First Draft: August 2004
This draft: August 2007
Comments welcome

The Anatomy of Value and Growth Stock Returns

Eugene F. Fama and Kenneth R. French*

Abstract

We break average returns on value and growth portfolios into dividends and three sources of capital gain, (i) growth in book equity primarily due to earnings retention, (ii) convergence in price-to-book ratios (P/B) due to mean reversion in profitability and expected returns, and (iii) upward drift in P/B during 1927-2006. The capital gains of value stocks trace mostly to convergence: P/B rises as some value firms become more profitable and their stocks move to lower expected return groups. Growth in book equity is trivial to negative for value portfolios, but it is a large positive factor in the capital gains of growth stocks. For growth stocks, convergence is negative: P/B falls because growth firms do not always remain highly profitable with low expected stock returns. Relative to convergence, drift is a minor factor in average returns.

* Graduate School of Business, University of Chicago (Fama), and Amos Tuck School of Business, Dartmouth College (French). We are grateful for the comments of Jonathan Lewellen.

Value stocks (with low ratios of price to book value) have higher average returns than growth stocks (high price-to-book ratios). (See, for example, Rosenberg, Reid, and Lanstein 1985, Fama and French 1992.) Our goal is a better understanding of the sources of this value premium in returns.

The one-period simple return on a stock from t to t+1 (R_{t+1}) is commonly broken into a dividend return (D_{t+1}/P_t) and a capital gain return (P_{t+1}/P_t).

(1) $$1 + R_{t+1} = D_{t+1}/P_t + P_{t+1}/P_t .$$

To better understand the average returns of value and growth stocks, we examine the sources of capital gain. In our initial tests we break the capital gain return into two pieces. The first is the growth rate of book equity due primarily to earnings retention. Capital gains from earnings retention follow from the dividend irrelevance theorem of Miller and Modigliani (1961). Specifically, an additional dollar of time t+1 earnings retained rather than distributed as dividends should result in an additional dollar of capital value for old shareholders at t+1. Breaking the growth rate of book equity (B_{t+1}/B_t) out of the capital gain return (P_{t+1}/P_t) leaves the growth rate of the price-to-book ratio ($P_{t+1}/B_{t+1} \div P_t/B_t$) as the remaining (multiplicative) piece of the capital gain return,

(2) $$1 + R_{t+1} = \frac{D_{t+1}}{P_t} + \left[\frac{B_{t+1}}{B_t}\right] x \left[\frac{P_{t+1}/B_{t+1}}{P_t/B_t}\right] .$$

We find that during 1964-2006 the contribution of dividends to average returns is higher for value stocks than for growth stocks. But an interesting result is that the higher dividends of value stocks are special to 1964-2006. During 1927-1963 the contribution of dividends to average returns is not systematically different for value and growth stocks.

Differences in the way capital gains split between book equity growth and growth in the price-to-book ratio (P/B) are more consistent during the 1927-2006 sample period. In the year after stocks are allocated to value portfolios, growth in book equity is on average minor (big value stocks) or negative (small value stocks). In other words, value firms do not do much equity-financed investment. Thus, the large average capital gains of value stocks show up as increases in P/B. In contrast, firms invest heavily after they are allocated to growth portfolios, and on average the growth rate of book equity exceeds the growth rate of the stock price. Thus, P/B on average declines after stocks move to the growth category , and the positive average rates of capital gain of growth portfolios trace to increases in book equity that more than offset the declines in P/B.

What explains the behavior of price-to-book ratios after stocks are characterized as value or growth? We suggest a simple story, driven by standard economic forces. When firms are allocated to value and growth portfolios, they tend to be at opposite ends of the profitability spectrum. Growth firms tend to be highly profitable and fast-growing, while value firms are less profitable and grow less rapidly if at all (Lakonishok, Shleifer, and Vishny 1994, Fama and French 1995). High expected profitability and growth combine with low expected stock returns (equivalently, low costs of equity capital) to produce high price-to-book ratios for growth stocks, while low profitability, slow growth, and high expected returns produce low P/B for value stocks.

Competition from other firms, however, tends to erode the high profitability of growth firms, and profitability also declines as they exercise their most profitable growth options. Thus, each year some growth firms cease to be highly profitable and fast-growing with low costs of equity capital (expected stock returns). As a result, price-to-book ratios of growth portfolios tend to fall in the years after portfolio formation. Conversely, price-to-book ratios of value portfolios tend to rise in the years after portfolio formation as some value firms restructure, their profitability improves, and they are rewarded by the market with lower costs of equity capital and higher stocks prices.

The tendency of price-to-book ratios to become less extreme after stocks are placed in value and growth portfolios is what we call convergence. There has, however, also been general upward drift in price-to-book ratios during 1927-2006. Higher prices relative to book values imply some combination of higher expected cashflows and lower expected returns (discount rates for expected cashflows) at the end of the period than at the beginning. We label this the drift effect in P/B and average returns. In our second set of tests we break capital gain returns into (i) growth of book equity, (ii) convergence of P/B, and (iii) drift of price-to-book ratios during the sample period.

The total increase in price-to-book ratios during the sample period is large, but the contribution of this drift to average annual returns is modest relative to the contribution of convergence. The differences between average growth rates of P/B for value and growth portfolios are thus due mostly to convergence.

Equation (2) gets to the core of the forces that generate stock prices – whether prices are rational or irrational. Rational prices for the stocks allocated to a portfolio at time t require rational assessments of (i) the expected payoff on the portfolio at t+1, $E_t(D_{t,t+1} + P_{t,t+1})$, (ii) the risk of the payoff, and (iii) the expected return implied by this risk. Assessing the risk of the payoff and its expected value requires predictions of how the profitability and growth of firms of the type (value or growth) allocated to the portfolio at t are likely to change and what the changes imply for future expected returns. This is what convergence is meant to capture – predictable changes in profitability and growth, and related changes in expected returns, that occur because growth stocks are not growth stocks forever and value stocks do not always remain value stocks. The growth in book equity for firms in the portfolio is in part the result of dividend policy, but it also depends on profitability and growth opportunities, and predictions of profitability and investment are central in pricing. In short, in a world of rational pricing the breakdown of returns in (2) captures the salient factors in the pricing of stocks.

The rational view of asset pricing outlined above has a well-known competitor. Behaviorists like Lakonishok, Shleifer, and Vishny (1994) argue that the higher average returns of value stocks relative to growth stocks are due to irrational pricing. Their story centers on convergence. They argue that the irrational investors that dominate prices underestimate the deterioration in profitability and growth (negative convergence) that occurs after stocks are allocated to growth portfolios and the improvement (positive convergence) after stocks are allocated to value portfolios. The result is unexpected low capital gains for growth stocks in the years after portfolio formation and high capital gains for value stocks.

For our purposes the important point is that the dividend yield and the components of the capital gain return in (2) capture the core sources of average return, irrespective of one's view about whether pricing is rational or irrational.

Finally, our earlier paper, "Migration" (Fama and French 2007), examines how the migration of stocks across style groups (for example, from small toward big or vice versa, and from value toward growth or vice versa) leads to higher average returns for small stocks and value stocks. The present paper in effect examines the effects of migration on average returns but from a different perspective, which gets more at the root cause of migration. Specifically, firms migrate across style groups because of the investments they make and the expected profitability of the investments, which combine to produce convergence in their price-to-book ratios. The equity-financed investments of firms are summarized by the growth rate of book equity in (2), and the growth rate of the price-to-book ratio captures the convergence of P/B produced by investment and its expected profitability.

Our story proceeds as follows. Section I motivates the breakdown of returns into dividends and capital gains due to growth in book equity and growth in P/B, and discusses estimation issues. Section II presents estimates of the breakdown for value and growth portfolios. Section III examines the more detailed breakdown of capital gain returns that splits growth in P/B between convergence and drift. Section IV concludes.

I. Components of Returns: Preliminaries

Our tests center on six portfolios formed on size and P/B. The data are from the Center for Research in Security Prices (CRSP) and Compustat, supplemented by the book equity data for NYSE stocks in Davis, Fama, and French (2000). As in Fama and French (1993), at the end of each June from 1926 to 2005, we sort stocks into two size groups, S (small, that is, NYSE, Amex (after 1962), and (after 1972) Nasdaq stocks with market capitalization below the NYSE median) and B (big, market cap above the NYSE median), and three price-to-book groups, G (growth stocks, that is, NYSE, Amex, and Nasdaq stocks in the top 30% of NYSE P/B), N (neutral, middle 40% of NYSE P/B), and V (value, bottom 30% of NYSE P/B). The intersection of these independent sorts produces six portfolios, refreshed at the end of June each year, where SG and BG are small and big growth portfolios, SN and BN are small and big neutral portfolios, and SV and BV are small and big value portfolios.

A. Concepts

Precise description of the concepts used in the dissection of returns requires a bit more notation. The one-year (gross) return for July of year t through June of t+1 for one of the six portfolios is,

$$(3) \qquad 1 + R_{t,t+1} = D_{t,t+1} / P_t + P_{t,t+1} / P_t,$$

where,

P_t = market value at time t of the securities allocated to the portfolio when it is formed at time t,

$P_{t,t+1}$ = market value at time t+1 of the securities allocated to the portfolio at t,

$D_{t,t+1}$ = dividends paid between t and t+1 on the securities allocated to the portfolio at t.

For simplicity, we omit the subscript that should appear on each variable to identify the portfolio. The two time subscripts on most variables indicate the time when the portfolio is formed and the time when the variable is observed. For example, $R_{t,t+1}$ is the annual return observed at the end of June of year t+1 on a portfolio formed at the end of June of t. To simplify the notation, we drop a time subscript if the variable is observed when the portfolio is formed. For example, we use P_t, rather than $P_{t,t}$, as the market value of a portfolio when formed at time t.

Our first (simple) breakdown of the capital gain return isolates the growth in book equity and the growth in the price-to-book ratio,

$$(4) \qquad \frac{P_{t,t+1}}{P_t} = \left[\frac{P_{t,t+1}/B_{t,t+1}}{P_t/B_t}\right] x \left[\frac{B_{t,t+1}}{B_t}\right] = \left[\frac{PB_{t,t+1}}{PB_t}\right] x \left[\frac{B_{t,t+1}}{B_t}\right],$$

where,

B_t = book value at time t of stocks allocated to the portfolio when it is formed at t,

$B_{t,t+1}$ = book value at time t+1 of the stocks allocated to the portfolio at t,

$PB_{t,t+1}$ = $P_{t,t+1}/B_{t,t+1}$, the price-to-book ratio at t+1 of the stocks allocated to the portfolio at t.

In words, the (gross) capital gain return on the portfolio from t to t+1 is the (gross) rate of growth of the price-to-book ratio for the stocks allocated to the portfolio at time t, times the (gross) rate of growth of book equity for these firms. Note that $PB_{t,t+1}$ is the price-to-book ratio at t+1 for the stocks allocated to the portfolio at t. This is not the price-to-book ratio of the refreshed version of the portfolio formed at

$t+1$, PB_{t+1}, since some stocks allocated to the portfolio at t move to different portfolios at t+1 and other stocks are added to the refreshed portfolio at t+1.

B. Motivation

For perspective on (4), suppose the price-to-book ratio for the stocks allocated to a portfolio at t is not expected to change from t to t+1. Then (3) and (4) imply that the portfolio's expected (gross) return is just the expected dividend yield, $E_t(D_{t,t+1})/P_t$, plus the expected (gross) rate of growth of book equity, $E_t(B_{t,t+1})/B_t$, where $E_t(\cdot)$ is the expected value at time t.

Earlier research (e.g., Fama and French 1995), however, leads us to expect systematic changes in price-to-book ratios after stocks are identified as value or growth. The high P/B of growth stocks, which are typically fast-growing highly profitable firms, tends to fall as the superior opportunities of these firms are eroded by competitors or natural decay. Conversely, firms tend to be relatively unprofitable when allocated to low P/B value portfolios. They are likely to respond by cutting back on unprofitable activities and taking other actions that improve profitability. As a result, we can expect that P/B rises after stocks are allocated to value portfolios.

The mean reversion in P/B due to mean reversion in profitability and growth is reinforced by the value premium – the negative relation between P/B and the expected stock returns (discount rates) that price expected cashflows. Thus, growth firms are hit with higher costs of equity capital (expected stock returns) as they move out of the highly profitable growth category, while value firms are rewarded with lower costs of equity capital as they restructure and become more profitable.

The expected decline in the high price-to-book ratios of growth stocks and the expected increase in the low P/B of value stocks is what we call convergence. It captures price effects (capital gains) due to convergence of growth, profitability, and expected returns.

We shall also see that for all our portfolios, P/B rises during 1926-2006 due to some combination of higher expected cashflows and lower discount rates (expected returns) at the end of the sample period. General changes in P/B during the sample period give rise to what we call the drift effect in capital gains.

The total changes in price-to-book ratios during 1926-2006 are large, but the contribution of this drift to average annual returns turns out to be relatively small, and differences in average growth rates of P/B for value and growth portfolios are primarily due to convergence. This fact justifies focusing much of the discussion that follows on the simple breakdown of the capital gain return in (4).

C. Estimation Details

We want to estimate how dividends and the two components of the capital gain return in (4) contribute to average returns on value and growth portfolios. The components of the simple capital gain return are, however, multiplicative, and the average of a product is not the product of the average components. If we switch to continuously compounded (CC) capital gain returns, (4) becomes,

$$
\begin{aligned}
\ln(P_{t,t+1}/P_t) &= [\ln(P_{t,t+1}/B_{t,t+1}) - \ln(P_t/B_t)] + \ln(B_{t,t+1}/B_t) \\
&= \ln(PB_{t,t+1}/PB_t) + \ln(B_{t,t+1}/B_t) \quad .
\end{aligned}
\tag{5}
$$

Thus, the components of the CC capital gain return are additive, and the average CC capital gain return is the sum of the average values of its components. CC returns also give direct perspective on the cumulative wealth generated by value and growth portfolios during our sample period.

A complication in estimating the terms of (5) is that the stocks allocated to a portfolio at the end of June of year t do not all survive to the next formation point at the end of June of t+1. Our solution to this problem follows the logic of the calculation of the annual capital gain returns we seek to explain.

We compute the annual capital gain return on a portfolio by compounding monthly value weight capital gain returns. This linking of returns implies that when stocks delist, their market value in the portfolio at delisting is invested in the stocks that remain. The shares of surviving firms held at the end of the year after portfolio formation (time t+1) thus include those purchased at t and those purchased as other firms delist between t and t+1. The total market equity of the portfolio at t+1, $P_{t,t+1}$, is the combined market value of the original and the additional shares of surviving firms. We define the total book equity at t+1, $B_{t,t+1}$, as the aggregate book equity "owned" by the shares in surviving firms purchased at t, scaled up by the ratio of the total market equity of the portfolio at t+1 divided by the t+1 market value of the shares in surviving firms purchased at t. Thus, we replace the missing book equity of delisted stocks with an estimate of the book equity acquired when the portfolio purchases additional shares of surviving firms.

In the breakdown of the capital gain return of (5), the growth rate of book equity for the year from t to t+1 is for the stocks allocated to the portfolio at t. This is akin to a per share growth rate which means that it is net of new share issues between t and t+1 and is largely due to earnings retained. Share issues can nevertheless have spillover effects because they affect book equity per share. In many equity transactions, such as seasoned equity offerings, new issues increase total book equity by the market value of the shares. In these transactions, book equity per share rises (and P/B falls) when P/B > 1.0, and book equity per share falls (and P/B rises) when P/B < 1.0. In our breakdown of returns, changes in B due to the spillover effects of share issues are pertinent because they are among the factors in the convergence of P/B in the year after portfolio formation. Skipping the details, however, we can report that the spillover effects of share issues on our measured growth rate of book equity [$\ln(B_{t,t+1}/B_t)$ in (5)] are important only for the small growth portfolio and only for the last 20 years of our sample period, when SG firms have low profitability and their high average growth rate of book equity in (5) is almost entirely spillover effects of massive share issues at prices far above book value.

Finally, our CC capital gain returns use CRSP (Center for Research in Securities Prices) returns without dividends. The CC total returns use CRSP returns with dividends. The contribution of dividends to the CC total annual return is taken to be the total annual return minus the return without dividends. Since monthly total returns are compounded to get annual returns, the dividend contribution includes dividends and the reinvestment return earned from the time a dividend is paid to the end of the annual return period.

II. The Simple Breakdown of Returns: Dividends, Growth in B, and Growth in P/B

Table 1 shows average values of annual CC returns and their components. The time periods in Table 1 and later tables are for annual returns, ending in June. For example, 1927-2006 refers to portfolios formed each year at the end of June from 1926 through 2005, producing annual returns realized in June 1927 through June 2006. Table 1 shows results for three time periods: (i) 1927-2006, (ii) the period after 1963 (1964-2006) examined by Fama and French (1992) and many other papers on value-growth returns, and (iii) the 1927-1963 "out-of-sample" period of Davis, Fama, and French (2000).

A. The Market Portfolio

To set the stage for the value and growth portfolios, we first examine the components of the average return on the value weight market portfolio of the stocks in our sample. The CC market return for 1927-2006 is 9.83% per year, and the market returns for 1927-1963 and 1964-2006 are similar, 9.35% and 10.25% per year. There is a shift, however, from higher dividends in the first period to faster growth in book equity and higher capital gains in the second. The average annual dividend contribution falls from 4.87% for 1927-1963 to 3.09% for 1964-2006, but, fueled by the increase in the rate of growth of book equity (from 3.25% to 6.87% per year), the capital gain return rises from 4.48% to 7.16%. The higher capital gains associated with faster growth in book equity are a nice (if rough) confirmation of the arguments of Miller and Modigliani (1961) about the tradeoff of dividends for capital gains.

In the breakdown of the CC capital gain return of (5), the growth rate of book equity, largely due to retained earnings, accounts for almost all the average capital gain return on the market portfolio, and growth in the price-to-book ratio is much less important. The average growth rate of the price-to-book ratio for the market portfolio for 1927-2006 is only 0.72% per year, so the average capital gain return, 5.92% per year, is close to the average growth rate of book equity, 5.20% per year. Similar results are observed in the two subperiods. They are in contrast to the results for value and growth portfolios, examined next, where growth in P/B (due to different growth rates of price and book equity) is important in capital gain returns, though it is opposite in sign for value (positive) and growth (negative) portfolios.

B. Dividends

In line with the results for the market portfolio, Table 1 and Figure 1 show that for the six size-P/B portfolios, the contribution of dividends to annual CC returns is higher for 1927-1963 than for 1964-2006. Moreover, within the two size groups the decline in the contribution of dividends to average returns is most extreme for the growth portfolio and least extreme for the value portfolio.

More interesting, there are patterns in dividends during 1964-2006 that are absent for 1927-1963. Table 1 and Figure 1 show that within P/B groups, dividends contribute more to the 1964-2006 average returns of big stocks. And given size, dividends contribute more to the returns of value stocks. In contrast, (i) during 1927-1963 small stock portfolios produce both the lowest and highest dividend contributions, (ii) the contribution of dividends to average returns is higher for the small growth portfolio than for the small value portfolio, and (iii) dividends contribute similar amounts to the returns of the big growth and big value portfolios.

Fama and French (2001) find that the propensity to pay dividends declines through time. But their results do not explain why the systematic patterns in dividends observed in later years (small firms and growth firms pay less) are absent in earlier years. This is an interesting topic for future research, particularly with respect to theories about why firms pay dividends.

C. Capital Gains: Growth in Book Equity and Growth in P/B

Table 1 also reports average values of the components of the CC capital gain return identified in equation (5), that is, the growth rate of book equity and the growth rate of the price-to-book ratio. Here observed patterns are similar for 1927-1963 and 1964-2006.

Firms invest a lot in the year after they are allocated to growth portfolios. The CC growth rate of book equity for 1927-2006 averages 10.30% for the big growth portfolio (BG) and 13.32% for the small growth portfolio (SG). Average rates of capital gain for the two growth portfolios for 1927-2006 are lower, 5.80% and 5.70%. Higher growth rates for book equity than for price imply declining price-to-book ratios. In the year after portfolio formation, P/B on average declines at a continuously compounded rate of 4.50% for BG and a somewhat larger 7.61% for SG.

Growth rates of book equity that are higher than growth rates of price do not imply, however, that dollar increases in book equity for the growth portfolios exceed increases in price. The price-to-book ratios of the growth portfolios are far above 1.0, and despite declining P/B in the year after portfolio formation, we can report that the dollar capital gains are on average greater than the dollar growth in book equity.

In contrast to the high growth rates of book equity of growth stocks, during 1927-2006 book equity for the big value portfolio (BV) on average increases by only 0.82% in the year after portfolio formation, and book equity for small value (SV) shrinks by 4.03%. In other words, on average big value firms do not do much equity-financed investment, and the equity-financed assets of small value firms actually decline. Average CC rates of capital gain for the two value portfolios are, however, high, 7.13% for BV and 11.23% for SV. As a result, P/B increases strongly in the year after portfolio formation, at an average rate of 6.31% for BV and an even more impressive 15.26% for SV.

In short, the split of average capital gain returns between growth rates of book equity and growth rates of P/B is quite different for growth and value portfolios. For the two growth portfolios, the growth rate of book equity in the year after portfolio formation is far in excess of the growth rate of price, and P/B declines. But for value portfolios, growth in book equity is on average near zero or negative in the year after portfolio formation, and high average rates of capital gain show up as growth in P/B. These patterns in growth rates of book equity and P/B are much the same for 1927-1963 and 1964-2006.

Average growth rates of price-to-book ratios combine the effects of convergence and drift. We see next that drift is minor relative to convergence, so differences in growth rates of P/B largely reflect convergence. The high P/B ratios of growth portfolios decline after portfolio formation because some growth firms cease to be highly profitable and fast-growing with low expected stock returns. And the low P/B ratios of value portfolios rise as some firms become more profitable with better investments opportunities and lower expected stock returns.

III. Drift and Convergence

Equation (5) splits the capital gain return on a portfolio between growth in its book equity and growth in its un-refreshed price-to-book ratio (the latter defined as the growth from t to t+1 of P/B for the stocks allocated to the portfolio at t). We next split the average growth in un-refreshed price-to-book ratios between drift and convergence.

A. Definitions and Estimates

For a given portfolio (for example, small value) the drift component of average returns is meant to capture the effects of changes from the beginning to the end of the sample period in the price-to-book ratios of stocks of that type. We estimate drift as the average value of $\ln(PB_{t+1}/PB_t)$, the CC growth rate of P/B for the refreshed version of the portfolio formed at t and then reformed at t+1. In economic terms, drift measures the contribution to average return of long-term changes in expected profitability, growth, and the discount rates used to price stocks of a given type.

In contrast, the convergence component of average returns focuses on changes in price-to-book ratios due to movement of stocks across types in the year after they are allocated to a portfolio of a given type. The average growth rate of a portfolio's un-refreshed P/B (the average value of $\ln(PB_{t,t+1}/PB_t)$), is in part due to convergence, but it also includes drift. To split the two, we define convergence as the average difference between the CC growth rates of a portfolio's un-refreshed and refreshed P/B, that is, the average value of $\ln(PB_{t,t+1}/PB_t) - \ln(PB_{t+1}/PB_t)$. Since PB_t drops out of this expression, convergence is $\ln(PB_{t,t+1}/PB_{t+1})$, the percent difference between a portfolio's un-refreshed and refreshed price-to-book ratios at t+1. In economic terms, for a given portfolio formed at time t, convergence from t to t+1 is the percent difference between the portfolio's un-refreshed price-to-book ratio at t+1 and an estimate of the P/B it would have in the absence of migration of stocks across types from t to t+1. Thus, convergence measures the increase in P/B that occurs as some value firms prosper and migrate towards growth, or the decline in P/B that occurs as some growth firms falter and move toward value.

The estimates of drift for 1927-2006 (Table 1) are modest relative to other components of average returns, and average drift is similar for the six size-P/B portfolios. Average growth rates of refreshed P/B range from 0.88% per year for the big growth portfolio to 1.81% for small value.

There is an interesting result in the drift estimates for 1927-1963 and 1964-2006. It is well-known that price-to-book ratios drift up in the later years of our sample period (for example, Fama and French 2002). But except for the big growth portfolio, average drift is in fact higher for 1927-1963 than for 1964-2006. For example, the estimates of drift for the market portfolio are 1.44% per year for 1927-1963, versus 0.66% for 1964-2006

Figure 2 plots the time series of refreshed price-to-book ratios that generate the estimates of drift for the big growth and big value portfolios (Figure 2a) and the small growth and small value portfolios (Figure 2b). For purposes of comparison, each figure also shows the path of P/B for the market portfolio. The price-to-book ratios for the neutral portfolios, which we omit to simplify the figures, are always between the ratios for the growth and value portfolios and typically close to the ratio for the market.

The differences between the beginning (1926) and ending (2006) ratios are testimony to the power of compounding. Modest average annual changes in P/B (and thus modest estimates of drift) cumulate to impressive 79-year simple growth in P/B, ranging from 102.3% for BG to 326.9% for SV.

The drift of P/B is far from relentless. The ratios are volatile, and for all portfolios, P/B in 1982 is close to its 1926 value. For example, P/B for the market portfolio is 1.08 in 1926 and 0.88 in 1982. Looking back from 1982, we would probably conclude that there is little noticeable drift in price-to-book ratios. Likewise, for all portfolios P/B is much higher in 2006 than in 1926, but the ratios for 2006 are similar to those of 1968. Skipping the details, we can also report that the estimates of average drift for 1927-2005 are all within 0.5 standard errors of zero. Thus, there is no reliable evidence of a positive trend in refreshed price-to-book ratios during the sample period.

Modest estimates of average annual drift lead to the inference that average growth rates of un-refreshed P/B for value and growth portfolios are largely due to convergence. The contributions of convergence to average returns are substantial. For 1927-2006, convergence in P/B (due to increases in expected profitability and growth and declines in expected returns) adds 13.45% and 5.07% per year to average returns on the small and big value portfolios (Table 1). This compares to drift estimates for SV and BV of 1.81% and 1.24% per year. For the growth portfolios, the positive drift of refreshed price-to-book ratios (1.25% per year for SG and 0.88% for BG) means that estimates of convergence are more negative than the declines in un-refreshed P/B. Convergence of P/B (due to increases in expected returns and lower expected profitability and growth) reduces average returns on the small and big growth portfolios by 8.86% and 5.38% per year. The capital losses from convergence are, however, outweighed by capital gains from growth in book equity, which averages 13.32% per year for SG and 10.30% for BG.

VI. Bottom Line

We break average returns on value and growth portfolios into dividends and three sources of capital gain, (i) growth in book equity, (ii) convergence in price-to-book ratios due to mean reversion in profitability, growth, and expected returns, and (iii) upward drift in P/B during 1926-2006.

Dividends - During 1964-2006, dividends contribute more to average returns on value stocks and big stocks. But these patterns are special to 1964-2006. For 1927-1963, the contribution of dividends to average returns is not systematically different for big and small stocks or for value and growth stocks.

Our main goal is to shed light on the three sources of capital gain returns. Our main results, summarized in Figure 3, are as follows.

Drift - Total increases in price-to-book ratios during 1926-2006 are large, but the contributions of this drift to the average annual capital gain returns of value and growth portfolios are small relative to the contributions of convergence.

Book Equity Growth and Convergence of P/B - The sharp contrasts between value and growth returns are in the contributions of growth in book equity and convergence of price-to-book ratios. Firms do not invest much in the year after they are allocated to value portfolios, and growth in book equity is trivial to negative. But value portfolios generate large capital gain returns as some value firms restructure, become more profitable, and move to lower expected return groups. Weak book equity growth and strong capital gains combine to produce upward convergence in the price-to-book ratios of value portfolios. And convergence is stronger for small value stocks than for big value stocks. In contrast, firms invest a lot in the year after they are allocated to growth portfolios, and growth stocks have book equity growth rates far in excess of capital gain returns. The result is negative convergence of P/B, which is again stronger for small growth stocks than for big growth stocks. Price-to-book ratios fall because as they exercise their growth options, all growth firms do not remain highly profitable with low expected stock returns.

How much of the convergence of price-to-book ratios for value and growth portfolios is expected and unexpected – and by whom? The answer depends on whether one leans toward a rational or a behavioral view of asset pricing. Rationalists like Fama and French (1995) would argue that convergence in the profitability, growth, and expected returns of value and growth stocks is anticipated and so built into the forward-looking prices of stocks. In this view, average convergence in P/B is the result of rational pricing that aligns expected returns and risk. And value stocks have higher expected returns because they are more risky.

In contrast, behaviorists like Lakonishok, Shleifer, and Vishny (1994) argue that the investors who determine stock prices never come to understand convergence in profitability and growth. Investors are thus surprised by the deterioration in profitability and growth that tends to occur after stocks move to the growth category and the improvement after stocks are allocated to value portfolios. The result is lower average returns (and negative convergence) for growth stocks and higher returns (positive convergence) for value stocks. In this view, convergence is largely unexpected, at least by the consistently irrational (and learning impaired) investors that dominate asset pricing.

The important point, however, is that our breakdown of average returns into the contributions of dividends and capital gains due to growth in book equity, drift, and convergence captures the core factors in asset pricing irrespective of one's views about whether pricing is rational or irrational.

References

Davis, James L., Eugene F. Fama,and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929-1997, *Journal of Finance* 55, 389-406.

Fama, Eugene F. and Kenneth R. French, 1992, The cross-section of expected stock returns*, Journal of Finance* 47, 427-465.

Fama, Eugene F. and Kenneth R. French, 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance* 50, 131-156.

Fama, Eugene F. and Kenneth R. French, 2001, Disappearing dividends: Changing firm characteristics or lower propensity to pay, *Journal of Financial Economics* 60, 3-43.

Fama, Eugene F. and Kenneth R. French, 2002, The equity premium, *Journal of Finance* 57, 637-659.

Fama, Eugene F. and Kenneth R. French, 2007, Migration, *Financial Analysts Journal* 63:3, 48-58.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, Contrarian investment, extrapolation, and risk, *Journal of Finance* 49, 1541-1578.

Miller, Merton H., and Franco Modigliani, 1961, Dividend policy, growth, and the valuation of shares, *Journal of Business* 63, 411-433 (October 1961).

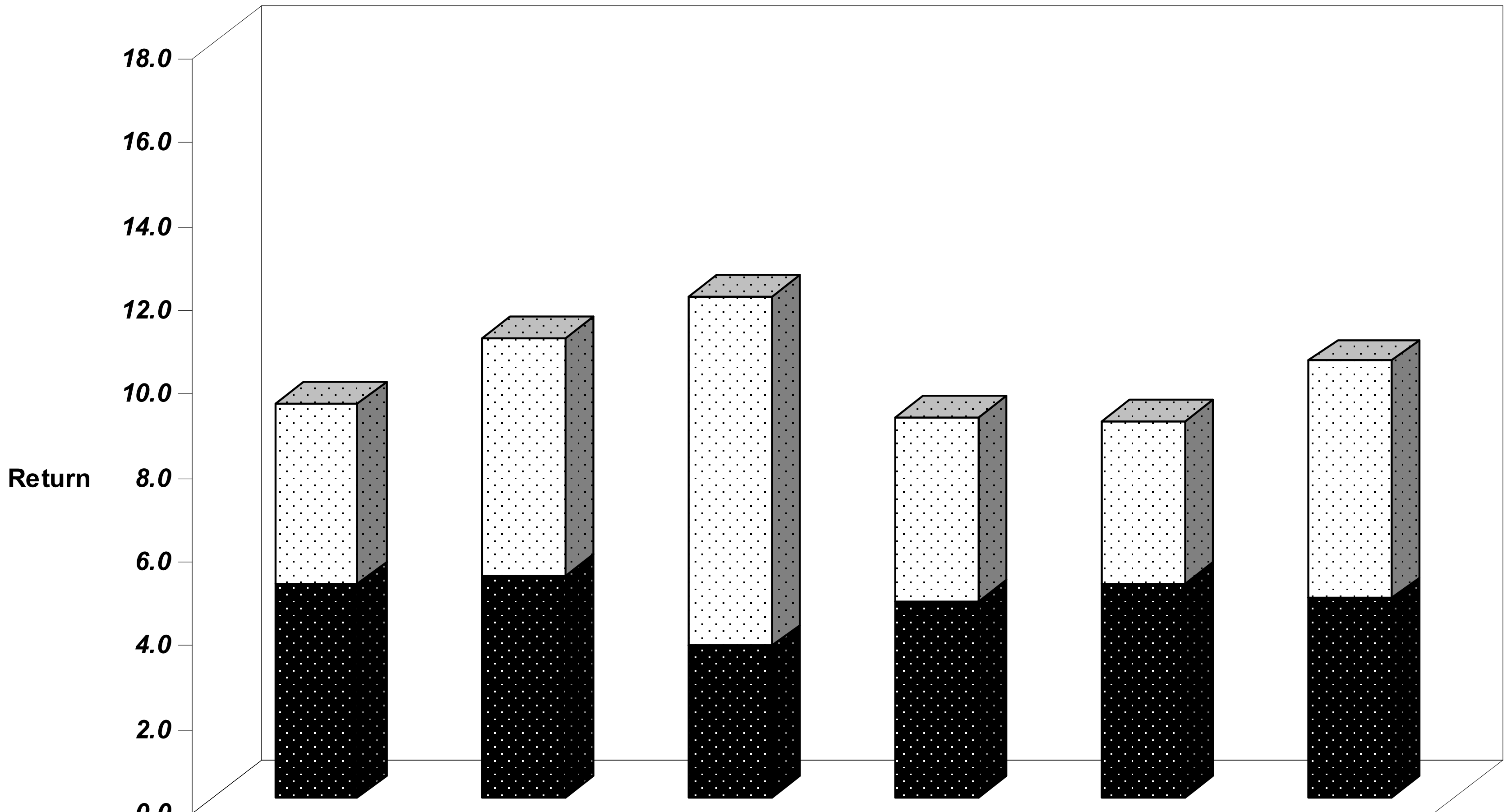
Rosenberg, Barr, Kenneth Reid, and Ronald Lanstein, 1985, Persuasive evidence of market inefficiency, *Journal of Portfolio Management* 11, 9-17.

Table 1 – Components of average continuously compounded annual returns, in percent

At the end of June of each year t from 1926-2005 we form six value-weight portfolios, SG, SN, SV, BG, BN, and BV, as the intersections of two size groups, small (S, stocks with June market cap below the NYSE median) and big (B, above the median), and three price-to-book (P/B) groups, growth (G, stocks in the top 30% of NYSE P/B), neutral (N, middle 40%), and value (V, bottom 30%). The portfolios for year t include NYSE, AMEX (after 1962), and Nasdaq (after 1972) stocks with positive book equity in t-1. We define book equity as Compustat's total assets (data item 6), minus liabilities (181), plus deferred taxes and investment tax credit (35) if available, minus (as available) liquidating (10), redemption (56), or carrying value (130) of preferred stock. In the P/B sorts to form portfolios in June of year t, book equity is for the fiscal year ending in t-1, and market equity is for the end of December of t-1. Market is the value-weight portfolio of the six portfolios. Total Return and Capital Gain are the average continuously compounded annual with and without dividend returns for July of t through June of t+1. Dividend Contribution is the difference between with and without dividend average returns. Growth in B is the average CC annual change in an un-refreshed portfolio's book equity from each firm's fiscal year end in calendar year t-1 to its fiscal year end in calendar year t, and is adjusted to eliminate the effect of shares issued or repurchased between the fiscal year ends. Similarly, a firm's market equity P at the end of June of t+1 is market equity at the end of June of t accreted by the next twelve months' capital gains. Growth in un-refreshed P/B is the average CC annual change in P/B from portfolio formation in June of t to June of t+1. Drift is the average CC annual change in P/B for the refreshed portfolio from t to t+1. Convergence is the difference between the un-refreshed and refreshed P/B.

	Total Return	Dividend Contribution	Capital Gain	Growth in B	Growth in Un-Refreshed P/B	Drift	Convergence
1927-2006							
Market	9.83	3.91	5.92	5.20	0.72	1.02	-0.30
SG	8.69	2.98	5.70	13.32	-7.61	1.25	-8.86
SN	12.91	3.87	9.04	4.11	4.93	1.19	3.73
SV	14.44	3.21	11.23	-4.03	15.26	1.81	13.45
BG	9.18	3.39	5.80	10.30	-4.50	0.88	-5.38
BN	10.03	4.49	5.54	5.03	0.51	0.94	-0.43
BV	11.82	4.69	7.13	0.82	6.31	1.24	5.07
1927-1963							
Market	9.35	4.87	4.48	3.25	1.22	1.44	-0.21
SG	9.39	5.11	4.28	11.11	-6.83	1.63	-8.45
SN	10.96	5.31	5.65	2.71	2.94	1.27	1.68
SV	11.94	3.61	8.33	-4.12	12.45	2.13	10.32
BG	9.08	4.67	4.41	7.71	-3.30	0.80	-4.10
BN	8.97	5.12	3.85	2.81	1.04	1.07	-0.03
BV	10.42	4.75	5.67	0.40	5.27	1.33	3.94
1964-2006							
Market	10.25	3.09	7.16	6.87	0.29	0.66	-0.38
SG	8.09	1.16	6.93	15.22	-8.29	0.93	-9.21
SN	14.59	2.63	11.96	5.33	6.63	1.13	5.50
SV	16.60	2.87	13.73	-3.95	17.68	1.54	16.14
BG	9.27	2.28	6.99	12.52	-5.53	0.95	-6.48
BN	10.94	3.95	7.00	6.94	0.06	0.83	-0.77
BV	13.02	4.64	8.38	1.18	7.20	1.17	6.03

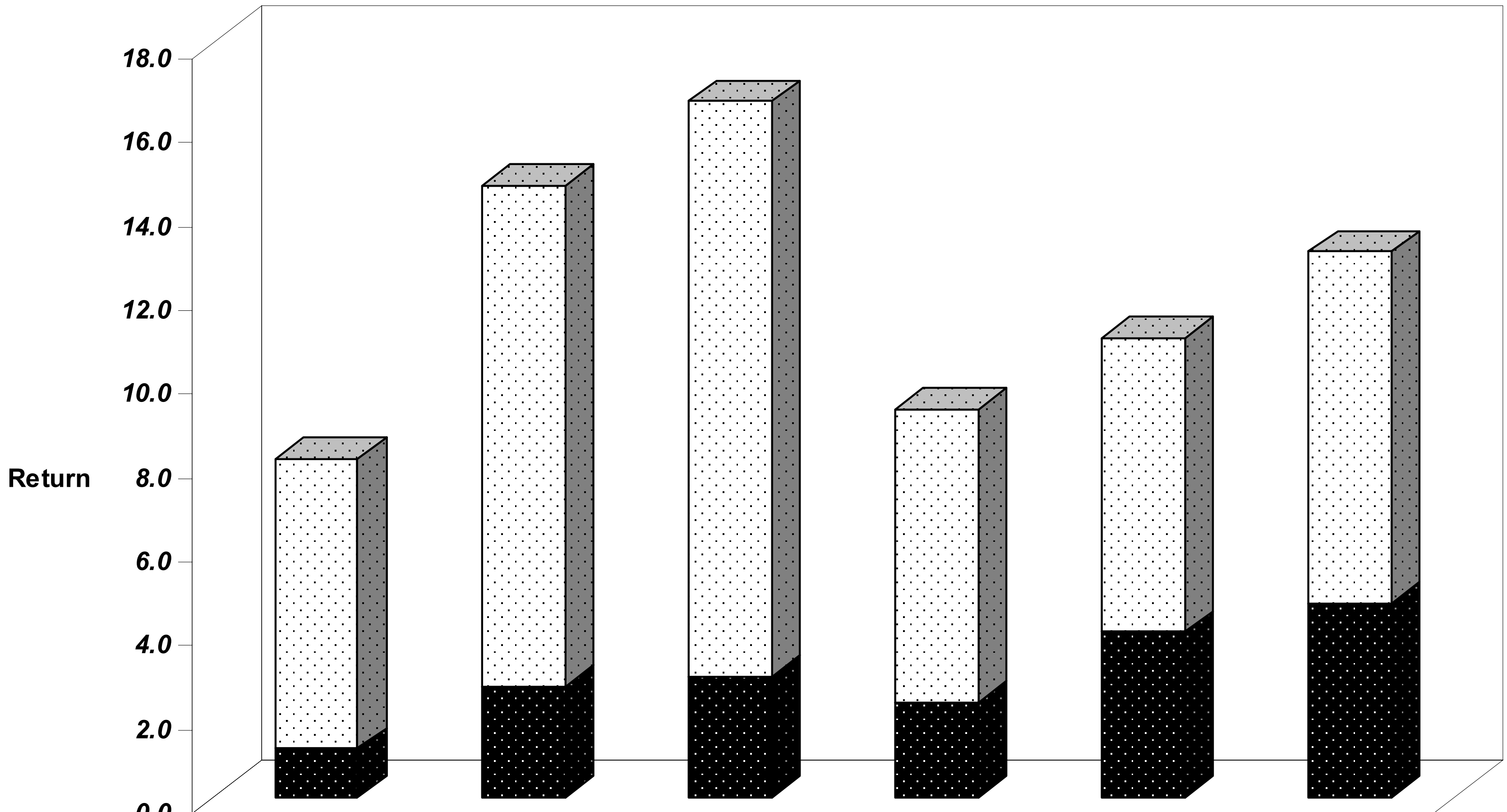
Figure 1a -- Dividend and Capital Gain Returns for the Six Style Portfolios - 1927-1963



	SG	SN	SV	BG	BN	BV
Capital Gain	4.28	5.65	8.33	4.41	3.85	5.67
Dividend	5.11	5.31	3.61	4.67	5.12	4.75

Portfolio

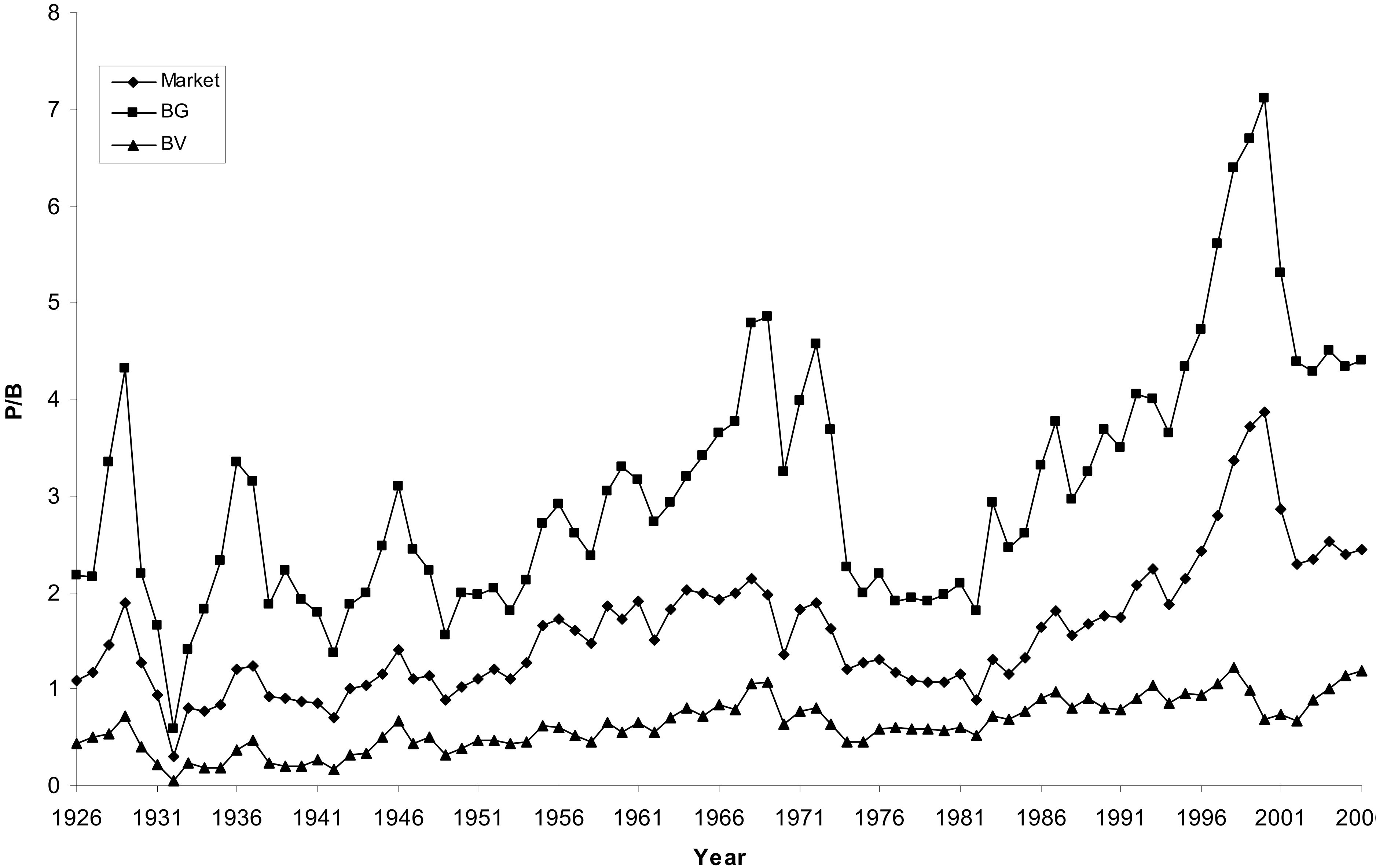
Figure 1b -- Dividend and Capital Gain Returns for the Six Style Portfolios - 1963-2006



	SG	SN	SV	BG	BN	BV
Capital Gain	6.93	11.96	13.73	6.99	7.00	8.38
Dividend	1.16	2.63	2.87	2.28	3.95	4.64

Portfolio

Figure 2a - Refreshed P/B for Market, Big Growth (BG), and Big Value (BV)



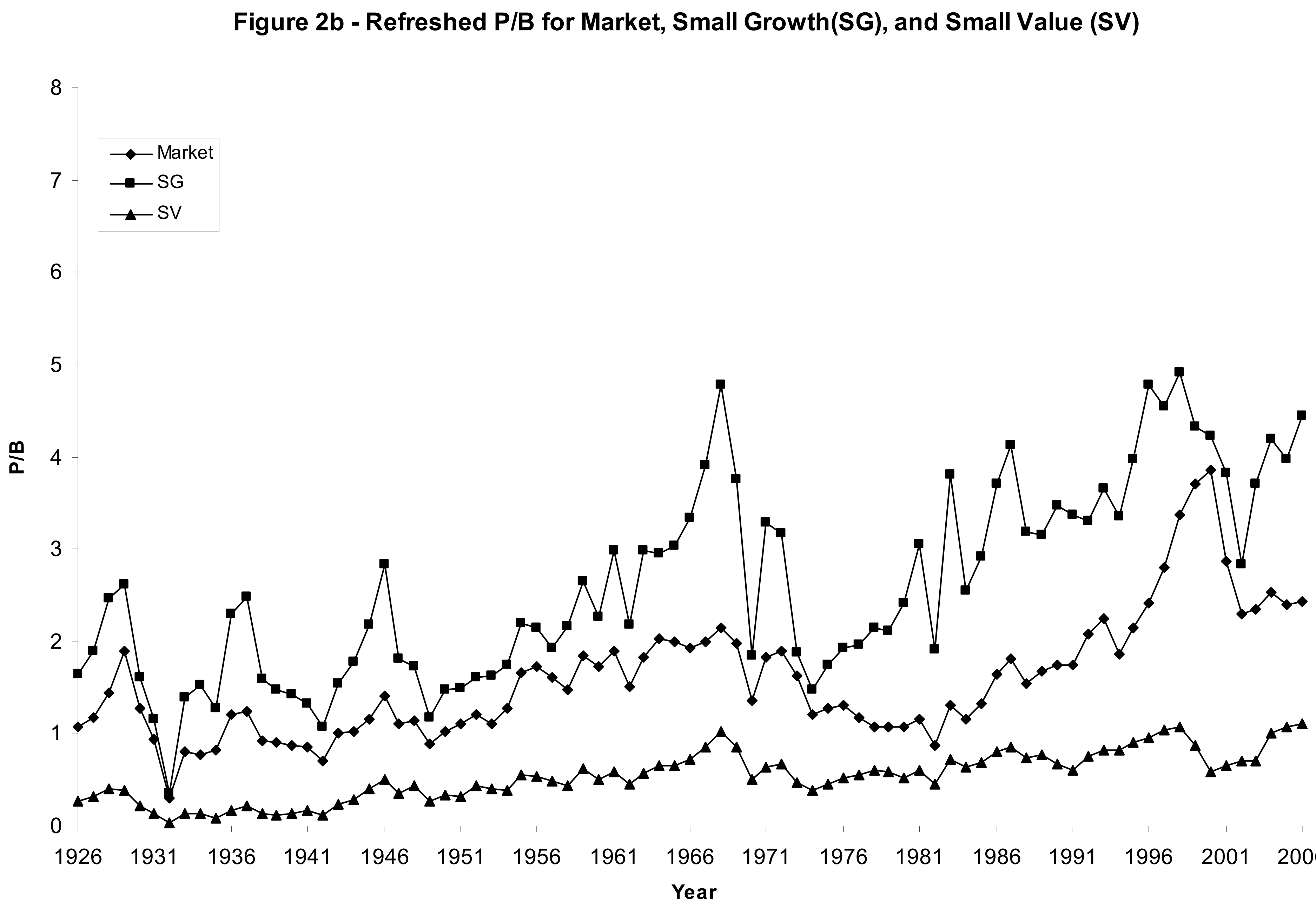
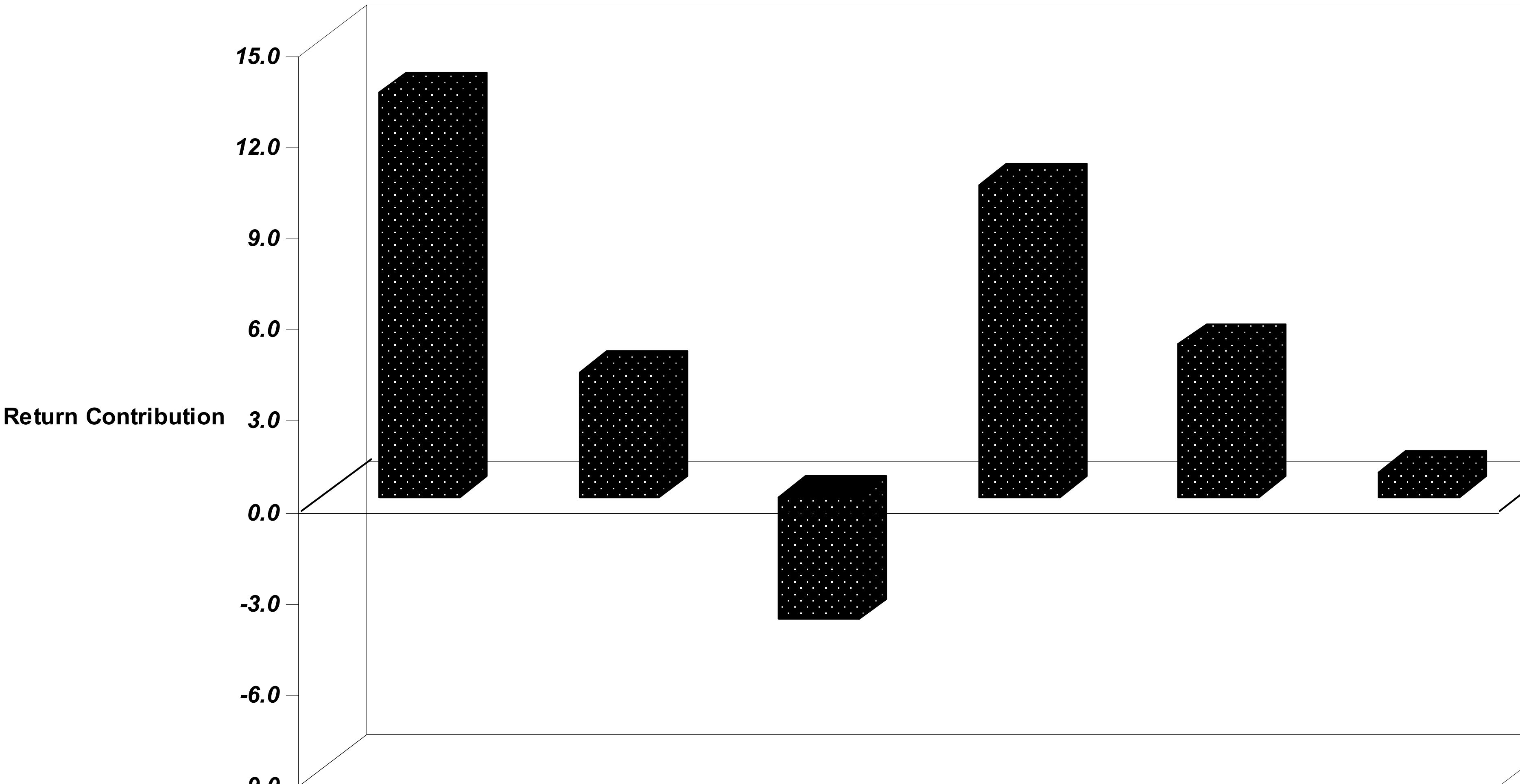


Figure 2b - Refreshed P/B for Market, Small Growth(SG), and Small Value (SV)
Market
SG
SV
P/B
Year
0
1
2
3
4
5
6
7
8
1926
1931
1936
1941
1946
1951
1956
1961
1966
1971
1976
1981
1986
1991
1996
2001
2006

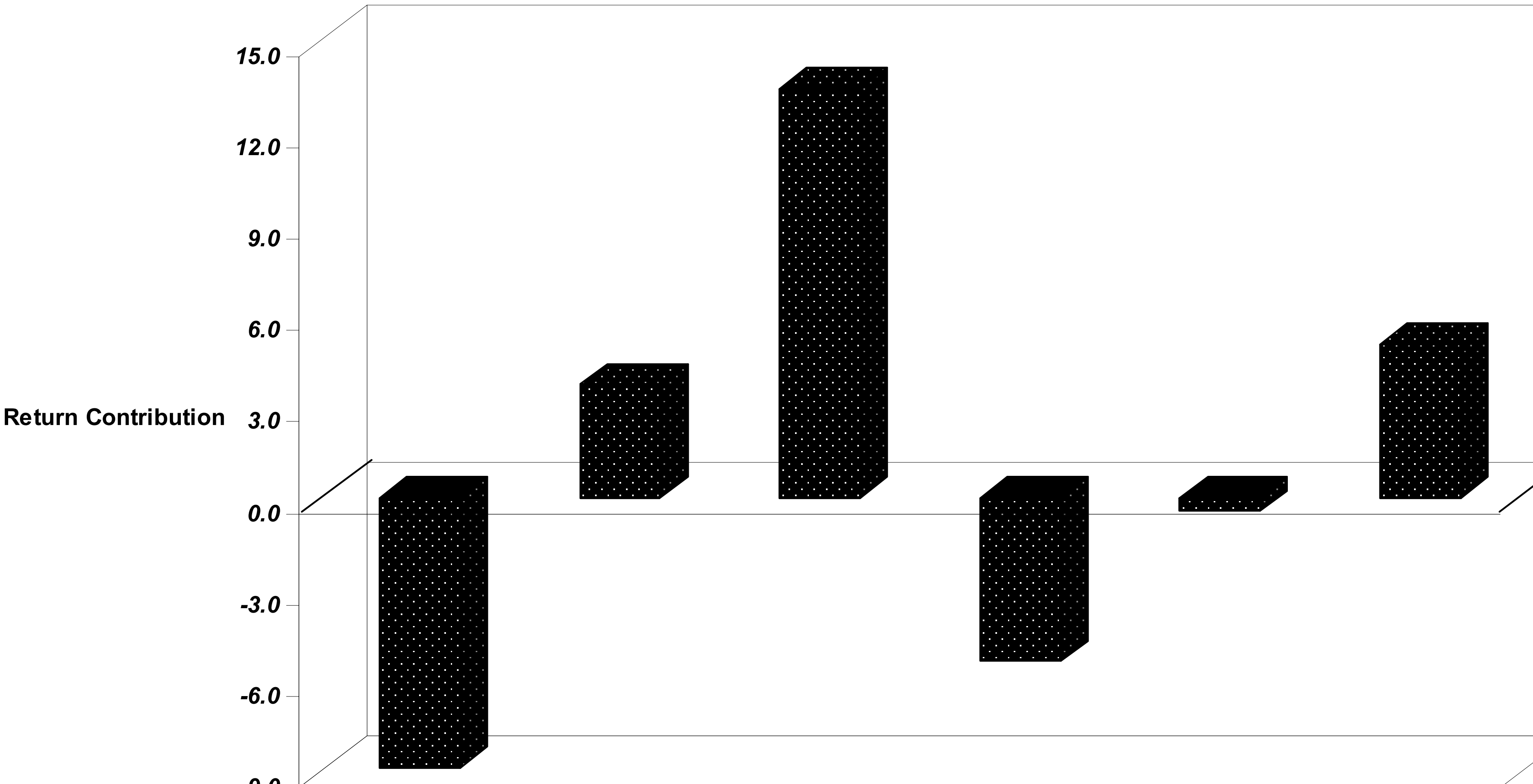
Figure 3a - Contribution of Growth in B to Average Returns for 1927-2006



	SG	SN	SV	BG	BN	BV
Growth in B	*13.32*	*4.11*	*-4.03*	*10.30*	*5.03*	*0.82*

Portfolio

Figure 3b - Contribution of Convergence of P/B to Average Returns for 1927-2006



	SG	SN	SV	BG	BN	BV
Convergence	-8.86	3.73	13.45	-5.38	-0.43	5.07

Portfolio

Figure 3c - Contribution of Drift in P/B to Average Returns for 1927-2006