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Rebalancing and the Value Effect

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Value and growth stocks are usually placed in opposite extremes of the equity spectrum, with passionate advocates on both sides. To highlight the conventional wisdom about value and growth stocks, consider one of the most traditional valuation models. Gordon [1962] assumed that the expected return, r, on a stock is simply the sum of its dividend yield, $\frac{D}{P}$, and the growth rate of its dividends, g. This model is a gross simplification because it assumes that the expected return and the growth rate of dividends remain constant in perpetuity, but it allows us to see the main characteristics of value and growth stocks through the simplifying lens of dividend yields and dividend growth rates.

Value stocks have lower prices relative to fundamentals—book value, sales, earnings, dividends, and so forth—and consequently pay a higher amount of dividends per dollar invested. Investors in value strategies typically believe that the higher income of value stocks (D/P) will trump the faster growth in income of growth stocks (g) and give value stocks an advantage in terms of higher return. They often also point to risk or mispricing as an added source of return: as valuations improve, price appreciation provides gains on top of the higher yield.

Growth stocks are the opposite, demanding a price premium and offering a diminished yield in exchange for a presumption of faster future growth in dividends. Investors in growth strategies expect that the lofty growth potential of growth stocks, and their better prospects for future increases in other fundamental measures of company success, such as earnings, sales, and book values, will more than make up for the lower initial yield.

In this article, we show that the conventional wisdom—for *both* value and growth investors—is supported by the data in the case of *individual stocks* but misses some important points about value and growth *portfolios*. In particular, we show that investors in growth portfolios are not getting exactly what they hope for—incremental near-term growth that dwarfs the reduction in yield—whereas investors in value portfolios are getting more than they expect.

Using a simple decomposition, we separate the total return of different portfolios into three components:

a. return from changing valuations
b. return from dividend income
c. return from growth in dividends

The portfolio that derives the most return from changing valuations varies over time. Sometimes growth stocks win, and other times value stocks win.[1] As expected, the value portfolio delivers more dividend income—the second component of our decomposition of return—than the growth

portfolio. Even though we use a company's book-to-price ratio rather than the dividend yield to assign stocks to our growth and value portfolios, lower prices to almost any fundamental measure of a company's economic scale will, on average, result in more dividends per dollar invested. Most growth and value investors will be surprised to learn that the value portfolio also outperforms in the third component: dividend *growth*. The finding of slower dividend growth for our growth portfolio should particularly surprise uninformed growth enthusiasts because growth stocks are expected to provide a higher rate of growth in sales, profits, dividends, and book value in order to justify their lower yields and their higher valuations.

To understand this puzzle of stocks versus portfolios, we further decompose the dividend growth component into two pieces:

c1. growth *before* rebalancing
c2. growth *from* the rebalance

This simple act explains our surprising result. As expected, the growth portfolio experiences a higher growth in dividends *before* the annual rebalance, but it gives away this higher growth *because of* the rebalance. The value portfolio, however, gets an extra source of growth from the rebalancing process.

In practice, the act of rebalancing cuts the income for the growth portfolio by substituting the stocks that no longer qualify for the growth portfolio, with replacements priced at premium growth multiples and lower yields. Except in the case of corporate actions, nearly every stock that is added will trade at higher valuation multiples—and offer lower yield—than nearly every stock that is dropped. The value portfolio, however, not only avoids stocks with higher valuation multiples and low yields, but it is also constantly refreshing the portfolio with stocks that are priced at ever lower valuation multiples and higher yields, thereby ratcheting its dividend distributions even higher. This preference for stocks with lower valuation multiples gives the value portfolio a constant source of dividends that also grow faster over time.

As we show, these effects are strong and persist for at least five years after the rebalance. Moreover, they are not restricted to U.S. stocks or portfolios. We show that the same results are also obtained in a sample with 23 developed countries excluding the United States.

Our results show that the characteristics of value and growth *stocks* do not translate directly into value and growth *portfolios*. If these past patterns of return also prevail in the future, then those who assume otherwise may be making a costly mistake. The annual rebalancing of these strategies—constantly updating the portfolio with newly minted value (hence, higher-yielding) and newly minted growth (hence, lower-yielding) stocks—creates side effects that might come as a pleasant surprise to value investors, but an unpleasant surprise to growth investors.

RELATED LITERATURE

The articles that are closest to ours are Fama and French [2007] and Chen [2011]. Fama and French [2007] also studied the characteristics of value and growth portfolios, but they used a different decomposition for the return of the portfolios and focused on changes in the portfolios' book-to-market ratios. Here, we are mainly interested in the dividends paid by the portfolios and how different they are with and without rebalancing. As we show, this characteristic turns out to be more surprising.

Consonant with our own research, Chen [2011] also found that value portfolios outperform growth portfolios in terms of both dividend income and growth rates in fundamentals. His explanation, however, differs from ours. He claims that value stocks outperform growth stocks in growth rates of fundamentals and that value/growth portfolios simply inherit the characteristics of value/growth stocks. Chen's evidence is supported only by two of the four measures he analyzes: rate of growth in earnings and accounting cash flows. The other two measures—rates of growth in dividends and book equity—also show that growth stocks outgrow value stocks using the value, neutral, and growth portfolios of Fama and French [1993].

Other researchers have also found that value portfolios have higher dividend growth rates than growth portfolios, but they do not try to explain the differences between portfolios and individual stocks.[2] An exception is Chen, Petkova, and Zhang [2008], who argued that the reinvestment of capital gains causes these differences; this is a natural interpretation of the results, but only if we fail to separately examine the growth (or shrinkage) in fundamentals that is derived from the rebalancing discipline. Because we separate and measure these two

sources of growth—the growth *before* rebalancing and the growth *from* rebalancing—we find that stocks in the growth portfolio enjoy a markedly higher dividend growth rate than the stocks in the value portfolio, even five years after the portfolios are formed. The rebalancing of the portfolios, far more than the reinvestment of the capital gains, is the culprit.

There are two competing theories for the outperformance of value stocks or portfolios. The results presented in our article neither rely upon *nor provide support for* either of the two.[3] We give a short description of the theories for completeness and as an update of the current debate in the literature. The first theory, proposed by Fama and French [1993], argues that value stocks and portfolios have higher expected returns as a reward for bearing financial distress or bankruptcy risk. The second theory, advanced by Lakonishok, Shleifer, and Vishny [1994], argues that investors incorrectly extrapolate the past performance in earnings growth of value and growth stocks, resulting in mispricings above and below fundamentals. Because they realize that future earnings growth is weaker or stronger than expected, they push stock prices back toward less extreme valuation multiples. Both point to empirical evidence to support their claims, but neither points to the disaggregation of growth—specifically, dividend growth—that we are testing.

DATA, VARIABLES, AND PORTFOLIO RULES

For the U.S., we combine monthly total returns and price returns from CRSP with book values from Compustat. As a robustness check we also use an international sample of 23 developed countries (excluding the U.S.) that is obtained from Datastream and Worldscope.[4] The U.S. sample is for the period 1963–2010, and the international sample is for the period 1983–2010.

Every year-end we select a universe with the top 1,000 stocks by market capitalization, excluding only the companies that lack book value data. All stocks are then sorted by book-to-market ratio. The top 50% by market capitalization are assigned to the value portfolio and the remaining 50% to the growth portfolio. This way, the growth and value portfolios are essentially equal in market capitalization, that is, we are splitting the market portfolio in half. All three portfolios (market, value, and growth) are capitalization weighted and then followed for the subsequent year.[5,6]

We follow Fama and French [1993] and require at least a 6-month lag between portfolio formation and the availability of the accounting data. Unlike Fama and French, however, we follow the traditional calendar year and rebalance all portfolios at the end of December. This means that for most companies we allow a full 12-month reporting lag; see the "Other Portfolios" section for limited results on the six Fama–French [1993] portfolios obtained from Ken French's website.

Annual total and price returns, $R_t = \left(P_{t+1} + D_{t+1}\right)/P_t$ and $R_t^* = P_{t+1}/P_t$, are calculated by compounding monthly returns with and without dividends, respectively.[7] Dividend-to-price ratios and dividend growth rates are calculated as

$$\frac{D_{t+1}}{P_{t+1}} = \frac{R_{t+1} - R_{t+1}^*}{R_{t+1}^*}$$
$$\frac{D_{t+1}}{D_t} = \frac{D_{t+1}}{P_{t+1}} \frac{P_t}{D_t} R_{t+1}^* \qquad (1)$$

With all the variables and portfolio construction rules defined, we jump next to the results.

METHODOLOGY AND RESULTS

We decompose the total return of the portfolios into three components: return from changing valuations, return from dividend income, and nominal growth in dividends over time. Some studies partition the nominal growth further into real growth plus inflation.[8] The following equation shows how each term is calculated:

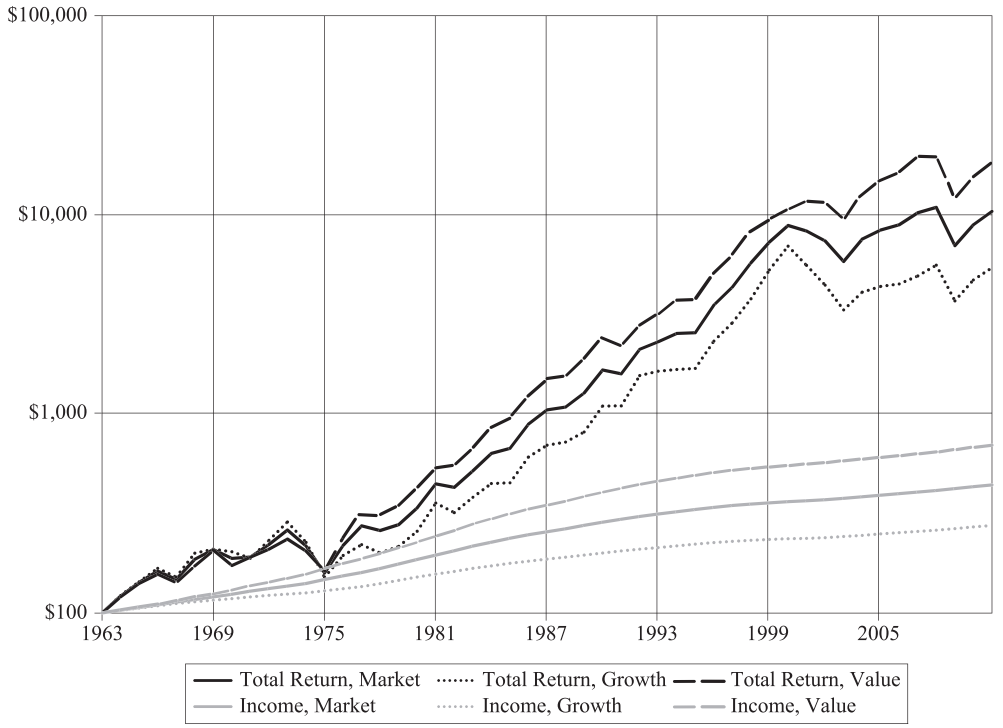
$$R_{t+1} = \frac{P_{t+1} + D_{t+1}}{P_t} = \frac{P_{t+1}/D_{t+1}}{P_t/D_t}\left(1 + \frac{D_{t+1}}{P_{t+1}}\right)\frac{D_{t+1}}{D_t} \qquad (2)$$

There is some freedom to use similar measures as substitutes for any of the three components in Equation (2): growth in cash flows as a proxy for dividend growth, price-to-earnings as an alternative valuation measure, and so forth. We follow Equation (2) closely, however, because it guarantees that the product between the parts is exactly equal to the total.

As an illustration, Exhibit 1 plots the total return and the income return of all three portfolios over time, expressed as the growth of a $100 investment at the end of 1962. The dark lines show the total returns, and the

EXHIBIT 1

Total Return and Dividend Return: Market, Growth, and Value Portfolios



grey lines show the results from dividend income alone. The value portfolio beats the market, which beats the growth portfolio, and this bears close resemblance to the relative returns from dividend income. The outperformance by the value portfolio in terms of dividend income is not surprising, but keep in mind that the stocks are sorted according to a ratio of price to book value, not price to dividend. Had we partitioned growth and value based on dividend yield, the income differences would have been even greater.

Our results confirm evidence of the *value effect* documented frequently in the literature. As Exhibit 2 shows, the value portfolio outperforms the market and growth portfolios by 131 basis points (bps) and 280 bps, respectively. The interesting and new evidence, however, is how it achieves this outperformance. Let's look at each term in Equation (2) separately.

Rising Valuation Levels

The returns from rising valuation levels are 96 bps, 107 bps, and 120 bps for the value, market, and growth portfolios, respectively. At first glance these numbers do not look very impressive, but 1% per year over 48 years means that, with compounding, valuations rose by almost two-thirds during the period. In other words, in 1962, the average dividend yield was roughly 60% higher than today for the market, and for our growth and value portfolios.

The grey lines in Exhibit 3 show this source of return presents significantly more volatility from year to year than across portfolios. During the first 30 years shown in the graph, the valuation levels (based on an initial $100 investment) of the value and market portfolios fluctuate around a relatively stable norm. During the Nifty Fifty bubble of 1971–1973, the growth portfolio enjoyed soaring valuation multiples, which then cratered. Meanwhile, the valuation multiple of the value portfolio generally trundled lower for the first 20 years of the sample. Then, something extraordinary happened: in the early 1990s, the valuation multiples of all three portfolios started to soar, culminating with the technology bubble in which the valuation multiple of the growth portfolio rises to nearly 10 times its 1978–1979 low. Of course, the tech bubble then implodes, ceding almost all of the relative gain in valuation multiples for growth

EXHIBIT 2
Annualized Total Return and Its Components, 1963–2010

	Total Return	Return from Rising Valuations	Return from Dividends	Growth in Dividends	Growth *Before* Rebalance	Growth *From* Rebalance
Value	11.47%	0.96%	4.12%	6.04%	*4.55%*	*1.43%*
Market	10.16%	1.07%	3.13%	5.69%	*6.85%*	*–1.08%*
Growth	8.67%	1.20%	2.13%	5.15%	*11.24%*	*–5.48%*

relative to value. The current levels for all three are quite similar, but well above the 1962 starting investment.[9] This explains the tight range of returns—less than 25 bps between the value and growth portfolios—associated with changes in valuation multiples.

Dividend Income

It is no surprise that a value strategy outperforms in this component of return. By selecting high book-to-market stocks, we select stocks with lower prices relative to various financial measures, including dividends. Nonetheless, two percentage points of extra income per year in dividends compounds mightily, as we observed in Exhibit 1.

Growth in Dividends

Growth in dividends is the most interesting and surprising component. The dark lines in Exhibit 3 show the performance of all three strategies. Contradicting the conventional wisdom that growth stocks experience stronger increases in fundamentals, the value strategy *outgrows* the growth strategy by 89 bps per year over the

EXHIBIT 3
Valuation Levels and Income Growth: Market, Growth, and Value Portfolios

past 48 years. The growth strategy underperforms in precisely the return component in which it presumably holds a comparative advantage. What happened to the long-term prospects of growth stocks? Do they disappoint in their promise of delivering faster growth? Yes, and No.

Rebalance Effects

To better understand what is going on with the last component, we break the growth in dividends into two separate pieces: growth *before* rebalance and growth *from* rebalance. Exhibit 4 illustrates the point; superscripts indicate portfolio formation dates and subscripts indicate the relevant year of the actual dividend paid. For instance, the unmodified portfolio constructed at the end of year $t-1$, held (without rebalancing) for an additional year, produces dividends during the second year of $D_{t+1}^{(t-1)}$. The bottom half of Exhibit 4 shows two years of the normal portfolio cycle: the portfolio is formed at the end of year $t-1$; $D_t^{(t-1)}$ in dividends are collected over the next year, t. The portfolio is rebalanced to create a new portfolio at the end of year t; and $D_{t+1}^{(t)}$ in dividends are collected over the following year, $t+1$. The alternative, illustrated in the top half of the graphic in Exhibit 4, shows that the portfolio constructed at the end of year $t-1$, without rebalancing for another year, delivers dividends collected over year $t+1$ of $D_{t+1}^{(t-1)}$.

The following equation shows each term in the decomposition:

$$\frac{D_{t+1}^{(t)}}{D_t^{(t-1)}} = \frac{D_{t+1}^{(t-1)}}{D_t^{(t-1)}} \frac{D_{t+1}^{(t)}}{D_{t+1}^{(t-1)}} \tag{3}$$

The first term on the right side shows the growth in dividends *for the original, unchanged portfolio.* The second term shows the ratio between the dividends of the modified portfolio and the dividends of the unchanged portfolio during the *same* year.

The column "Growth Before Rebalance" in Exhibit 2 shows that growth *stocks* indeed experience a significantly higher growth in dividends at 11.24% versus only 4.55% for value stocks. The market is doing a brilliant job of identifying the companies that will enjoy higher growth and paying higher book-to-price ratios for these companies. But the growth *portfolio* gives away almost half of that growth—5.48%—*because of* the annual rebalance. The market portfolio also suffers a loss of just over 1% due to the substitution of the stocks in the universe. The rebalance rule *increases*, however, the dividend growth of the value portfolio by 1.43%.

These numbers show that, in practice, the rebalance rule affects growth and value portfolios in opposite ways. To clarify these effects, we run a further analysis for each of the three portfolios: market, value, and growth. Following each annual rebalance, we form two cap-weighted portfolios with the stocks that were just traded by the rebalance rule—one composed of the stocks that were just dropped and the other of the stocks that were just added—and then measure their dividend yields in the subsequent year. Notice that the proceeds from the sale of one portfolio are fully reinvested in the other, so comparing their dividend yields gives us a good indication of the impact of the rebalancing on the original market, value, and growth portfolios.

Exhibit 5 reports these results, reinforcing the intuition from Exhibit 2. The stocks that are added to the market portfolio pay a dividend yield that is 14% lower than the stocks dropped by it. What causes this reduction? The market portfolio replaces only those stocks that no longer make the cut for the 1,000 largest market-cap companies. Apart from corporate actions, these will typically be "fallen angels" with depressed

EXHIBIT 4

Illustration of the Separation of Growth *Before* Rebalance and Growth *From* Rebalance

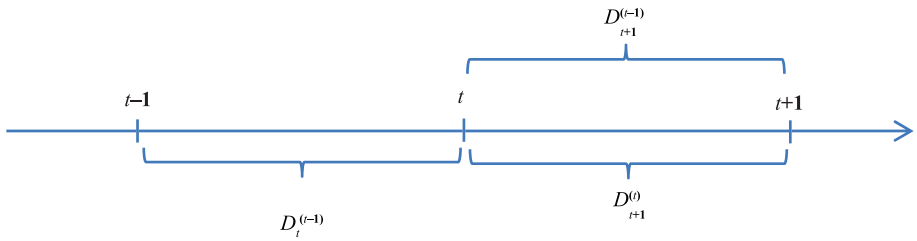


EXHIBIT 5

Average Dividend Yield (following the Rebalance) of the Cap-Weighted Portfolios Formed by Stocks Dropped and Added, 1963–2010

	Yield of Dropped Stocks	Yield of Added Stocks	Percentage Difference in Yield
Value	2.76%	3.50%	27%
Market	2.43%	2.09%	–14%
Growth	3.33%	2.37%	–29%

prices and will be replaced with newcomers to the top 1,000 list, which have larger market capitalizations, but also are typically high-flying growth stocks at high multiples and low dividend yields. This pattern of trading has the effect of trimming the yield on the cap-weighted market portfolio.

On top of the market rebalance effect, the growth and value portfolios also trade the stocks that experience significant changes in their book-to-market ratios; the growth portfolio sells the new value stocks to the value portfolio, and the value portfolio sells the new growth stocks to the growth portfolio! The growth portfolio drops stocks now trading as value stocks and paying good dividends and reinvests the proceeds into new high-flying growth stocks that on average pay 29% *lower* dividends. The value portfolio experiences the opposite phenomenon: its recently added stocks pay on average 27% *higher* dividends than its recently dropped stocks. These numbers show how powerful the rebalance effect can be, even on portfolios with relatively low turnover rates.

Alert readers will notice something interesting. Although the growth and value portfolios are swapping stocks that are not too far away from the typical yield of the broad stock market, the *market* portfolio is selling and buying stocks with average dividend yields lower than either the growth or the value portfolio; Exhibit 11, which we discuss in the "Other Portfolios" section later in the article, hints at the reason: smaller stocks tend to have lower dividend yields than larger stocks. The rebalance rule generally drops small-cap value stocks and replaces them with mid-cap growth stocks, and because the yield on the former exceeds the yield on the latter, both lists have pretty low yields.

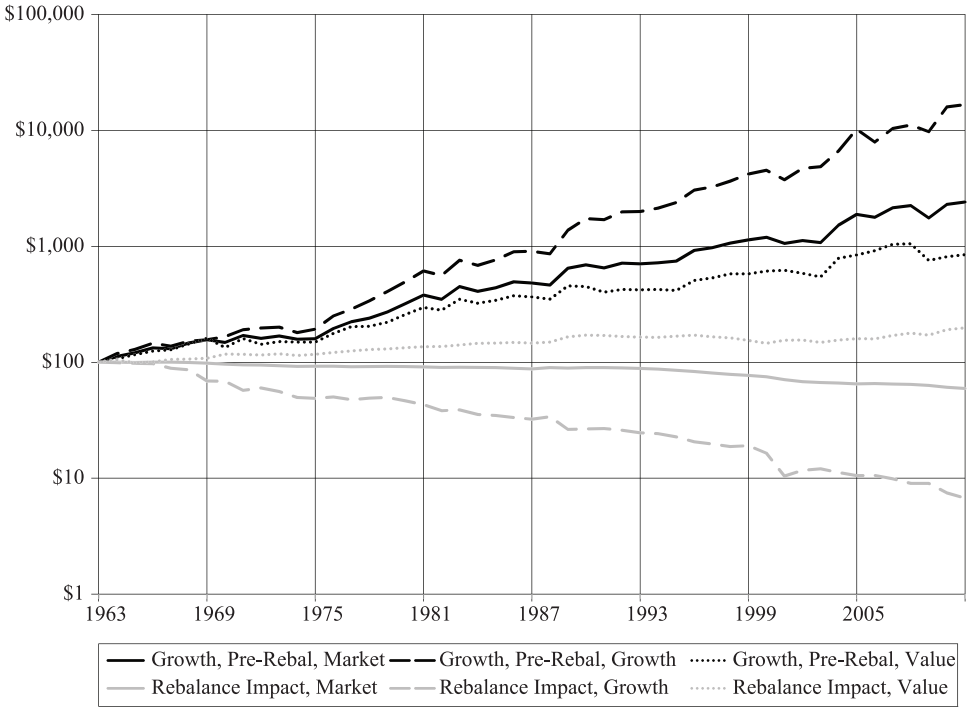
It bears a mention that growth stocks earn a lower dividend yield in exchange for *considerably* higher near-term dividend growth. On average, the yield is 1% lower than the market portfolio, and the dividends grow 4.39% faster than the market portfolio. So, why isn't growth a winner, if it garners 3.39% more return than the market? As Exhibit 2 shows, growth loses 5.48%, on average, on the yearly rebalance, which is 4.40% worse than the market portfolio loses on its rebalance. Reciprocally, if value earns 99 bps more in current yield in exchange for 2.30% slower dividend growth, then value investing must be a fool's game, ceding 1.31% of return relative to the market. But, here, the value portfolio gains 1.43% per year from the rebalance, whereas the market portfolio loses 1.08% on its rebalance.

Exhibit 6 shows the disaggregation of the growth in dividends, illustrating the effect over time. The darker lines show that, before the rebalance, our growth portfolio delivers faster dividend growth than the market portfolio, which delivers faster growth than the value portfolio. This is exactly what we would hope to see; the market is doing a fine job of identifying which stocks are indeed likely to deliver faster growth.

The differences in growth rates of fundamentals change the very nature of some stocks and thus trigger rebalance rules that, in turn, impact the realized dividend growth of the portfolios. The grey lines in Exhibit 6 show the impact that the rebalancing has on dividend growth. The magnitude of the differences in growth rates is larger than the relative growth rates before the rebalance, but of course the rank order is in the opposite direction. As the growth stocks deliver on their promise of faster growth, they literally grow the denominator of their price-to-fundamentals ratio and create a lower valuation multiple, forcing the growth portfolio to trade *out* of some of these stocks and *into* new growth stocks with lower yields. Reciprocally, as value stocks deliver the disappointing growth that the markets were expecting, their price-to-fundamentals ratios rise, forcing the value portfolio to trade into new, higher-yielding value stocks.

EXHIBIT 6

Pre-Rebalance Income Growth and Rebalance Effect: Market, Growth, and Value Portfolios



An obvious question is, why bother with rebalancing a growth strategy? If we can keep the higher yield and the higher growth rate in dividends, why dissipate the whole advantage by rebalancing? The answer is straightforward. Growth stocks do not remain growth stocks indefinitely; their lofty rate of dividend growth slows with time. We explore this point in more detail later when we analyze the long-term growth of the unmodified portfolios.

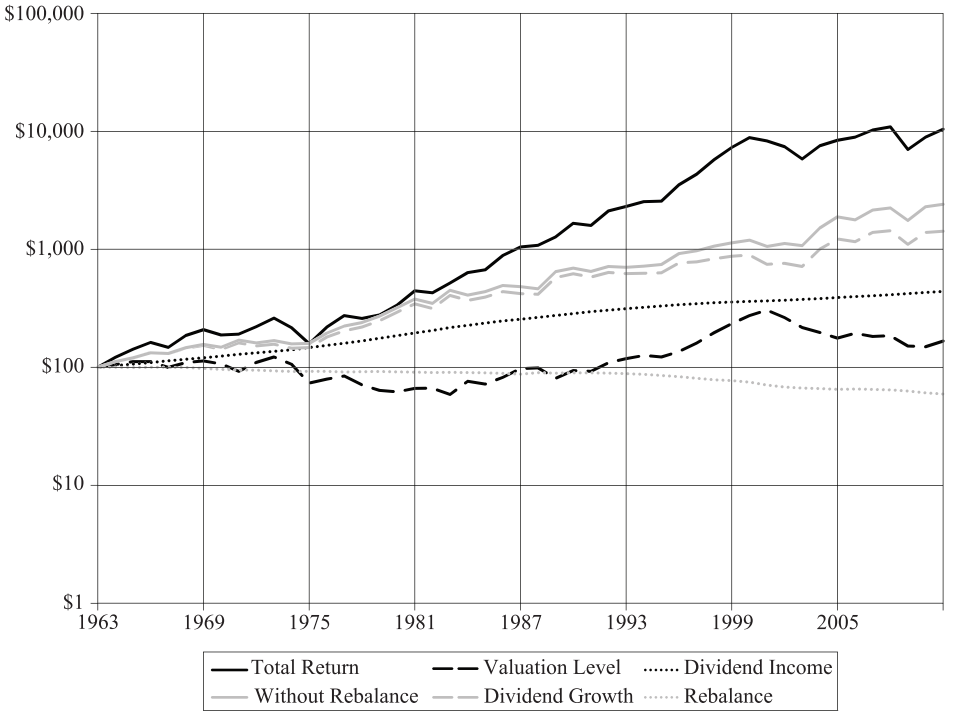
Note that the average annual yield of our growth portfolio is 2.13% over the past 48 years compared to 3.13% for the market. This means that the cumulative growth advantage, relative to the market, must eventually exceed that reflected in the relative yield of 3.13% to 2.13% in order to justify those valuation multiples. To reach the point at which its dividend yield matches that of the market, our average growth stock must eventually grow its dividend by nearly 50% relative to the broad market's dividend growth. The 4.39% (11.24% – 6.85%) first-year growth advantage is only one small step in the direction of growing the dividends enough to justify the lower yield, and even that is not quite sufficient. Because the income is lower in the early years, the cumulative growth advantage must eventually lead to a total net present value of cumulative income, matching that of the market, in order to justify the valuation differential.

Now, suppose a growth stock exhibits faster dividend growth than the broad market—exactly as the market expects *and prepays to own*. As the growth rates converge, the valuation multiples should also converge so that the stock delivers the market rate of return. In an efficient market, this is exactly what should be expected. If this pattern continues for several years, the yield will rise and the stock may no longer fall into the growth camp. As the stock is dropped and replaced with a stock that has newly lofty valuation multiples and a low yield, the yield of the growth portfolio takes a haircut. Every year, the growth portfolio loses dozens of its stocks as a result of this type of transition to be replaced with new high-fliers that offer lower income.

Exhibit 7, Panels A–C, show these same decompositions, which focus on the market, value, and growth portfolios, respectively. In Panel C, for example, the impressive immediate dividend growth of the growth portfolio, before rebalancing, demonstrates that the market is doing a very fine job of discerning which

EXHIBIT 7
Sources of Return

Panel A: Market Portfolio



Panel B: Value Portfolio

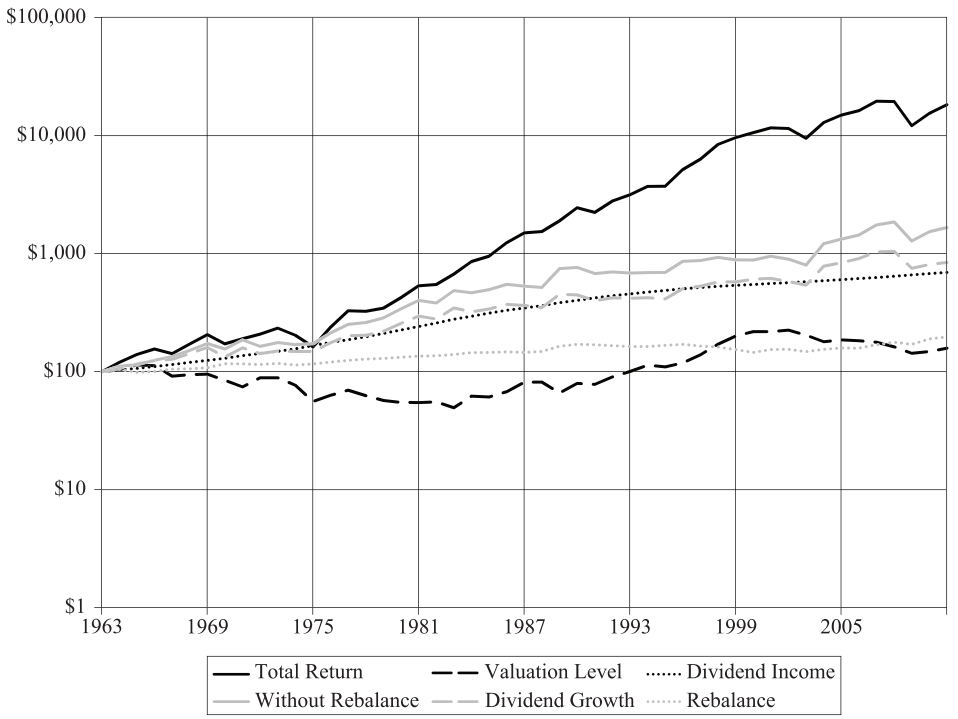
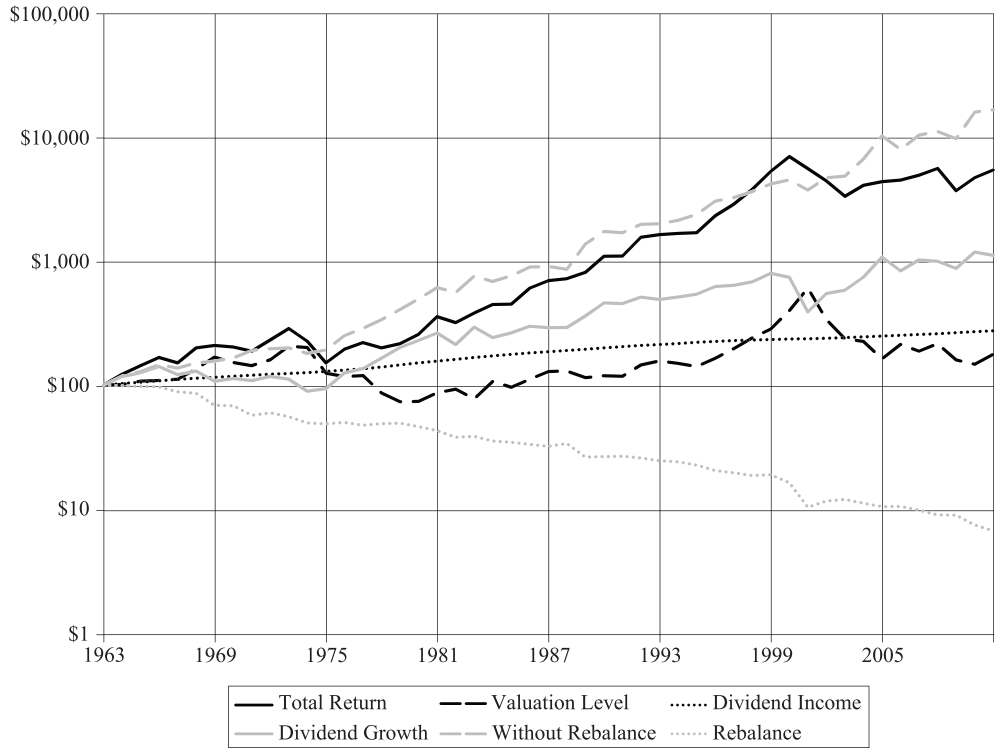


EXHIBIT 7 *(continued)*

Panel C: Growth Portfolio



companies have superior growth prospects. The evidence we present in this article suggests, however, that the market historically tends to overpay for that future growth—which is correctly discerned, but not correctly valued. This is wholly consistent with Arnott, Li, and Sherrerd [2009a].

It is also interesting to examine the market portfolio itself, both in Exhibit 2 and in Exhibit 7, Panel A. From 1963 through 2010, the market delivers a very respectable 10.16% annualized rate of return. The constituent parts are 1.07% from rising valuation multiples, 3.13% from the average dividend yield, and 5.69% from dividend growth. As happened with the growth stocks, there is rebalancing drag. The buy-and-hold portfolio enjoys 6.85% growth in dividends on average. But with each rebalancing a company that is no longer a member of the top 1,000 "club," as ranked by market capitalization, is dropped and is replaced with a new member of the club. The dropped stocks will often be deep-value names, trading at impressive dividend yields, whereas the new names will often be high-flying growth names, offering little or no dividends. This transition reduces the return each year by a surprising 1.08%, a reminder of the importance of universe selection in the rebalancing process.[10]

Exhibit 8 shows that the differences between the growth rates in dividends of value and growth stocks are persistent. The unmodified growth portfolio (before any rebalancing) still experiences a higher rate of dividend growth for at least an additional four years if the strategy is to buy and hold. But, in the fifth year, the unmodified growth portfolio loses over half of its growth-rate advantage relative to a buy-and-hold value portfolio; the 6.69% difference in dividend growth rates in the first year drops to only 2.72% by the fifth year. With the passage of time, the growth stocks are growing slower and the value stocks are growing faster, that is, *the growth rates are mean reverting.* Thus, in order for the growth portfolio to stay focused on growth stocks and the value portfolio on value stocks, indices must rebalance.[11]

To investigate whether the decomposition in Equation (2) can produce different results in shorter subpe-

EXHIBIT 8

Annualized Growth in Dividends *Before* Rebalance in the First Five Years, 1963–2010

	First Year	Second Year	Third Year	Fourth Year	Fifth Year
Value	4.55%	5.14%	5.01%	4.84%	5.41%
Market	6.85%	6.62%	6.62%	6.38%	6.61%
Growth	11.24%	9.92%	9.57%	9.54%	8.13%

riods, we split the original sample into three shorter 16-year samples: 1963–1978, 1979–1994, and 1995–2010. Exhibit 9 reports that the value portfolio outperforms the growth portfolio in all three subperiods. In the three 16-year spans, the value portfolio outperforms the growth portfolio by 3.15%, 2.31%, and 2.90% per year, respectively. In terms of valuation levels, all three portfolios show a negative return in the first 16 years, but positive returns in the next 32 years. Confirming the evidence in Exhibit 2, the value portfolio shows higher returns from dividend payments in all three subperiods, yielding more than the growth portfolio by 2.42%, 2.72%, and 0.87% per year.

The return component from growth in dividends also confirms the earlier results. First, in all three subperiods, the rebalance effect continues to provide a tailwind for the value portfolio and a headwind for the growth portfolio. Before the rebalance, the growth portfolio outgrows the value portfolio by 4.09%, 7.65%, and 8.37%. In two of the three spans, however, the dividend growth advantage of the growth stocks is offset by the yield drop from rebalancing the portfolio into new high fliers. The only exception is 1979–1994 when the growth in income of the value portfolio underperforms the growth portfolio by only 67 bps. Because this advantage for growth is smaller than the yield advantage of the value portfolio, growth still loses.

GLOBAL EVIDENCE

To show that our results are not particular to U.S. stocks and portfolios, we use the decompositions in Equations (2) and (3) on an international sample spanning the 23 countries in the MSCI Developed ex-U.S. portfolio, including the 1,000 largest market-cap companies in the 23 nations. Exhibit 10 reports the results. The U.S. results are also shown in italics for ease of comparison. Between 1983 and 2010, in the 23 developed international markets, the value portfolio outperforms the market and growth portfolios by 2.46% and 5.20%, respectively. The value portfolio has higher return from dividends as well as higher dividend growth, but the differences relative to the growth portfolio are smaller than those in the U.S.: 101 bps and 19 bps (see Exhibits 2 and 9). More importantly, the rebalancing still affects the portfolios in the same way, that is, by hurting the

EXHIBIT 9

Annualized Total Return and Its Components, 1963–2010 (three subperiods)

	Total Return	Return from Rising Valuations	Return from Dividends	Growth in Dividends	Growth *Before* Rebalance	Growth *From* Rebalance
1963–1978						
Value	8.07%	–3.45%	4.80%	6.80%	*5.07%*	*1.65%*
Market	6.59%	–2.79%	3.60%	5.84%	*6.40%*	*–0.53%*
Growth	4.92%	–1.90%	2.38%	4.46%	*9.16%*	*–4.30%*
1979–1994						
Value	16.05%	4.20%	5.38%	5.70%	*4.04%*	*1.59%*
Market	14.88%	4.17%	4.02%	6.02%	*6.53%*	*–0.48%*
Growth	13.74%	4.17%	2.65%	6.37%	*11.68%*	*–4.76%*
1995–2010						
Value	10.44%	2.30%	2.22%	5.62%	*4.54%*	*1.03%*
Market	9.17%	1.95%	1.78%	5.21%	*7.61%*	*–2.24%*
Growth	7.55%	1.42%	1.35%	4.62%	*12.91%*	*–7.34%*

EXHIBIT 10

Annualized Total Return and its Components, 23-Country International Sample, 1983–2010

	Total Return	Return from Rising Valuations	Return from Dividends	Growth in Dividends	Growth *Before* Rebalance	Growth *From* Rebalance
International Value	12.61%	2.13%	2.73%	7.32%	*6.08%*	*1.17%*
U.S. Value	*11.47%*	*0.96%*	*4.12%*	*6.04%*	*4.55%*	*1.43%*
International Market	10.15%	0.75%	2.23%	6.94%	*7.40%*	*–0.43%*
U.S. Market	*10.16%*	*1.07%*	*3.13%*	*5.69%*	*6.85%*	*–1.08%*
International Growth	7.41%	–1.43%	1.72%	7.13%	*9.58%*	*–2.24%*
U.S. Growth	*8.67%*	*1.20%*	*2.13%*	*5.15%*	*11.24%*	*–5.48%*

EXHIBIT 11

Six Size and B/M Portfolios in Fama and French [1993], 1928–2010

	Total Return	Return from Rising Valuations	Return from Dividends	Growth in Dividends
Small				
High (Value)	14.76%	0.71%	3.20%	10.42%
Medium	13.22%	1.68%	3.77%	7.30%
Low (Growth)	8.55%	1.83%	2.86%	3.63%
Big				
High (Value)	11.49%	1.01%	4.71%	5.42%
Medium	9.79%	1.00%	4.46%	4.06%
Low (Growth)	8.89%	1.09%	3.33%	4.25%

growth and market portfolios while helping the value portfolio.

The biggest difference between the international and U.S. results is in the return from changing valuation levels. The market and value portfolios experience an increase in price-to-dividend ratios over the 28 years in the sample, whereas the growth portfolio suffers a decrease. We attribute these differences to a narrowing of the gap between the valuation levels of growth and value stocks in international markets. In the early 1980s, growth stocks were priced at very high valuation multiples and very low dividend yields, which have converged toward the broad market over the past 28 years.

OTHER PORTFOLIOS

Here we provide limited evidence on the six size and book-to-market portfolios of Fama and French [1993] and explore the impact of dividend growth in alternative indices. Because we do not have access to the returns of the unchanged Fama–French portfolios, we report only the three basic components included in Equation (2). These portfolios are slightly different in the sense that they are constructed from the entire universe of U.S. stocks and use different breakpoints for size and book-to-market ratio.

The portfolios in Exhibit 11 confirm the evidence presented in the preceding sections on different value and growth portfolio definitions and on a much longer time series: 1928–2010. Among either small or big stocks, the value portfolios earn higher total returns as a result of both higher dividend yields as well as higher growth rates of dividends.

Once we understand that the process of rebalancing is a first-order component even for capitalization-weighted indices—such as the value, market, and growth strategies we study here—it is unsurprising that the fast-evolving suite of alternative "index" strategies and indices are also heavily influenced by their rebalancing schemes.[12] Analyzing all the different alternatives that have emerged in recent years would be a Herculean task (not to mention that it would probably double the length of this article), so we focus on some of the strategies surveyed by Chow et al. [2011].[13]

Exhibit 12 presents the results for 1964–2009, the same period studied by Chow et al. [2011]. We also add the market, value, and growth portfolios as reference points. All strategies are annually rebalanced and long only (i.e., short selling of stocks is not allowed). The

EXHIBIT 12

Valuation-Indifferent Indices Sorted by Average Dividend Yield, 1964–2009

	Total Return	Return from Rising Valuations	Return from Dividends	Growth in Dividends	Growth *Before* Rebalance	Growth *From* Rebalance
Growth, Cap Weight	*8.17%*	*0.81%*	*2.15%*	*5.04%*	*11.26%*	*–5.59%*
Equal Weighting	11.69%	1.11%	2.82%	7.43%	7.23%	0.19%
Diversity Weighting	10.15%	0.71%	3.06%	6.13%	6.79%	–0.62%
Market, Cap Weight	*9.79%*	*0.76%*	*3.15%*	*5.63%*	*6.72%*	*–1.02%*
Maximum Diversification	11.82%	1.98%	3.32%	6.12%	8.22%	–1.94%
Fundamental Weighting	11.57%	0.80%	3.83%	6.60%	4.84%	1.68%
Value, Cap Weight	*11.14%*	*0.78%*	*4.17%*	*5.87%*	*4.41%*	*1.40%*
Minimum Variance	11.22%	0.88%	4.43%	5.57%	5.40%	0.16%

best known of these strategies are likely equal weighting and minimum variance, both originally promoted in the 1980s and 1990s. Equal weighting selects the 1,000 largest-cap stocks each year and then attributes the same weight to all 1,000 stocks. Minimum variance uses a Markowitz-based optimization to find the portfolio with the lowest possible variance. Both strategies present positive, but near-zero growth from rebalancing because they do not systematically focus turnover on the companies with the most extreme performance (up or down) relative to fundamentals. Minimum variance also favors the lowest-beta companies, which tend to be high-yield stocks. Note that minimum variance has the highest return from dividend income among all strategies in Exhibit 12.

More recent additions to the valuation-indifferent opportunity set include Intech's Diversity-Weighted Index, Research Affiliates' Fundamental Index® strategy, and TOBAM's Maximum Diversification Index®. The Fundamental Index assigns weights to companies in proportion to fundamental measures of their economic footprint.[14] Its value tilt relative to the cap-weighted stock market is well known. With considerably less value tilt than the value portfolio we use here, it garners a higher return. Its low turnover is dominated by the sale of the companies with the greatest rise in valuation multiples—the most beloved companies—and purchase of the companies with the largest drop in valuation multiples—the most feared and loathed companies. So, even with less value tilt than our value portfolio, it adds more from the rebalancing discipline than the value portfolio does.

The Intech Diversity-Weighted Index defines its portfolio weights as

$$W_{DW,i} = \frac{(W_i)^p}{\Sigma_{i=1}^{N}[(W_i)^p]} \tag{4}$$

where W_i is the market-capitalization weight, and $p \in (0,1)$ is a parameter that allows the manager to select a desired level of tracking error relative to the market portfolio. These weights are basically a compromise between equal weighting ($p = 0$) and capitalization weighting ($p = 1$). The portfolio implemented by Chow et al. [2011] uses $p = 0.76$, which is Intech's choice for its U.S. large-cap portfolio and, therefore, has return sources between the two extremes on most dimensions.

The TOBAM Maximum Diversification Index solves the following (simplified) optimization problem to find its vector of weights, w,

$$\max_{w}\left\{\frac{w'\sigma}{\sqrt{w'\Sigma w}}\right\} \tag{5}$$

where σ is the vector of standard deviations, and Σ is the variance–covariance matrix. Equation (5) shows that the portfolio is tilted toward companies with high volatility and low covariance with other stocks (beta), which leads it strongly in the direction of stocks with strong relative idiosyncratic performance (idiosyncratic momentum). It should come as no surprise that relative idiosyncratic outperformance will tend to correlate with relatively higher prices relative to fundamentals and, therefore,

result in a negative growth from rebalancing, much like the cap-weighted growth index.

We garner a deeper understanding of these newcomers to the indexing community by carrying our return attribution to a new level, separating the growth in dividends for the stocks in the portfolios from the growth in dividends attributable to our rebalancing discipline. Rebalancing helps the strategies that systematically trade against changes in price or valuation multiples and hurts strategies that chase momentum. Conversely, momentum helps assure that the negative growth from rebalancing is not large enough to eliminate the positive growth before rebalancing.

At a risk of rather drastically oversimplifying, it would seem that the maximum diversification approach is a better way to pursue growth investing; the diversity-weighted approach is a better way to handle core and broad-market investing; the equal-weighted approach is a better way to handle small- and mid-cap investing; and the Fundamental Index approach is a better way to handle value investing.

CONCLUSION

It is well known that value portfolios empirically outperform growth portfolios over long horizons. The source of this outperformance is not as deeply understood as we might expect after so many years of study. If the market is doing its job properly, the premium valuation multiples of the growth stocks should be rewarded with faster dividend growth. And they are. The value portfolio wins, but not because of faster dividend growth from the value stocks. Rather, the value portfolio wins because, with each rebalance, the portfolio sheds some lower-yielding stocks that no longer qualify as value stocks and buys new deep-value stocks that offer a much improved yield. The opposite happens with the growth portfolio.

In this article, we have shown that value portfolios experience constantly higher dividend payments per dollar invested as well as a higher growth rate of dividends over time. As expected, the higher dividend yield is inherited from the underlying value stocks, which are selected following depressed valuations relative to fundamentals. The higher dividend growth rate, however, is a side effect of the rebalance rule.

We argue that these results are not well understood by most managers and investors, who believe that growth portfolios should display the same characteristics—higher dividend growth rates—as growth stocks. The mechanical rebalance rule acts in opposite ways on the growth and value portfolios: in the growth (value) portfolio, it is constantly selling (buying) old-fashioned value stocks and buying (selling) recently minted growth stocks. This trading pattern creates a constant source of dividends for the value portfolios and significantly reduces the potential growth in dividends from growth portfolios.

It is entirely possible that rebalancing plays a significant contributing role in the performance of other strategies and indices. Those that tend to sell whatever has performed best and buy whatever has performed worst—such as an equal-weighted approach—may be expected to derive a rebalancing alpha, while strategies that do the opposite—such as momentum—may need to overcome a negative rebalancing alpha. Similar results may also be found in other markets, such as bonds, currencies, commodities, REITs, and so forth. We leave these interesting open questions to be answered by future studies.

ENDNOTES

[1]Over long stretches either strategy could win by chance, but given mean reversion in valuations both strategies should perform equally in expected risk-adjusted returns. In other words, relying on this component of returns to outperform is not a good strategy. It is beyond the scope of this article to explore the mean-reversion phenomenon in the growth/value "cycle." That was explored in some detail by Fama and French [2007] and Arnott, Li, and Sherrerd [2009b].

[2]A few examples are Ang and Liu [2004], Bansal, Dittmar, and Lundblad [2005] and Hansen, Heaton, and Li [2008].

[3]This is not to say that our work offers evidence against these theories. The theories are not mutually exclusive.

[4]Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, Canada, and Luxembourg.

[5]The portfolios constructed here are similar to the Russell 1000 value and growth indices but are not meant to replicate them. Our goal is to use very simple definitions that still give us portfolios with value and growth characteristics. The annualized results for our value and growth indices differ by less than one percentage point from the Russell 1000 value and growth indices, since their 1979 launch, with cor-

relations above 0.98. Using alternative definitions results in minor changes only and does not affect our conclusions. As an example, see our results for portfolios constructed using the Fama and French [1993] definition of value and growth discussed in the "Other Portfolios" section of this article.

[6]Readers may wonder why we did not partition by dividends, given that we are examining the dividend growth for the growth and value stocks. There are two main reasons. Much of the literature uses book-to-price partitioning; very little relies on dividend yield. Also, many companies would generally be seen as "deep value" (e.g., troubled companies that cannot afford to pay a dividend) and would therefore be dropped into the growth camp if we were to use dividend yield as the basis for building our growth and value portfolios. Our results are, therefore, even more surprising than if we had partitioned on dividend yield. Growth stocks based on book-to-price exhibit much faster growth in subsequent dividends.

[7]The implicit assumption that we make is that monthly dividends are reinvested in the portfolios at the end of each month and that annual dividends measure total reinvested dividends. We also calculated total returns with dividends reinvested only at the end of the year. Obviously, this alternative definition results in minor changes in the total performance of the portfolios, but all our conclusions remain the same. We prefer the first definition because it more accurately reflects actual portfolios.

[8]See Arnott and Bernstein [2002] for an example with the market portfolio.

[9]This is not to say that the valuation multiples are the same. Rather, it means that the spread in price-to-dividend ratios for growth and value is not dissimilar to the spread in 1962.

[10]It is beyond the scope of this article, but this systematic ratcheting downward in the market portfolio's dividends may be a major contributor to Siegel and Schwartz's [2006] finding that the buy-and-hold S&P 500 outperforms the actual S&P 500 since the launch of the S&P 500 Index in 1957. It may also help to explain the difference between the performance of the S&P 500 and the Fortune 500, as explored by Arnott and Kuo [2011].

[11]One rather interesting subtlety is found by considering these growth rate differences in the context of a two-stage dividend discount model (DDM). Suppose we have a growth stock and a value stock, each representing the mean for their style. Our growth and value stocks have dividend yields of 2.13% and 4.12%, respectively. To make up for the dividend yield difference, they have growth of 11.24% and 4.55%, respectively. In a two-stage DDM, we assume that they enjoy this growth rate for n years. After n years, both companies converge to a market dividend yield and growth rate of 3.13% and 6.85%, respectively. How large must n be, before the dividends of the growth stocks surpass the dividends of the value stocks? Eleven years. How long in order for the DDM internal rate of return of growth to beat value? Thirteen years. Unless we believe, contrary to Little [1962], that we can forecast superior growth (for fully half of the market, undiminished for 16 years!), this yield difference is too large to allow growth and value stocks to deliver the same internal rate of return.

[12]We recognize that the cap-weight indexers do not like the words "index" or "passive" attached to portfolios that are not capitalization weighted. Accordingly, we use the word "index" advisedly to reflect its dictionary meaning, not its CAPM meaning.

[13]We thank the authors for providing us with the annual weights for the strategies we study here. Minor differences in results are due to simulation details and revised data.

[14]The term Fundamental Index® is used with permission from Research Affiliates, LLC.

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