The Anatomy of Value and Growth Stock Returns

Eugene F. Fama and Kenneth R. French

Average returns on value and growth portfolios are broken into dividends and three sources of capital gain: (1) growth in book equity, primarily from earnings retention, (2) convergence in price-to-book ratios (P/Bs) from mean reversion in profitability and expected returns, and (3) upward drift in P/B during 1927–2006. The capital gains of value stocks trace mostly to convergence: P/B rises as some value companies become more profitable and their stocks move to lower-expected-return groups. Growth in book equity is trivial to negative for value portfolios but is a large positive factor in the capital gains of growth stocks. For growth stocks, convergence is negative: P/B falls because growth companies do not always remain highly profitable with low expected stock returns. Relative to convergence, drift is a minor factor in average returns.

Value stocks (those with low ratios of price to book value) have higher average returns than growth stocks (high P/Bs).1 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 \( (P_{t+1}/P_t) \):

\[
1 + R_{t+1} = \frac{D_{t+1}}{P_t} + \frac{P_{t+1}}{P_t}.
\]

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, primarily from 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 (that is, \( P_{t+1}/B_{t+1} \)) as the remaining (multiplicative) piece of the capital gain return:

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

We find that for the 1964–2006 period, 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. For 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 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 (for the big-capitalization value stocks) or negative (for the small-cap value stocks). In other words, value companies 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, companies 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, on average, P/B 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 P/B after stocks are characterized as value or growth? We suggest a simple story that is driven by standard economic forces. When companies are allocated to value versus growth portfolios, they tend to be at opposite

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ends of the profitability spectrum. Growth companies tend to be highly profitable and fast growing, whereas value companies are less profitable and growing less rapidly, if at all.\(^2\) High expected profitability and growth combine with low expected stock returns (equivalently, low costs of equity capital) to produce high P/Bs for growth stocks, whereas low profitability, slow growth, and high expected returns produce low P/Bs for value stocks.

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

The tendency of P/Bs to become less extreme after stocks are placed in value and growth portfolios is what we call “convergence.” There was also, however, a general upward drift in P/Bs during 1927–2006. Higher prices relative to book values imply some combination of higher expected cash flows and lower expected returns (discount rates for expected cash flows) 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 (1) growth of book equity, (2) convergence of P/Bs, and (3) drift of P/Bs during the sample period.

The total increase in P/Bs during the sample period is large, but the contribution of 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 for growth portfolios are thus mostly a result of 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 (1) the expected payoff on the portfolio at \(t + 1\) [that is, \(E_t(D_{t+1} + P_{t+1})\)], (2) the risk of the payoff, and (3) 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 companies 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 companies in the portfolio is partly 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 Equation 2 captures the salient factors in the pricing of stocks.

The rational view of asset pricing outlined above has a well-known competitor. Behaviorists such as Lakonishok, Shleifer, and Vishny (1994) argue that the higher average returns of value stocks relative to growth stocks stem from 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 Equation 2 capture the core sources of average return, irrespective of one’s view about whether pricing is rational or irrational.

Finally, our earlier article, “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-cap stocks and value stocks. The present article, 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, companies migrate across style groups because of the investments they make and the expected profitability of the investments, which combine to produce convergence in their P/Bs. The equity-financed investments of companies are summarized by the growth rate of book equity in Equation 2, and the growth rate of P/B captures the convergence of P/B produced by investment and its expected profitability.

Our story proceeds as follows. We first discuss what motivates the breakdown of returns into dividends and capital gains from growth in book equity and growth in P/B, and we address estimation issues. We then present estimates of the breakdown for value and growth portfolios. Finally, we examine the more detailed breakdown of capital gain returns that splits growth in P/B between convergence and drift.
Components of Returns: Preliminaries

Our tests center on six portfolios formed on size and P/B. The data are primarily from the Center for Research in Security Prices (CRSP) and Compustat and are 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—small cap, S, composed of NYSE, Amex (after 1962), and NASDAQ stocks (after 1972) with market capitalizations below the NYSE median, and big cap, B, defined as market cap above the NYSE median. We separately sort stocks into three P/B groups—growth stocks, G, consisting of NYSE, Amex, and NASDAQ stocks in the top 30 percent of NYSE P/B; neutral, N, consisting of the middle 40 percent of NYSE P/B; and value, V, the bottom 30 percent 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-cap and big-cap growth portfolios, SN and BN are small-cap and big-cap neutral portfolios, and SV and BV are small-cap and big-cap value portfolios.

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

\[
1 + R_{t,t+1} = \frac{D_{t,t+1}}{P_t} + \frac{P_{t+1}}{P_t},
\]

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 each year for 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 P/B:

\[
\frac{P_{t,t+1}}{P_t} = \left( \frac{B_{t,t+1}}{B_t} \right) \left( \frac{B_t}{B_{t+1}} \right)
\]

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 \( t \)
- \( P_{B,t,t+1} = P_{t+1} / B_{t,t+1} \), the price-to-book ratio at \( t + 1 \) for 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 P/B for the stocks allocated to the portfolio at \( t \) times the (gross) rate of growth of book equity for these companies. Note that \( P_{B,t,t+1} \) is the price-to-book ratio at \( t + 1 \) for the stocks allocated to the portfolio at \( t \). This is not P/B for the refreshed version of the portfolio formed at \( t + 1 \), which is \( P_{B,t+1} \), because 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 \( t + 1 \).

Motivation. For perspective on Equation 4, suppose P/B for the stocks allocated to a portfolio at \( t \) is not expected to change from \( t \) to \( t + 1 \). Then Equation 3 and Equation 4 imply that the portfolio’s expected (gross) return is simply 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 P/B after stocks are identified as value or growth. The high P/B of growth stocks, which are typically fast-growing, highly profitable companies, tends to fall as the superior opportunities of these companies are eroded by competitors or natural decay. Conversely, companies 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 P/B to rise 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 cash flows. Thus,
growth companies are hit with higher costs of equity capital (expected stock returns) as they move out of the highly profitable growth category, whereas value companies are rewarded with lower costs of equity capital as they restructure and become more profitable.

The expected decline in the high P/Bs of growth stocks and the expected increase in the low P/Bs of value stocks is what we call convergence. The term captures price effects (capital gains) resulting from convergence of growth, profitability, and expected returns.

We shall also see that for all our portfolios, P/B rises during 1926–2006 because of some combination of higher expected cash flows 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 drift to average annual returns turns out to be relatively small. Thus, differences in average growth rates of P/B for value and growth portfolios are primarily a result of convergence. This fact justifies focusing much of the discussion that follows on the simple breakdown of the capital gain return in Equation 4.

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

\[
\ln\left(\frac{P_{t+1}}{P_t}\right) = \left[ \ln\left(\frac{P_{t+1}}{B_{t+1}}\right) - \ln\left(\frac{P_t}{B_t}\right) \right] + \ln\left(\frac{B_{t+1}}{B_t}\right)
\]

\[
= \ln\left(\frac{PB_{t+1}}{PB_t}\right) + \ln\left(\frac{B_{t+1}}{B_t}\right).
\]  

(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 Equation 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 year 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-weighted capital gain returns. This linking of returns implies that when stocks are delisted, their market value in the portfolio at delisting is invested in the stocks that remain. The shares of surviving companies held at the end of the year after portfolio formation (time t + 1) thus include those purchased at t and those purchased as other companies delist between t and t + 1. The total market equity of the portfolio at t + 1, \(P_{t+1}\), is the combined market value of the original and the additional shares of surviving companies. We define the total book equity at t + 1, \(B_{t+1}\), as the aggregate book equity “owned” by the shares in surviving companies 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 companies 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 companies.

In the breakdown of the capital gain return of Equation 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 a result of 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 book value resulting from 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+1}/B_t)\] in Equation 5) are important only for the small-cap growth portfolio and only for the last 20 years of our sample period, when SG companies have low profitability and their high average growth rate of book equity in Equation 5 is almost entirely spillover effects of massive share issues at prices far above book value.

Finally, our CC capital gain returns use CRSP 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. Because monthly total returns are compounded to get annual returns, the dividend
contribution includes dividends and the reinvestment return earned from the time a dividend was paid to the end of the annual return period.

**Simple Breakdown of Returns**

Table 1 shows average values of annual CC returns and their components—dividends, growth in book value, and growth in P/B. The time periods in Table 1 and the figures to follow 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 periods: (1) the full 1927-2006 sample period, (2) the period after 1963 (1964-2006) examined by Fama and French (1992), and (3) the 1927-1963 "out-of-sample" period of Davis, Fama, and French (2000).

### 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 percent.

#### Table 1. Components of Average Continuously Compounded Annual Returns

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Total Return</th>
<th>Dividend Contribution</th>
<th>Capital Gain</th>
<th>Growth in Book Value</th>
<th>Growth in Unrefreshed P/B</th>
<th>Drift</th>
<th>Convergence</th>
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<tr>
<td><strong>A. Total sample period: 1927-2006</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Market</td>
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<td>3.91%</td>
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</tr>
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<td>1.22%</td>
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<td>4.28</td>
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<td>1.63</td>
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</tr>
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Notes: 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 returns, with and without dividends, for July of t through June of t + 1. "Dividend Contribution" is the difference between with-dividend and without-dividend average returns. "Growth in Book Value" is the average CC annual change in an unrefreshed portfolio's book equity from each company'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 company'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 12 months' capital gains. "Growth in Unrefreshed 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 unrefreshed and refreshed P/B.
per year, and the market returns for 1927–1963 and 1964–2006 are similar, 9.35 and 10.25 percent. 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 percent for 1927–1963 to 3.09 percent for 1964–2006, but fueled by the increase in the rate of growth of book equity (from 3.25 percent to 6.87 percent per year), the capital gain return rises from 4.48 percent to 7.16 percent. 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 trade-off of dividends for capital gains.

In the breakdown of the CC capital gain return of Equation 5, the growth rate of book equity, largely a result of retained earnings, accounts for almost all the average capital gain return on the market portfolio. Growth in P/B is much less important. The average growth rate of P/B for the market portfolio for 1927–2006 is only 0.72 percent per year, so the average capital gain return, 5.92 percent, is close to the average growth rate of book equity, 5.20 percent. 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 (because of different growth rates of price and book equity) is important in capital gain returns, although it is opposite in sign for value (positive) and growth (negative) portfolios.

**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 (Panel A of Figure 1) than for 1964–2006 (Panel B). 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, the contribution of dividends to returns varies systematically with market cap and P/B in the later subperiod, 1964–2006, but not during 1927–1963. Table 1 and Figure 1 show that within P/B groups, dividends contribute more to the 1964–2006 average returns of big-cap stocks than to those of small-cap stocks. And given size, dividends contribute more to the returns of value stocks than to those of growth stocks. In contrast, for the earlier subperiod, 1927–1963, (1) small-cap portfolios produce both the smallest and largest dividend contributions, (2) the contribution of dividends to average returns is larger for the small-cap growth portfolio than for the small-cap value portfolio, and (3) dividends contribute similar amounts to the returns of the big-cap growth and big-cap value portfolios.

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

**Capital Gains: Growth in Book Equity and in P/B.** Table 1 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 P/B. The patterns in these variables are similar for 1927–1963 and 1964–2006. Companies invest a lot in the year after they are allocated to growth portfolios. The CC growth rate of book equity for the full 1927–2006 period averages 10.30 percent for the big-cap growth portfolio and 13.32 percent for the small-cap growth portfolio. Average rates of capital gain for the two growth portfolios for the full period are lower, 5.80 percent and 5.70 percent. Higher growth rates for book equity than for price imply declining P/Bs. In the year after portfolio formation, P/B on average declines at a continuously compounded rate of 4.50 percent for BG and a somewhat larger 7.61 percent 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 P/Bs of the growth portfolios are far above 1.0, and despite declining P/Bs in the year after portfolio formation, 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, book equity for the big-cap value portfolio for the full 1927–2006 period on average increases only 0.82 percent in the year after portfolio formation and book equity for small-cap value shrinks by 4.03 percent. In other words, on average, BV companies do not do much equity-financed investment and the equity-financed assets of SV companies actually decline. Average CC rates of capital gain for the two value portfolios are high, however, at 7.13 percent for BV and 11.25 percent for SV. As a result, P/B increases strongly in the year after portfolio formation, at an average rate of 6.31 percent for BV and an even more impressive 15.26 percent 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 P/B 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/Bs of growth portfolios decline after
Drift and Convergence

Equation 5 splits the capital gain return on a portfolio between growth in its book equity and growth in its unrefreshed P/B (defined as the growth from time $t$ to $t+1$ of P/B for the stocks allocated to the portfolio at time $t$). We next split the average growth in unrefreshed P/Bs between drift and convergence.

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 P/Bs of stocks of that type. We estimate drift as the average value of $\ln(P_{B,t+1}/PB_t)$, 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 P/Bs resulting from 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 unrefreshed P/B [the average value of $\ln(P_{B,t+1}/PB_t)$] is partly a result of 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 unrefreshed and refreshed P/B—that is, the average value of $\ln(P_{B,t+1}/PB_t) - \ln(P_{B,t+1}/PB_t)$. Because $PB_t$ drops out of this expression, convergence is $\ln(P_{B,t+1}/PB_t)$, the percentage difference between a portfolio's unrefreshed and refreshed P/Bs at $t+1$. In economic terms, for a given portfolio formed at time $t$, convergence from $t$ to $t+1$ is the percentage difference between the portfolio's unrefreshed P/B 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 companies prosper and migrate toward growth and the decline in P/B that occurs as some growth companies falter and move toward value.

The estimates of drift for 1927–2006 (see 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/Bs range from 0.88 percent per year for the big-cap growth portfolio to 1.81 percent for the small-cap value portfolio.

There is an interesting result in the drift estimates for 1927–1963 and 1964–2006. It is well known that P/Bs drift up in the later years of the 1964–2006 period (see, for example, Fama and French 2002). But Panels B and C of Table 1 show that, except for the big-cap growth portfolio, average drift is, in fact, larger for 1927–1963 than for 1964–2006. For example, the estimates of drift for the market portfolio are 1.44 percent per year for 1927–1963 versus 0.66 percent for 1964–2006.

Figure 2 plots the time series of refreshed P/Bs that generate the estimates of drift for the big-cap growth and big-cap value portfolios (Panel A) and the small-cap growth and small-cap value portfolios (Panel B). For purposes of comparison, each panel also shows the path of P/B for the market portfolio. (The P/Bs for the neutral portfolios, which we have omitted in order 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 percent for BG to 326.9 percent for SV.

The drift of the P/Bs is far from relentless. The ratios are volatile, and for all portfolios, P/B in 1982 is close to its 1926 value. For example, the 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 P/Bs. Similarly, for all portfolios, P/B is much higher in 2006 than in 1926, but the ratios for 2006 are close 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 P/Bs during the sample period.

Modest estimates of average annual drift lead to the inference that average growth rates of refreshed P/Bs for value and growth portfolios are largely a result of convergence. The contributions of convergence to average returns are substantial. Table 1 shows that for the full 1927–2006 period, convergence in P/B (because of increases in expected profitability and growth and declines in expected returns) adds 13.45 percent and 5.07 percent per year to average returns on the small-cap and big-cap value portfolios, versus drift estimates for SV and BV of only 1.81 percent and 1.24 percent. For the growth portfolios, the positive drift of

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51

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refreshed P/Bs (1.25 percent for SG and 0.88 percent for BG) means that estimates of convergence are more negative than the declines in unrefreshed P/Bs. Convergence of P/Bs (because of increases in expected returns and lower expected profitability and growth) reduces average returns on the small-cap and big-cap growth portfolios by 8.86 percent and 5.38 percent per year. The capital losses from convergence are outweighed, however, by the capital gain from growth in book equity, which averages 13.32 percent for SG and 10.30 percent for BG.

**Bottom Line**

We break average returns on value and growth portfolios for 1927–2006 into dividends and three sources of capital gain: (1) growth in book equity, (2) convergence in P/Bs due to mean reversion in profitability, growth, and expected returns, and (3) upward drift in P/Bs.

During 1964–2006, dividends contribute more to average returns on value stocks versus growth stocks, and dividends contribute more to average
returns on big-cap stocks versus small-cap 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-cap and small-cap stocks or for value and growth stocks.

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

- **Drift.** Total increases in P/Bs during 1927–2006 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 P/B convergence.** The sharp contrasts between value and growth returns are in the contributions of growth in book equity and convergence of P/Bs. Companies 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 companies restructure, increase profitability, and move to lower-expected-return groups. Weak growth in book equity and strong capital gains combine to produce upward convergence in the P/Bs of value portfolios. And convergence is stronger for small-cap value stocks than for big-cap value stocks. In contrast, companies 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/Bs, which is again stronger for small-cap growth stocks than for big-cap growth stocks. P/Bs fall because as the companies exercise their growth options, not all growth companies remain highly profitable with low expected stock returns.

How much of the convergence of P/Bs for value and growth portfolios is expected and how much is unexpected—and by whom? The answers depend on whether one leans toward a rational or toward a behavioral view of asset pricing. Rationalists, such as Fama and French (1995), would argue that convergence in profitability, growth, and expected returns of value and growth stocks is anticipated and thus built into the forward-looking prices of stocks. In this view, average convergence in P/Bs 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, such as Lakonishok et al. (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 is that, irrespective of one’s views about whether pricing is rational or irrational, our breakdown of average returns into the contributions of dividends and capital gains resulting from growth in book equity, drift, and convergence captures the core factors in asset pricing.

We are grateful for the comments of Jonathan Lewellen.

This article qualifies for 1 PD credit.

Notes

1. See, for example, Rosenberg, Reid, and Lanstein (1985); Fama and French (1992).


References


