furthermore, what are extraordinary items for a single company are entirely ordinary for the economy as a whole. In some companies and some sectors, write-offs are commonplace. The focus on oper-

ating earnings for the broad market averages is misguided at best and deceptive at worst.

3. Those peak earnings of 1999–2000 consisted of three dubious components. The first is an underrecognition of the impact of stock options, which various Wall Street strategists estimated at 10–15 percent of earnings. The second is pension expense (or pension “earnings”) based on assumptions of a 9.5 percent return, which were realistic then but are no longer; this factor pumped up earnings by approximately 15 percent at the peak and 20–30 percent from current depressed levels. The third component is Enron-style “earnings management,” which various observers have estimated to be 5–10 percent of the peak earnings. (We suspect this percentage will turn out to be conservative.)

If these three sources of earnings overstatement (aggressive pension accounting, failure to expense management stock options, and outright fraud) are removed, the \$54 peak earnings per share for the S&P 500 Index in 2000 turn out to be closer to \$36. This figure implies normalized earnings a notch lower still. If the normalized earnings for the S&P 500 are in the \$30–\$36 range, as we suspect is the case, then the market at mid-year 2003 was still at a relatively rich 27–32 times normalized earnings. Using Shiller’s (2000) valuation model (real S&P 500 level divided by 10-year average of real reported earnings) confirms this analysis. Shiller’s model pegs the current multiple at nearly 30 times normalized earnings in mid-2003.

In principle, several conditions could allow earnings growth to exceed GDP growth. Massive stock buybacks are one. But we have demonstrated that buybacks in the 20th century were far more smoke than fire. Buybacks have been much touted as the basis for sustained earnings growth at unprecedented rates, but they simply do not show up in the data on market capitalization relative to market index price levels. Cross-holdings could also offer an interesting complication. But again, their impact does not show up in the objective shareholder dilution data. We have demonstrated that buybacks and cross-holdings do not yet show any signs of offsetting the historical 2 percent dilution, but the exploration of the possible impact of buybacks and cross-holdings is beyond the scope of this study.

## Conclusion

Expected stock returns would be agreeable if dividend growth, and thus price growth, proceeded at the same rate as, or a higher rate than, aggregate economic growth. Unfortunately, dividends do not



grow at such a rate: When we compared the Dimson et al. 20th century dividend growth series with aggregate GDP growth, we found that even in nations that were not savaged by the century's tragedies, dividends grew 2.3 percent more slowly, on average, than GDP. Similarly, by measuring the gap between the growth of market cap and share prices in the CRSP database, we found that between 1926 and the present, a 2.3 percent net annual dilution has occurred in the outstanding number of shares in the United States.

Two independent analytical methods point to the same conclusion: In stable nations, a roughly 2 percent net annual creation of new shares—the Two Percent Dilution—leads to a separation between long-term economic growth and long-term growth in dividends per share, earnings per share, and share price.

The markets are probably in the eye of a storm and can expect further turmoil as the rest of the storm passes over. If normalized S&P 500 earnings are \$30–\$36 per share, if payout ratios on those normalized earnings are at the low end of the historical range (implying lower-than-normal future earnings growth), if normal earnings growth is really only about 1 percent a year above inflation, if stock buybacks have been little more than an appealing fairy tale, if the credibility of earnings is at an all-time low, and if demographics suggest Baby Boomer dis-saving in the next 20 years, then we have a problem.

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## Notes

1. In calculating "trend growth," we used a loglinear line of best fit to minimize the impact of distortions from an unusually high or low starting or ending date. The loss years of 1932 and 1933 were excluded because of loglinear calculation.
2. The Dimson et al. book is a masterwork. If you do not have a copy, you should.
3. We assumed the dilution factor to be zero in those two months. If a massive stock buyback or a massive new IPO occurred during one of these two months, we may have missed it. But net buybacks or net new share issuance during months in which the "index" saw a major reconstitution would be difficult to measure.

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alternative investment vehicles has recently been documented, no such evidence is available on the ability of investors to generate superior risk-adjusted returns based on timing among various hedge fund styles.

This article is, to the best of our knowledge, the first to document the existence of predictability in hedge fund index returns and to focus on its implications for tactical allocation decisions. Specifically, we examined (lagged) multifactor models for the return on nine hedge fund indexes. We chose factors that would measure the many dimensions of financial risk—market risks (proxied by stock prices, interest rates, and commodity prices), volatility risk (proxied by implicit volatilities from option prices), default risk (proxied by default spreads), and liquidity risk (proxied by trading volume). We show that a parsimonious set of models captures a significant amount of predictability for most hedge fund styles.

We also found that the benefits of tactical style allocation are potentially enormous. The article first provides evidence of the economic significance of the performance of hedge fund style-timing models by comparing the performance of a market timer with perfect forecasting ability in the alternative investment universe with the performance of a perfect market timer in the traditional universe. Then, the performance of a realistic style-timing model is presented. An equity-oriented portfolio that mixed traditional and alternative investment vehicles and a similar debt-oriented mixed portfolio produced spectacular results. Moreover, the results do not seem to be significantly affected by the presence of reasonably high transaction costs.

Some specific features of hedge fund investing do not facilitate the implementation of tactical allocation strategies. In particular, the absence of liquidity and the presence of lockup periods, which are typical of investments in hedge funds, are likely to prevent investors from implementing any kind of dynamic allocation among funds. We believe, however, that the future of hedge fund style timing is even brighter than its past or present. The hedge fund industry is still relatively new, and market conditions are evolving at an astounding pace. Although the world of alternative investing has consisted of a disparate set of managers following disparate specific strategies, significant attempts at structuring the markets have occurred in the past few years. Important, well-established firms are creating relatively liquid investment products designed to track the performance of hedge fund indexes. ☒

**Keywords:** Alternative Investments: hedge fund strategies; Portfolio Management: asset allocation; Portfolio Management: hedge fund strategies

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The bull market of the 1990s was built largely on a foundation of two immense misconceptions:

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- When earnings are not distributed as dividends and not reinvested into stellar growth opportunities, they are distributed back to shareholders in the form of stock buybacks.

In fact, neither of these widespread beliefs stands up to historical scrutiny. Since 1800, the economy, as measured by real GDP, has grown a thousandfold, averaging about 3.7 percent a year. The long-term uniformity of economic growth is remarkable; it is both a blessing and a curse. To know that real U.S. GDP doubles every 20 years is reassuring. But this growth is also a dire warning to those predicting rapid acceleration of economic growth from the computer and Internet revolutions.

The relatively uniform increase in GDP implies a similar uniformity in the growth of corporate profits—which does, in fact, occur. Except for the Great Depression, during which overall corporate profits briefly disappeared, nominal aggregate corporate earnings have tracked nominal GDP growth, with corporate earnings staying at 8–10 percent of the GDP growth. The trend growth in corporate profits is identical, to within a remarkable 20 bps, to the trend growth in GDP.

For 16 countries, with data spanning the 20th century, we compared dividend growth, price growth, and total return with GDP data from the same period. We found that in stable, non-war-torn nations, per share dividend growth was 2.3 percent less than growth in aggregate GDP and 1.1 percent less than growth in per capita GDP. In the war-torn nations, the situation was far worse—per share dividend growth 4.1 percent less than growth in aggregate GDP and 3.3 percent less than growth in per capita GDP.

Data for the comprehensive CRSP 1–10 Index from 1926 to June 2002 show that, after adjustment for additions to the index, total U.S. market capitalization grew 2.3 percent faster than the price index. Thus, over the past 76 1/2 years, a 2.3 percent net new issuance of shares took place, which is the equivalent of

negative buybacks. Although net buybacks occurred in the 1980s, by the 1990s, buyback activity had once again returned to historical norms.

Earnings growth was indeed high during the 1990s. But the persistence of this growth is dubious for three reasons:

- The market went from trough earnings in the 1990 recession to peak earnings in the 2000 bubble. Measuring growth from trough to peak is meaningless; extrapolating that growth is even worse.
- Analysts frequently ignored write-offs while increasing their focus on operating earnings. This behavior is acceptable if write-offs are truly “extraordinary items” but not if write-offs become an annual or biannual event, as was commonplace in the 1990s. Furthermore, what are extraordinary items for a single company are entirely ordinary for the economy as a whole.
- The peak earnings of 1999–2000 consisted of three dubious components. The first was an underrecognition of the impact of stock options, which various Wall Street strategists estimated at 10 percent or more of earnings. The second was pension expense (or pension “earnings”) based on 9–10 percent return assumptions, which were realistic then but are no longer; this factor pumped up earnings by about 15 percent at the peak and 20–30 percent from recent, depressed levels. The third was Enron-style “earnings management,” which various observers have estimated at 5–10 percent of the peak earnings.

In summary, in a dynamic, free-market economy, considerable capital is consumed funding new ventures. For this reason, per share growth of prices, earnings, and dividends will lag aggregate macroeconomic growth by an amount equal to the net issuance of new shares. In peaceful, stable societies, this gap appears to be about 2 percent a year. In war-torn nations, this gap is considerably larger. Although these nations’ economies can recover relatively rapidly, the high degree of recapitalization that is required savages shareholders. ☒

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## Outlier-Resistant Estimates of Beta

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Recent surveys show that many analysts continue to use the capital asset pricing model and that most of them purchase betas from commercial providers, which invariably use a raw or adjusted ordinary least-squares estimate of beta. The sanctified use of OLS is justified by the fact that the OLS beta is statistically the best estimate of the linear model parameters under idealized assumptions.

In practice, however, one of the ways these assumptions fail is associated with the occurrence of a small fraction of exceptionally large or small returns—that is, outliers. We show by using several examples that outliers can, depending on their location in the equity-market-returns space, substantially bias OLS estimates of beta. Furthermore, the weekly returns for 8,314 companies from the CRSP database that had at least two years of returns in the period January 1992 through December 1996 contained many examples in which the deletion of a few outliers, sometimes even a single outlier, dramatically affected the OLS beta.

The vast majority of commercial providers do nothing to deal with outliers; the few that do deal with this problem use some form of outlier treatment without a solid statistical rationale. We deal with the vulnerability of the OLS beta to outliers by introducing a new beta estimate that is resistant to the types of outliers that cause the most bias in OLS estimates but that produces estimates similar to OLS for outlier-free data. The outlier-resistant beta is an intuitively appealing weighted-least-squares estimate with data-dependent weights. It has several advantages over other commonly used “robust” techniques.

The outlier-resistant beta applied to the CRSP database shows that the absolute value of the difference between the resistant and OLS betas is greater than 0.5 for 13 percent of the companies and that this difference is considerably larger than 1.0 for 3.2 percent of the companies. Such extreme sensitivity of the OLS beta to outliers results in misleading interpretations of the risk and return characteristics of a company. This study shows that outlier distortion of the OLS beta is primarily a small-firm effect (i.e., there is a monotonic relationship between the median market capitalization of companies and the absolute difference between the resistant and OLS betas). Furthermore, the resistant beta has superior performance relative to the OLS beta for predicting future betas when influential outliers are present but suffers (at most) only a slight degradation in performance when no influential outliers are present.