The Journal of Portfolio Management

VOLUME 35 NUMBER 3 www.iijpm.com SPRING 2009

Clairvoyant Value and the Value Effect

ROBERT D. ARNOTT, FEIFEI LI, AND KATRINA F. SHERRERD

IIJ Institutional Investor Journals

The Voices of Influence | iijournals.com

Clairvoyant Value and the Value Effect

Robert D. Arnott, Feifei Li, and Katrina F. Sherrerd

Robert D. Arnott
is the chairman and founder of Research Affiliates, LLC, in Newport Beach, CA.
arnott@rallc.com

Feifei Li
is the director of research at Research Affiliates, LLC, in Newport Beach, CA.
li@rallc.com

Katrina F. Sherrerd
is the chief operating officer at Research Affiliates, LLC, in Newport Beach, CA.
sherrerd@rallc.com

In the past 40 years, few elements of modern finance have been studied as extensively as the value effect, in which value stocks significantly and consistently outperform growth stocks for investors who are patient enough to ride out the often-extended periods of growth dominance. Although the profession has no standard definition of "value stock" and "growth stock," the working definitions are usually derived from partitioning stocks by a relevant valuation multiple, such as the price-to-book ratio (P/B). This approach is useful as a practical tool, and tacitly indicative of future growth expectations, but valuation multiples provide little insight into a company's true value.

In a business context, "value" is often used to describe what an investment is *ultimately* going to be worth—the present value of all future cash flows from an investment. It can be calculated ex ante, on the basis of expectations, or ex post, on the basis of actual subsequent cash flows. Unfortunately, ex ante value cannot be measured objectively. Only ex post realized value can be *accurately* measured, and typically only long after the fact; given the near-perpetuity nature of stock returns, "after the fact" may be decades later. Even so, to truly understand the interplay between growth and value, this analysis is well worth doing.

In this article, we explore the value effect through the lens of "Clairvoyant Value,"[1] which we define as ex post realized cash flow discounted back to a historical point in time with a discount rate based on a risk premium model, as compared with the share price at that historical point in time. Although the ex ante fair value can never be objectively observed (not even far in the future, because random future shocks affect the realized future cash flows that are being discounted), we can use Clairvoyant Value as a crude proxy for that unobservable quantity. Our research focuses attention on how the myriad definitions of "value" dovetail with the actual ex post realized—or clairvoyant—value of companies.

In many ways, an exploration of Clairvoyant Value hearkens back to the early dawning of modern finance. John Burr Williams [1938] taught us that a central purpose of the capital markets is to seek out intrinsic value. He was among the first to suggest net present value of future cash flows as the correct basis for gauging intrinsic value. If databases were as extensive and computer power as cheap then as they are today, some variant of this article might well have been written by Williams 70 years ago![2] About that same time, Graham and Dodd [1934] taught us that comparisons of valuation multiples with those of the broad market, and the yields available in the bond market, can point to pricing errors (or market inefficiencies as we now call them), which the courageous in-vestor could exploit to ample profit.[3] One of Ben Graham's students, Warren Buffett,

combined Ben's ideas with quality, growth, and market share as a basis for building one of the great fortunes of the modern world.

Other research has explored the idea of perfect foresight, using different time periods and testing different relationships. Malkiel [1963] showed that the expected growth rates implied for high-multiple-stocks' prices have been abnormally aggressive, beyond what can be justified by the normal range of observed future growth rates in the valuation model based on discounted future cash flows. In his study of stock market volatility, Shiller [1987] adopted the "perfect foresight price" concept to calculate the ex post rational price of the Standard and Poor's Composite Index, and compared it with the observed price, which is the expected value of discounted future dividend streams. Shiller's work focused on the aggregate level and pointed out that the excess volatility in the market price cannot be explained by the change in dividends, in real interest rates, or in the intertemporal marginal rate of substitution.

Our research, which focuses on how the myriad definitions of "value" dovetail with the actual ex post realized value of companies, offers some new insights relating to the extent to which the market has correctly anticipated various future growth rates and the extent to which investors have paid up for future growth expectations. We find that market capitalization has not historically (at least not in the past 51 years) represented an unbiased estimate of ex post realized value as measured by Clairvoyant Value. We also find that, although growth stocks (those trading at high multiples) do historically exhibit superior future growth, the market overpays for superior growth expectations with statistical significance.

WILL THE REAL "VALUE" PLEASE STAND UP?

"Value" in the investment community has many definitions. The academic community and the many practitioners who rely upon the prevailing theories of modern finance tend to define value in terms of well-established theoretical models—notably, the efficient market hypothesis (EMH), which is a core assumption of much of modern finance. Adherents of the EMH believe that price is a perfectly neutral and unbiased predictor of future value (discounted by the appropriate risk-adjusted rate), so price is a predictor of the present value of all future cash flows from each asset. This value tacitly corresponds to the present value of all expected (ex ante) future cash flows from an investment.[4]

From this perspective, *fair value* is the price that a fully informed, rational investor, who has access to all currently available information, is willing to pay for an asset. This EMH perspective suggests that, as new information comes into the market, prices change, but they always reflect fair value *at that moment*. Therefore, from this perspective, all assets in all markets, at every minute of every day, are correctly priced to offer the same expected return, after adjusting for risk.

Note that this particular concept of fair value is, rather like the astronomer's black hole, something that one can never observe. Indeed, unlike the black holes of astrophysics, one cannot *ever* hope to measure the fair value—as distinct from its price—that a fully informed investor in a truly efficient market would place on an asset today. All one can find are various proxies for that fair value. Still, although one can never observe ex ante fair value, if the EMH holds, we *should* observe that future return fluctuations approach a zero mean, across enough time and enough different assets, net of the appropriate risk-adjusted market return.

The practitioner community, particularly the community of quantitative analysts, often defines "value" in terms of valuation multiples. In this second context, value stocks are companies with below-average valuation multiples. Growth stocks are those with above-average valuation multiples. The same company can be a growth stock in one year and a value stock the next. Valuation multiples and other appropriate company characteristics are often combined, sometimes through the use of arbitrary formulas, into an aggregate measure, which is then used for value–growth partitioning.

So defined, value stocks are nothing more than out-of-favor stocks with below-average valuation multiples. The related "value effect" refers to the general tendency for these stocks to outpace the more favored growth stocks, trading at premium valuation multiples. Implicitly, these "value" companies do reflect below-average consensus growth expectations, suggested by their below-average valuation multiples, and the growth stocks do reflect above-average consensus growth expectations, which are reflected in their above-average valuation multiples. But in this approach, the definitions of "growth" and "value" have little to do with the classic definitions of the terms; they are simply a partitioning of the market on the basis of valuation multiples.

MEASURING THE VALUE OF A COMPANY

Most of the commonly used measures of value provide little insight into economic value—that is, what the company is ultimately going to be worth. For example, whenever we define value as price, we strip any useful *independent* meaning out of the term. Value is merely a synonym for price. In this value-equals-price model, the idea of "fair value" has as little independently testable meaning as the ancient theological debate about the number of angels who can dance on the head of a pin. For some, the existence of an ex ante fair value is similarly an act of faith, that price assuredly equals fair value.

Furthermore, the ex ante fair value for stocks has little meaning because the future prospects for the company are uncertain—particularly as one forecasts decades into the future. Therefore, we believe that focusing on the concepts of value or economic scale that can be *measured* is more useful than estimating theoretical values that cannot.

We use three measures of size in this research: Clairvoyant Value, market capitalization, and fundamental economic size.

The first of these is Clairvoyant Value. Although one cannot measure the ex ante fair value of a stock, one can measure the ex post (after the fact) realized value of a company by calculating the discounted present value of the actual cash flows that the investment subsequently delivers. Generally, unless one has these cash flows up to and including the last distribution that an investment ever delivers, one can never get the exact Clairvoyant Value. But, with enough years of data, one can get a reasonably good estimate of it.

The second objective metric is a company's market capitalization. Apart from nuances, such as stale pricing or bid–ask spreads, one can measure the market capitalization of most companies with considerable precision. The market capitalization represents the market's ex ante consensus as to the likely ex post realized value (the Clairvoyant Value), given all available information, in an efficient market of rational investors.

Finally, one can also measure the fundamental economic size of a company. The economic scale of a business can be measured by such variables as sales or revenues, free cash flow or earnings, book value or net assets, and the cash returned to the shareholders through dividends or stock buybacks. In this study, we use a combination of four of these variables, as will be explained later, to measure a company's fundamental economic size.

To facilitate comparisons across the different measures, we convert each measure into a portfolio weight. Converting price to an index weight is familiar territory for analysts who deal with market capitalization; we divide a company's market cap by the overall market's cap. This calculation method—dividing each company's size or value measure by the corresponding overall sum for the market—is effectively the same for the fundamental size measure and the Clairvoyant Value measure.

These company weights can then be compared to extract some interesting results. The ratio of a company's company-size weight in the market relative to its capitalization weight is another way to distinguish value stocks from growth stocks. For example, as was noted by Brandhorst [2006], each measure of fundamental economic size relates to traditional measures of market capitalization through a company's relative valuation multiples: sales weighting relates to capitalization weighting based on the relative sales-to-price ratio, earnings weights with the earnings-to-price ratio (earnings yield), book value weights with the book-to-price ratio, and dividend weights with the dividend-to-price ratio (dividend yield).

CALCULATING CLAIRVOYANT VALUE

To estimate the Clairvoyant Value of an asset at some historical point in time, we calculate the present value of the subsequent cash flows at that presumed purchase date. To do this, we need all of the cash flows and a discount rate. It is relatively straightforward to determine the historical cash flows for companies that no longer exist—whether they were eventually sold for cash, merged, or folded—because all of their cash distributions to shareholders are known. But for the majority of companies, the *future* cash flows—after today—remain unknown. The natural simplifying assumption, entirely reasonable in an efficient market, is to use today's price as a substitute for that perfect clairvoyant view of all remaining future cash flows. When we follow this approach, we are assuming that the market is perfectly efficient at the end of the valuation time span and that the ending share price is correct.

In their article, "Long-Term Returns on the Original S&P 500 Companies," Siegel and Schwartz [2006] called attention to two important aspects of calculating long-term returns: the treatment of the cash flows once they have been received and the relevance of failed companies. Because Clairvoyant Value is, in some ways, a direct consequence of long-term returns, their

first point has a bearing on any investigation of Clairvoyant Value. For our purposes, we assume that the cash flows are removed from the portfolio once an investor receives them. Fortunately for dealing with the problem of failed companies, the CRSP database offers the delisting returns for stocks that are removed from the exchanges as a result of corporate actions. Thus, we are able to incorporate the delisting returns in the calculation of final sale prices or final cash distributions. In so doing, we can largely eliminate survivorship bias.

Choosing the appropriate discount rate for calculating the Clairvoyant Value is, in some ways, thornier than determining the future cash flows. Consistent with the theme of this research, we use a "clairvoyant discount rate"—that is, an ex post discount rate—to calculate Clairvoyant Values. In other words, if one can see the cash flows in the future, why not presume that one can also see the market returns over that same span—the "clairvoyance span"? For our analysis of the U.S. market, we used two discount rates: a market discount rate and a risk-adjusted discount rate.[5]

The market discount rate is the return of the S&P 500 over the applicable discounting span. This discount rate would result in an aggregate Clairvoyant Value for the S&P 500 approximately matching the market cap of the S&P 500 at the start of our clairvoyance span.[6] This rate can also be viewed as a market-clearing discount rate. By using this discount rate for all cash flows of S&P 500 members since the end of 1956, we are tacitly assuming that the risk premium should be the same at the start date for all 500 companies. As a simple approach, this method results in a usable approximation of a "fair clairvoyant discount rate" for computing the Clairvoyant Values (CVs) of all stocks. This approach does not, however, allow one to distinguish companies with high systematic risks from those with low systematic risks.

The risk-adjusted discount rate is the discount rate that incorporates the ex post CAPM beta for each stock, based on the classic formulation of the model.[7] This discount rate allows us to risk-adjust our return expectations for each stock in accordance with the nondiversifiable risk of that stock.[8]

In this fashion, for any given stock, at any given time, we compute a 10-year Clairvoyant Value as the net present value of the cash flows over a 10-year clairvoyance span, relying on the ending price after the 10 years as our best estimate of the present value of all subsequent flows. Similarly, we use the first 20 years of data to estimate a 20-year Clairvoyant Value. Finally, we compute Clairvoyant Value, based on all cash flows through year-end 2007, relying on the year-end 2007 price as our best estimate of the present value of all cash flows after that date.

Clairvoyant Value cannot be accurately assessed until many years have passed, so, as the clairvoyance span expands to cover many years, the present value of our liquidation price eventually begins to taper into irrelevance. We can gauge the approximate reliability of our Clairvoyant Value by looking at how much of the Clairvoyant Value is determined by the present value of the price at the end of our Clairvoyant Span. If the cash flows prior to the end point comprise 99% of the Clairvoyant Value, then it is reasonably harmless to assume that today's price proxies for the net present value of all future cash flows. Conversely, if the terminal price represents 99% of the Clairvoyant Value, then this assumption is heroic at best: the resulting measure of Clairvoyant Value is hardly clairvoyant!

EXAMINING THE "DAYS OF FUTURE PAST"

We can calculate Clairvoyant Value from any point in the past, using distributions over any span up until today. We chose to begin with year-end 1956 for several reasons. First, a half century of data is a long enough span to avoid short-term influences on market prices, which might unduly influence our calculations. Second, the S&P 500 was launched only weeks after this particular year-end, so we have a relevant benchmark—with essentially no backfilled data or survivorship bias—for the entire period. Third, if we go back any farther, there are far fewer than 500 companies, for which these three measures (market capitalization, economic size, and Clairvoyant Value) are available. Finally, 51 years is long enough to get a pretty accurate gauge of companies' Clairvoyant Values. With due respect to the Moody Blues, we acknowledge that this approach is an examination of the "days of future past."

As Exhibit 1 shows, the rankings of the top 10 names in the U.S. stock market at year-end 1956 differ depending on the metric used to measure size. General Motors was the largest by market capitalization, sales, and dividends paid, whereas AT&T was the largest by total assets, cash flow, and book value. Standard Oil of New Jersey (now part of Exxon Mobil) ranked second or third on all of these measures. Farther down the list is Union Carbide, which failed to make the top 10 on *any* of the fundamental measures of company scale, but still made the top 10 by

EXHIBIT 1

Ten Largest Companies by Various Measures of Company Size on December 31, 1956 (dollars in millions)

Company	Market Cap	Total Assets	Sales	Cash Flow	Dividends Paid	Book Value
General Motors Corp.	$12,206	$6,569	$10,796	$1,985	$553	$4,235
Standard Oil Company of New Jersey	11,534	7,871	7,127	1,582	412	5,143
American Telephone & Telegraph Co.	10,778	16,207	5,825	2,039	517	9,554
Du Pont E.I. de Nemours & Co.	8,769	2,591	1,917	616	296	1,885
General Electric Co.	5,225	2,221	4,090	522	172	1,143
United States Steel Corp.	3,947	4,109	4,199	948	145	2,454
Gulf Oil Corp.	3,657	2,865	2,340	601	69	1,901
Union Carbide & Carbon Corp.	3,483	1,460	1,325	396	94	812
Texas Co. (Texaco)	3,285	2,574	2,046	497	129	1,836
Standard Oil Company of California	3,114	2,041	1,453	415	104	1,711
Average for Top 10	$6,600	$4,851	$4,112	$960	$249	$3,067
Average Cap/Metric Ratio		1.36	1.61	6.87	26.49	2.15

Source: Research Affiliates, based on data from CRSP and Compustat.

market cap because of its lofty valuation multiple (which is easily confirmed by noting its market cap relative to almost any of the fundamental size metrics). It seems odd, from 51 years removed, that Union Carbide was *the* hot, high-flying growth stock of the mid-1950s.

A natural question is: What were these companies *really* worth at year-end 1956? Exhibit 2 shows the Clairvoyant Value calculation for General Motors—the largest-cap stock in 1956. Over the 51 years from year-end 1956 through the end of 2007, GM's (split-adjusted) share price rose from $44 to a peak of $195 per share (in 1999), and its dividends rose from $2.00 to a peak of $6.80 per share per year (in 1977). Cumulatively, through year-end 2007, investors received $206 in dividends, or almost five times their initial investment. Initially, the Clairvoyant Value per share—for an investment at year-end 1956—rose as well; it peaked at $58.29 per share in 1965. But after this peak, GM's Clairvoyant Value started to decline. What happened?

After 10 years, the 1956 GM investor had received $31.75 in dividends and experienced a split-adjusted share price of $65.88. But when these cash flows are discounted at the market rate of 10.5% over 10 years, the investors received a 10-year Clairvoyant Value of only $42.19 per share. For the investor with 10 years of perfect foresight, the 1956 price of $44 was a little high but still relatively close to fair value.

Note on Panel B in Exhibit 3 that, even after a full decade, fully 59% of this Clairvoyant Value is attributable to the 1966 closing price. Ten years of dividend distributions comprise just 41% of the 1956 Clairvoyant Value based on a 10-year clairvoyance span. So, 10 years of clairvoyance gives our 1956 investor a very imperfect estimate of the eventual worth of GM as a buy-and-hold investment.

Sadly for the 1956 GM investor, the Clairvoyant Value for GM peaked in the first 10 years. After 20 years of clairvoyance, the 1956 Clairvoyant Value falters to $38 per share; after 30 years and after 40 years, it was down below $35 per share. Finally, by the end of 2007, the GM investor had received $206 in dividends and could sell at the split-adjusted share price of $67. Unfortunately, at a market discount rate of 10.5%, the Clairvoyant Value after 51 years is only $33.69 per share. By the end of 2007, the cumulative dividends comprise 98.8% of the Clairvoyant Value, with only 1.2% associated with the share price at the end of 2007, so one can be confident that the 51-year Clairvoyant Value for GM in 1956 is pretty close to a "final number."

The numbers for DuPont are no better as Panel A in Exhibit 3 shows. On a 10-year look-ahead basis, using the market return as our discount rate, DuPont was worth 74% of its market cap at the end of 1956. With 20 years of clairvoyance, the end-1956 Clairvoyant

Value was about 72% of DuPont's market cap. The Clairvoyant Value "through 2007" provides a mere 49% of the end-1956 market cap. Plainly, a clairvoyant investor who was able to see the difficulties that faced this industrial giant from the 1960s onward would not have paid the price that the stock commanded at the end of 1956. Reciprocally, for the patient investor, the "Standards" (Standard Oil of California, Gulf Oil, and Texaco, now all part of Chevron Texaco, together with Standard Oil of New Jersey) are proving to have been a rather better bet.[9] The U.S. reliance on oil has remained deeply entrenched.

Most of the companies on our 1956 top 10 list (by market cap) have a Clairvoyant Value lower than the company's closing 1956 market cap. This finding holds for all three holding periods and also for the CAPM risk-adjusted results. The results are very similar to those documented by Arnott [2005] who found that during the past 80 years, fewer than one-third of the top 10 names selected by market capitalization managed to outpace the *average* stock in the S&P 500 over the next 10 years. Moreover, the average performance of that list over the next 10 years would have left an investor nearly 30% poorer than the average performance for the full 500-stock roster.

EXHIBIT 2

Clairvoyant Value Example: General Motors

Year	Ending Price[a]	Dividends Paid[b]	Cumulative Dividends Received	Net Present Value[c] in 1956 (CV/Share)	Clairvoyant Value/Price[d]
1956	$44.00				
1957	33.50	$2.00	$2.00	$32.21	73.2%
1958	49.50	2.00	4.00	44.14	100.3
1959	54.50	2.00	6.00	45.54	103.5
1960	40.63	2.00	8.00	33.80	76.8
1961	57.00	2.50	10.50	42.72	97.1
1962	58.13	3.00	13.50	41.76	94.9
1963	78.63	4.00	17.50	50.96	115.8
1964	97.88	4.45	21.95	57.97	131.8
1965	103.50	5.25	27.20	58.29	132.5
1966	65.88	4.55	31.75	42.19	95.9
:::	:::	:::	:::	:::	:::
1976	78.50	5.55	73.25	38.18	86.8
1977	62.88	6.80	80.05	36.11	82.1
:::	:::	:::	:::	:::	:::
1986	69.42	5.26	117.03	34.86	79.2
:::	:::	:::	:::	:::	:::
1996	117.27	3.36	155.53	34.87	79.3
1999	194.54	3.90	168.11	35.57	80.8
:::	:::	:::	:::	:::	:::
2006	82.21	2.68	202.90	33.82	76.9
2007	66.61	2.68	205.58	33.69	76.6

Notes: [a]Ending prices were calculated by using split-adjusted price returns beginning with the actual December 31, 1956, closing price for GM of $44.00; [b]Dividends were split-adjusted; [c]Cash flows were discounted by using the market annualized rate for the entire period of 10.5%; [d]Price = the December 31, 1956, price.

Source: Research Affiliates, based on data from CRSP and Compustat.

EXHIBIT 3

Clairvoyant Values Based on Various Time Spans and Methods, 1957–2007

Company	1956 Market Cap (millions)	S&P DR, 10 Years	S&P DR, 20 Years	S&P DR, through 2007	CAPM DR, through 2007
A. Clairvoyant Values					
General Motors Corp.	$12,206	$12,947	$14,219	$9,346	$9,446
Standard Oil Company of New Jersey	11,534	8,479	9,270	12,241	19,515
American Telephone & Telegraph Co.	10,778	13,507	15,381	9,519	11,912
Du Pont E.I. de Nemours & Co.	8,769	6,479	6,305	4,313	4,420
General Electric Co.	5,225	4,396	4,124	5,149	4,341
United States Steel Corp.	3,947	1,784	1,559	1,416	1,479
Gulf Oil Corp.	3,657	3,321	3,438	2,840	3,122
Union Carbide & Carbon Corp.	3,483	1,919	1,870	1,757	1,780
Texas Co. (Texaco)	3,285	4,925	4,856	3,401	4,316
Standard Oil Company of California	3,114	2,827	3,066	3,192	3,976
Average for Top10	$6,600	$6,058	$6,409	$5,317	$6,431
Average Cap/Clairvoyant Value		1.09	1.03	1.24	1.03
B. Terminal Price (Percent of Clairvoyant Value)					
General Motors Corp.		58.9%	33.6%	1.2%	1.2%
Standard Oil Company of New Jersey		61.3	43.3	29.6	40.2
American Telephone & Telegraph Co.		67.1	40.5	3.2	5.0
Du Pont E.I. de Nemours & Co.		65.0	36.7	7.9	8.3
General Electric Co.		72.8	50.8	36.6	32.9
United States Steel Corp.		46.3	38.5	4.9	5.8
Gulf Oil Corp.		75.5	40.9	36.6	38.5
Union Carbide & Carbon Corp.		61.8	40.9	25.3	25.6
Texas Co. (Texaco)		74.1	35.7	12.0	16.2
Standard Oil Company of California		68.2	45.4	23.1	27.9
Average for Top 10		65.1	40.6	18.0	20.2

Note: DR = discount rate.

Source: Research Affiliates, based on data from CRSP and Compustat.

These results are *average* results for an 80-year period beginning in 1926; in individual years, this top 10 list sometimes provided modest benefits, relative to the equally weighted S&P 500, but usually provided substantial shortfalls.

As Panel B in Exhibit 3 confirms, with the passage of time, more of the Clairvoyant Value is explained by the actual cash flows from an investment and less is explained by the terminal price. From these results, confidence in the accuracy of the Clairvoyant Value—under the assumption that the discount rate is correct—grows. Most Clairvoyant Values are well defined by the time 51 years have passed, but not all of them. Still, even after 51 years, this exhibit shows that the discounted year-end 1956 present value of the year-end 2007 share price for the top 10 stocks by market capitalization is, on average, 18% of the total Clairvoyant Value; indeed, 37% of the 1956 value of General Electric is still embodied in the year-end 2007 price. From another perspective, the fact that, on average, 18% of the Clairvoyant Value remains unknown *after 51 years of dividend distributions* may come as a surprise to most investors.

Because of the Fama–French [1992, 1993] finding of statistically significant small-cap and value premiums for the past 51 years, we performed a Fama–French factor analysis of these data. Not surprisingly, Exhibit 4 shows that the market cap–weighted average ratio of the Clairvoyant Value per share to the starting price (the CV/Price ratio), which is a measure of the realized value, relative to the expected value in 1956 reflected in the starting price, is rather poor for companies with low book-to-market ratios (BMRs) and reasonably good for companies at the value

end of the spectrum (high BMRs). The results also show a strong size effect: The large companies (especially the large growth stocks, those with both low BMRs and large market capitalization) exhibit a much lower CV/price than the small companies.

Readers may be surprised to see the magnitude of this effect, especially for the tails of the distribution and over longer time spans. The average 51-year CV/price for stocks in the smallest quintile of size *and* highest quintile for value (based on B/P) is nearly 20 times the average CV/price for stocks in the opposite corner, the largest quintile for size *and* lowest quintile for value. Small-cap value stocks have beaten large-cap growth stocks, on average over time; this relationship compounds mightily over time.

The pattern is similar, albeit a little less impressive, when the Clairvoyant Values were calculated by using the beta-adjusted CAPM discount rates. The value stocks, and small-cap value stocks in particular, display the highest CV/price; the growth and large-cap stocks exhibit the lowest CV/price ratio. These results indicate that value stocks were indeed sold at a discount in 1956.

EXHIBIT 4

CV/Price Ratio by Size and Value Quintiles, 1957–2007

		S&P Discount Rate						CAPM Discount Rate					
		Value Quintiles						Value Quintiles					
		Low	2	3	4	High	*Size Only*	Low	2	3	4	High	*Size Only*
	10 Year												
Size Quintiles	**Small**	1.13	1.14	1.15	1.50	1.74	*1.33*	0.98	0.99	1.01	1.31	1.50	*1.16*
	2	0.96	1.25	1.23	1.29	1.91	*1.33*	0.84	1.10	1.08	1.13	1.66	*1.16*
	3	0.99	1.22	1.23	1.46	1.28	*1.24*	0.86	1.07	1.07	1.27	1.13	*1.08*
	4	1.02	1.19	1.48	1.39	1.23	*1.26*	0.89	1.04	1.30	1.22	1.08	*1.11*
	Large	0.97	0.84	1.39	0.84	1.06	*1.02*	0.84	0.74	1.22	0.74	0.94	*0.90*
	Book/Mkt Only	*1.01*	*1.13*	*1.30*	*1.30*	*1.44*	—	*0.88*	*0.99*	*1.14*	*1.13*	*1.26*	—
	20 Year												
Size Quintiles	**Small**	0.87	1.24	1.28	2.28	3.03	*1.74*	0.68	0.98	1.03	1.79	2.34	*1.36*
	2	0.78	1.29	1.73	1.89	3.50	*1.84*	0.63	1.04	1.38	1.50	2.71	*1.45*
	3	0.75	1.38	1.37	2.32	1.87	*1.54*	0.62	1.11	1.11	1.83	1.49	*1.23*
	4	0.84	0.97	1.92	2.26	1.77	*1.55*	0.68	0.80	1.53	1.78	1.41	*1.24*
	Large	0.92	0.85	1.38	0.98	1.29	*1.09*	0.74	0.70	1.13	0.80	1.06	*0.88*
	Book/Mkt Only	*0.83*	*1.15*	*1.54*	*1.94*	*2.29*	—	*0.67*	*0.93*	*1.23*	*1.54*	*1.80*	—
	Thru 2007												
Size Quintiles	**Small**	0.34	1.95	2.47	7.09	13.36	*5.04*	0.27	1.07	1.36	3.54	6.34	*2.51*
	2	0.51	1.55	3.23	4.02	7.28	*3.32*	0.38	0.96	1.79	2.20	3.86	*1.84*
	3	0.60	1.91	1.71	3.10	4.23	*2.31*	0.43	1.13	1.07	1.86	2.31	*1.36*
	4	0.82	0.94	2.11	2.53	2.42	*1.76*	0.53	0.65	1.32	1.55	1.46	*1.10*
	Large	0.70	0.77	1.13	0.86	1.16	*0.92*	0.48	0.54	0.82	0.62	0.83	*0.66*
	Book/Mkt Only	*0.59*	*1.42*	*2.13*	*3.52*	*5.69*	—	*0.42*	*0.87*	*1.27*	*1.95*	*2.96*	—

Notes: Here the 25 portfolios are taken from Kenneth R. French's data library. The portfolios, which are constructed at the end of each June, are the intersections of 5 portfolios formed on size (market equity, ME) and 5 portfolios formed on the ratio of book equity to market equity (BE/ME). The size breakpoints for year t are the NYSE market equity quintiles at the end of June of t. BE/ME for June of year t is the book equity for the last fiscal year end in t − 1 divided by ME for December of t − 1. The BE/ME breakpoints are NYSE quintiles.

Source: Research Affiliates, based on data from CRSP and Kenneth R. French's Data Library.

IS PRICE AN UNBIASED PREDICTOR OF FUTURE FAIR VALUE?

In an efficient market, CV/price should center on 1.00 across all stocks and should be independent of price, market capitalization, or valuation multiple. That is, if price is an unbiased predictor of the eventual fair value of an investment, the Clairvoyant Value, *discounted appropriately*, should be randomly distributed around that price. We test this relationship using the largest 1,000 U.S. companies and using Compustat and CRSP data. In order to have apples-with-apples comparisons, we rely on rescaling these data into portfolio weights for Cap Weight, Company Size Weight, and Clairvoyant Value weight.

Before reporting the results of our analysis, we define some terms:

- Cap Weight is the weight a company has in the stock market as measured by its stock market capitalization.
- Company Size Weight is the weight a company has, as a share of publicly traded companies, using a blend of four financial measures of company size: sales, cash flow, book value, and dividends.[10] We did not use book value alone to discriminate between growth and value companies, as is typical within our industry, because any single-metric measure of value has its own peculiarities. For example, capital-intensive companies have a strong bias to fall into the value camp on a book-to-price measure, while a dividend weight has a bias against growth companies, reinvesting in future product innovation. We believe a blend of multiple measures mitigates these biases somewhat.
- Clairvoyant Weight is the weight that a company would have in the stock market if it were trading at the price that would deliver the same return as all other stocks (either simple return or CAPM risk-adjusted return), its Clairvoyant Value.

The *differences* among these three measures of company size or value are the source of our most interesting and most important results:

- The difference between Clairvoyant Weight and Cap Weight is a measure of whether a company is under- or overvalued relative to its ex post realized value, its Clairvoyant Value. We call this measure of the ex post observed error in the ex ante price the "Clairvoyant Error."[11] A positive Clairvoyant Error means that the stock subsequently outperformed the broad market, either on a simple or a risk-adjusted basis; a negative Clairvoyant Error means that the stock subsequently underperformed the broad market.
- The difference between Cap Weight and Company Size Weight indicates whether a company delivers more or less sales, cash flow, book value, and dividends—relative to market value—than the market.[12] This metric is the "Relative Valuation." If the Relative Valuation difference is positive for a particular company, that stock carries a premium valuation multiple relative to the market (based on a blend of the four relative valuation multiples); this stock is a growth stock. If the Relative Valuation difference is negative, the stock is priced at a discount to the market; it is a value stock. Tacitly, then, Relative Valuation is a measure of the confidence the investment community has in the future growth prospects of the company.

Our construction differs from the classic Fama–French formulation. Instead of defining growth stocks as the 30% of the market with the highest valuation multiples, all cap weighted, we count all companies with above-market valuation multiples *proportionally weighted in accordance with the difference between their Cap Weight and their Company Size Weight*. Similarly, our value stocks include all companies with below-market valuation multiples, again proportionally weighted by the difference between their Company Size Weight and their Cap Weight.

- The difference between Clairvoyant Weight and Company Size Weight reveals whether the company delivered more or less future value to the shareholder, relative to its initial fundamental economic scale, than the broad market delivered. This difference was measured in terms of discounted future cash flows versus the starting economic scale of the company, as defined by the four fundamental measures of company size. We term this measure "Clairvoyant Growth."[13]

RESULTS FROM A SNAPSHOT IN TIME

Our exploration of the nuances of Clairvoyant Value begins with a look at results for a snapshot in time—namely, the end of 1956. The summary statistics in Exhibit 5

show that most of the data conform to expectations. The average for Company Size Weight, Cap Weight, and any variant of Clairvoyant Weight is naturally equal to the reciprocal of the number of companies, or approximately 0.0024, because the sum of the weights is 100% and our database contained 415 companies at year-end 1956.[14] Of course, the differences (Clairvoyant Error, Clairvoyant Growth, or Relative Valuation) all average zero. We also note that Company Size Weight has an 84% regression coefficient on Cap Weight (and a 95% correlation), which is not a surprise: Big companies are generally large-cap companies, and vice versa. Of course, the results for 1956 are far less relevant to modern investors than the average results over a 50-year span. Exhibit 6 shows the average of these results over the entire span.[15]

Our first interesting result is that Cap Weight is highly correlated with Relative Valuation, with a correlation coefficient of 50% for the original 1956 data and 30% on average over the past half-century. While the magnitude of the correlation may surprise some readers, as it did us, companies can be large cap as easily due to high valuation multiples as large company size. *History clearly shows that most of the top-capitalization companies will be both.*

The most interesting results relate to the correlations of Clairvoyant Value weight with other measures of value. Clairvoyant Weight is uniformly a little more highly correlated with Cap Weight than with Company Size Weight. Thus, the market—both in 1956 and over the subsequent history—did a better-than-random job of gauging the future growth of these companies. It should! One purpose of the market is to allocate capital where the growth prospects are best. The impressive correlation between Relative Valuation and Clairvoyant Growth (47%–59% for the market of 1956, and 29%–68% on average over the subsequent 50 years) corroborates the intuition that the market does a far better-than-random job of gauging the future growth of a company.

EXHIBIT 5

Characteristics of Clairvoyant Value Weight and Links to Company Size Weight and Cap Weight on December 31, 1956

			Correlations			Regression Coefficients		
Variable	Mean	Standard Deviation	With Cap Weight	With Company Size Weight	With Relative Valuation	On Cap Weight	On Company Size Weight	On Relative Valuation
Cap Weight	0.0024	0.0076	1.000**	0.950**	0.497**	1.000**	1.072**	1.553**
Company Size Wgt	0.0024	0.0067	0.950**	1.000**	0.200**	0.841**	1.000**	0.553**
Relative Valuation	0.0000	0.0024	0.497**	0.200**	1.000**	0.159**	0.072**	1.000**
Clairvoyant Value Weights								
10 Years, S&P	0.0024	0.0076	0.932**	0.906**	0.405**	0.936**	1.028**	1.271**
20 Years, S&P	0.0024	0.0076	0.928**	0.904**	0.399**	0.932**	1.024**	1.251**
Thru 2007, S&P	0.0024	0.0073	0.944**	0.910**	0.430**	0.907**	0.987**	1.293**
Thru 2007, CAPM	0.0024	0.0085	0.898**	0.871**	0.394**	1.000**	1.096**	1.374**
Clairvoyant Error = Clairvoyant Weight – Cap Weight								
10 Years, S&P	0.0000	0.0028	–0.173**	–0.107*	–0.244**	–0.064**	–0.045*	–0.283**
20 Years, S&P	0.0000	0.0029	–0.180**	–0.111*	–0.254**	–0.068**	–0.048*	–0.302**
Thru 2007, S&P	0.0000	0.0025	–0.282**	–0.227**	–0.252**	–0.093**	–0.085**	–0.261**
Thru 2007, CAPM	0.0000	0.0037	0.001	0.043	–0.117*	0.000	0.024	–0.180*
Clairvoyant Growth = Clairvoyant Weight – Company Size Weight								
10 Years, S&P	0.0000	0.0032	0.223**	0.057	0.539**	0.095**	0.028	0.717**
20 Years, S&P	0.0000	0.0033	0.210**	0.050	0.518**	0.091**	0.024	0.698**
Thru 2007, S&P	0.0000	0.0030	0.165**	–0.028	0.594**	0.066**	–0.013	0.739**
Thru 2007, CAPM	0.0000	0.0042	0.287**	0.153**	0.474**	0.159**	0.096**	0.820**

*Notes: The result is based on a cross-sectional regression at the end of year 1956. For 10-year, 20-year, and thru-2007 analyses, Clairvoyance spans shorter than 5, 10, and 20 years, respectively, are excluded. *5% significance level; **1% significance level.*

Source: Research Affiliates, based on data from CRSP and Compustat.

EXHIBIT 6

Cross-Sectional Correlations and Regression Coefficients, Average Results for 1957–2007

			Correlations			Regression Coefficients		
Variable	Mean	Standard Deviation	With Cap Weight	With Company Size Weight	With Relative Valuation	On Cap Weight	On Company Size Weight	On Relative Valuation
Cap Weight	0.0012	0.0033	1.000**	0.864**	0.289**	1.000**	0.884**	0.597**
Company Size Wgt	0.0012	0.0032	0.864**	1.000**	–0.213**	0.851**	1.000**	–0.403**
Relative Valuation	0.0000	0.0016	0.289**	–0.213**	1.000**	0.149**	–0.116**	1.000**
Clairvoyant Value Weights								
10 Years, S&P	0.0013	0.0040	0.897**	0.825**	0.177**	0.908**	0.848**	0.396**
20 Years, S&P	0.0012	0.0035	0.880**	0.838**	0.119**	0.868**	0.831**	0.300**
Thru 2007, S&P	0.0012	0.0032	0.846**	0.839**	0.079*	0.788**	0.802**	0.212*
Thru 2007, CAPM	0.0012	0.0036	0.780**	0.797**	0.024	0.837**	0.878**	0.105
Clairvoyant Error = Clairvoyant Weight – Cap Weight								
10 Years, S&P	0.0000	0.0016	–0.210**	–0.074**	*–0.258***	–0.092**	–0.035**	–0.201**
20 Years, S&P	0.0000	0.0016	–0.276**	–0.127**	*–0.298***	–0.132**	–0.059**	–0.284**
Thru 2007, S&P	0.0000	0.0017	–0.393**	–0.212**	*–0.394***	–0.212**	–0.114**	–0.455**
Thru 2007, CAPM	0.0000	0.0021	–0.236**	–0.058*	–0.378**	–0.163**	–0.038*	–0.562**
Clairvoyant Growth = Clairvoyant Weight – Company Size Weight								
10 Years, S&P	0.0000	0.0021	0.086**	–0.262**	*0.679***	0.057**	–0.152**	0.799**
20 Years,S&P	0.0000	0.0019	–0.014	–0.298**	*0.596***	–0.010	–0.169**	0.716**
Thru 2007, S&P	0.0000	0.0019	–0.141**	–0.349**	*0.448***	–0.085**	–0.198**	0.545**
Thru 2007, CAPM	0.0000	0.0022	–0.046*	–0.178**	0.294**	–0.036*	–0.122**	0.438**

*Notes: The result is based on the time-series average of the year-by-year regression results from 1957 to 2007. For 10-year, 20-year, and thru-2007 analyses, Clairvoyance spans shorter than 5, 10, and 20 years, respectively, are excluded; *5% significance level; **1% significance level.*

Source: Research Affiliates, based on data from CRSP and Compustat.

Interestingly, comparing the regression coefficients for Clairvoyant Value on Relative Valuation, it looks like 1956 (Exhibit 5) is an outlier compared to the average (Exhibit 6). Most of the time, the market is over generous in valuing future Clairvoyant Value.

The data also show a negative correlation of some 24%–39% between Clairvoyant Error and Relative Valuation. In other words, the extent of "growthiness" in the valuation multiples is negatively (and powerfully) correlated with the ex post observed error in the ex ante price. Because these Clairvoyant Error versus Relative Valuation correlations are mostly smaller than the Clairvoyant Growth versus Relative Valuation correlations, but with the opposite sign, the market apparently paid a premium multiple for (mostly) the right companies, but paid a much larger premium than subsequent events would have justified.

The results of our regression analysis provide further support for insights derived from the correlation statistics.

- **Was price an unbiased predictor of Clairvoyant Value?** If the correlation between Clairvoyant Error and Cap Weight is zero across all stocks in 1956, give or take some statistical noise, then the market capitalization of 51 years ago was an unbiased predictor of ex post value. If this correlation is substantially different (positive *or* negative), then capitalization was not an unbiased predictor at that time.

  Given the well-documented size and value effects, we would expect to see a negative correlation; that is, large-cap stocks historically underperform, which means that market cap should be negatively correlated with pricing error. This expected negative correlation is evident for all periods when we used the S&P 500 discount rate. But, as the numbers in Exhibit 5 show, it is of a larger magnitude, with greater statistical significance, than we expected.
- **Was the fundamental economic size of a company an unbiased predictor of Clairvoyant Error?** Intuition suggests that there should be little

or no link between the underlying economic scale of a company's business and the ex post realized errors in the price; that is, whether a company is large or small, one may reasonably surmise that the market, in its pricing, could as easily overestimate as underestimate the future Clairvoyant Value of the stock.

These results are interesting. When Clairvoyant Value was computed by using the market discount rate, the subsequently observed error in the original price (Clairvoyant Error) and company size (Company Size Weight) were negatively correlated, although the magnitude and the significance level were consistently lower than the cap weight result. When we risk-adjusted the discount rate by using the CAPM, the picture changed considerably: The large companies tend to outperform, but the results are no longer statistically significant.

When we examine *t*-statistics over time, we see that, on average over the past 50 years, while market cap is starkly negatively correlated with Clairvoyant Error, company size is far less so. Unlike the 1956 results, we do find a strong negative link between market cap and CAPM risk-adjusted Clairvoyant Error. As with the 1956 results, if we adjust for CAPM risk, we get almost no linkage between company size and Clairvoyant Error; company size has been largely unrelated to whether that company ultimately proves to have been over- or undervalued, relative to the ex post realized returns.

- **Is the starting valuation multiple of a stock correlated with its subsequent performance?** In an efficient market, starting valuation should generally not be correlated with subsequent performance: If a company carries a premium multiple, it should deliver superior growth, on average, fully sufficient to justify the higher valuation multiples. For all three time spans, the subsequent performance of a stock is starkly inversely correlated with its starting valuation multiple (as measured by the gap between Cap Weight and Company Size Weight). CAPM risk adjustments made almost no difference. These results are statistically highly significant, both for our initial sample and over the subsequent 51 years.
- **Did the market do a good job in gauging which companies were going to grow and which were not?** The results offer a powerful affirmation of the market's ability to gauge long-term growth prospects.[16] The Clairvoyant Growth metric is strongly correlated with Relative Valuation. When the market paid a premium for a company (Cap Weight > Company Size Weight), the company delivered more subsequent rewards to the shareholder, relative to the fundamental size of the company, than the market norm, with impressive statistical significance. We find that the market, both in 1956 and since, apparently segregated growth and value companies sensibly.

  A comparison of the regression coefficients indicates that the market in 1956 paid about 50% more of a premium for growth stocks, relative to value stocks, than the clairvoyant investor would have been willing to pay. While the companies that carried the premium multiples also delivered more growth, the market paid too much for growth and discounted the value companies too deeply. We might well infer that the market exhibits hubris, overestimating its abilities to gauge—and to correctly price—these long-term prospects. So, even if the market was inefficient in 1956, it was not inept.

CONCLUSION

Clairvoyant Value provides an intuitive framework to understand how the market integrates information into price. In our exploration of only a few of the myriad things that historical Clairvoyant Value can reveal, we found several interesting results. The market was able to assign higher valuation to stocks—in each of the past 51 years, without exception—that subsequently exhibited faster growth than other stocks. But in the vast majority of the years, the market paid far more for growth stocks, relative to value stocks, than the clairvoyant investor would have.

Our research opens the door to several interesting lines of future research. In a related subsequent study by Arnott, Li, and Sherrerd [2009], intertemporal results on Clairvoyant Value reveal the time variation in the market capability to estimate future growth, and the link between the dispersion of valuation multiples across all the stocks in the market and the growth–value cycle is further explored. Clairvoyant Value may also provide tools to understand the market drivers that are beyond CAPM tools and even Fama–French risk factors (i.e., value and size). For example, the concept of Clairvoyant Value may allow investigators to answer the question of whether the market overpays *as a result of* a momentum effect or other

potential behavioral trading patterns. Or, does the observed link between Relative Valuation and Clairvoyant Error potentially help to provide an explanation for the Fama–French factors? Indeed, do Clairvoyant Error and the Fama–French factors offer *independent* insights, or are they alternative interpretations of the same phenomena?

Another interesting line of research would try to discern how well the market recognizes what Clairvoyant Value has in store for investors. How much of the Clairvoyant Error in any given company is corrected, on average, in a typical year? Clairvoyant Value can be used for analysis of insider trading or institutional trading: Are some insiders or institutions better at predicting Clairvoyant Value than the general market? Do all market participants care about short-term rewards from near-term price increases, or do some care about the long-term payoffs on a risk-adjusted basis? If a large number of Wall Street analysts are following a company, does that company have higher Clairvoyant Value (relative to price) than the companies that are not covered by as many analysts or media? The answer to this question is directly linked to the sensitivity of long-term investors' buy/sell decisions to analyst forecasts. For each of these questions, the Clairvoyant Value concept may provide an easy way to derive objective answers.

The concept of Clairvoyant Value may seem simple, even trivial, harkening back to quill-pen estimates of future value. But the estimation of future fair value, of the eventual Clairvoyant Value for each asset, is a core mission of financial analysis. The concept of Clairvoyant Value reflects the essence—the raison d'être—of the pricing mechanism of the capital markets. This simple concept turns out to be a surprisingly rich idea, with implications that may go far beyond what we have explored in this article.

ENDNOTES

[1]William F. Sharpe coined the term "clairvoyant value" to refer to the concept of ex post realized value to draw attention to the fact that it can be measured only long after the fact or measured a priori only with the perfect foresight of a clairvoyant.

[2]Williams also taught us that equity and debt are two sides of the same capital-structure coin and advanced the idea of capital structure irrelevance—a fact acknowledged in the Nobel Prize–winning work of Miller and Modigliani.

[3]Indeed, in a classical Graham and Dodd context, finding what something is worth is the basic problem that was once the raison d'être of the financial analyst.

[4]The net present value of future cash flows calculation is the basis for the dividend discount model, the discounted cash flow model, and many other means of estimating ex ante value. We do not intend to add to the extensive literature on valuation models in this article.

[5]There are, of course, many ways to choose a discount rate. We could have used the Treasury bill yield or Treasury bond yield, but doing so typically produces an aggregate Clairvoyant Value for the whole market that is very different from—usually far larger than—the aggregate market capitalization at the chosen start date. Alternatively, we could have used the ex ante beta on the date that we chose to compute the Clairvoyant Value or the realized cap-weighted return on the constituents of the S&P 500 at the start date. The permutations are endless. Each choice has advantages and disadvantages.

[6]This definition requires some wiggle room for subsequent changes in the index. Siegel and Schwartz [2006] found that the return on the original S&P 500 companies was 46–55 basis points (bps) higher than the actual index returns, depending on how one parses corporate actions, than the return of the subsequently evolved live index. The difference is material, but our findings will not be much affected by a discount rate that is 50 bps too high or too low.

[7]The classic form is $r_o + ß(r_m - r_o)$, where r_o is the risk-free interest rate, ß is the beta coefficient, or the sensitivity of the stock returns to the market returns, and r_m is the return on the market. This is based on monthly returns data over the corresponding clairvoyance span.

[8]The Fama–French [1992, 1993] model shows that stock returns are a function of market risk (beta), company size, and valuation multiple. The Fama–French factors, *when applied in a Clairvoyant Value context*, suggest that companies trading at premium multiples should be discounted at a lower discount rate than other companies *because the companies are trading at premium multiples*. We find this logic to be circular. For this reason, coupled with the inherent double counting of using Fama–French discount rates to gauge differences between Clairvoyant Value weighting and cap weighting *that could then be attributed to Fama–French factors,* we have not presented the results within a Fama–French factor approach in this article. We carried out such an analysis and found that the results did not change our core conclusions; we will share the results with those who are interested.

[9]The bits of history reflected in the exhibits show how much things can change in 51 years. The four oil companies merged their way into new and different companies. Indeed, barely half of the companies in the 1956 top 10 list now resemble their 1956 incarnations.

[10]Our Company-Size-Weighted portfolio is a specific variant of the Fundamental Index® concept introduced in Arnott, Hsu, and Moore [2005]. In this study, portfolios are separately constructed, weighted in accordance with each company's aggregate sales, free cash flow, aggregate book value, and total dividend distributions. We calculate an average of the four size

weights—or, for companies that had not paid dividends, an average of sales, cash flow, and book value weights—and then use this composite-size-weighted list to construct our Company-Size-Weighted portfolio.

[11]Even if markets are efficient, today's price will not exactly equal the unknowable future value of a stock, so relative to actual ex post realized value, today's price embeds some error regardless of the efficiency of markets.

[12]Of course, the latter three are the familiar earnings yield, BMR, and dividend yield, widely used in finance. Because four measures are used, some companies that are value or growth on any single measure may be the opposite on the blended measure.

[13]This label is something of an oversimplification. After all, Clairvoyant Growth might more aptly refer to the difference between future Company Size Weight and current Company Size Weight. But, from the perspective of the shareholder, future *rewards* matter more than future economic scale. While this metric will have some natural biases against companies in historically low-margin industries—assuming that those margins remain low—it does a very nice job defining whether a company delivered future shareholder rewards, which are above its objective economic scale at the start of the clairvoyance span.

[14]The sample size drops below 500 firms because we required each company to have book value, cash flow, or sales reported at year-end 1956.

[15]Because short time spans add noise, Clairvoyant time spans shorter than 5, 10, and 20 years for the 10-year, 20-year, and thru-2007 analyses, respectively, are not used.

[16]These results are far stronger than we, as true believers in Higgledy Piggledy Growth (Little [1962]) expected.

REFERENCES

Arnott, Robert D. "What Cost 'Noise'?" *Financial Analysts Journal*, Vol. 61, No. 2 (March/April 2005), pp. 10–14.

Arnott, Robert D., Jason Hsu, and Philip Moore. "Fundamental Indexation." *Financial Analysts Journal*, Vol. 61, No. 2 (March/April 2005), pp. 83–99.

Arnott, Robert D., Feifei Li, and Katrina F. Sherrerd. "Growth—Value Dispersion and the Growth—Value 'Cycle'." Research Affiliates Working Paper, 2009.

Basu, S. "Investment Performance of Common Stocks in Relation to Their Price–Earnings Ratio: A Test of the Efficient Market Hypothesis." *The Journal of Finance*, Vol. 32, No. 3 (June 1977), pp. 663–682.

Brandhorst, Eric. "Fundamentals-Weighted Indexing Offers New Insight on Value Investing." State Street Global Advisors White Paper, January 2006.

Chan, Louis K.C., Narasimham Jegadeesh, and Josef Lakonishok. "Momentum Strategies." *The Journal of Finance*, Vol. 51, No. 5 (December 1996), pp. 1681–1713.

Fama, Eugene F., and Kenneth R. French. "The Cross-Section of Expected Stock Returns." *The Journal of Finance*, Vol. 47, No. 2 (June 1992), pp. 427–465.

———. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics*, Vol. 33, No. 1 (February 1993), pp. 3–56.

———. "Value versus Growth: The International Evidence." *The Journal of Finance*, Vol. 53, No. 6 (December 1998), pp. 1975–1999.

———. "New Lists: Fundamentals and Survival Rates." *Journal of Financial Economics*, Vol. 73, No. 2 (August 2004), pp. 229–269.

Graham, Benjamin, and David Dodd. *Security Analysis*. New York: McGraw-Hill, 1934.

Jegadeesh, Narasimhan, and Sheridan Titman. "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency." *The Journal of Finance*, Vol. 48, No. 1 (March 1993), pp. 65–91.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny. "Contrarian Investment, Extrapolation, and Risk." *The Journal of Finance*, Vol. 49, No. 5 (December 1994), pp. 1541–1578.

Little, I.M.D. "Higgledy Piggledy Growth." *Bulletin of the Oxford University Institute of Economics and Statistics*, Vol. 24, No. 4 (November 1962), pp. 387–412.

Malkiel, Burton G. "Equity Yields, Growth, and the Structure of Share Prices." *The American Economic Review*, Vol. 53, No. 5 (December 1963), pp. 1004–1031.

Moskowitz, Tobias J., and Mark Grinblatt. "Do Industries Explain Momentum?" *The Journal of Finance*, Vol. 54, No. 4 (August 1999), pp. 1249–1290.

Shiller, Robert J. "The Volatility of Stock Market Prices." *Science*, 235 (January 1987), pp. 33–37.

——. *Market Volatility*. Cambridge, MA: MIT Press, 1989.

Siegel, Jeremy J., and Jeremy D. Schwartz. "Long-Term Returns on the Original S&P 500 Companies." *Financial Analysts Journal*, Vol. 62, No. 1 (January/February 2006), pp. 18–31.

Williams, John Burr. *The Theory of Investment Value*. Fraser Publishing, 1938.