Clairvoyant Value II: *The Growth/Value Cycle*

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This is the second part of the article, the first part being published in the Spring 2009 issue.

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, has been a topic of discussion within the investment community for more than four decades. In Arnott, Li, and Sherrerd [2009], we contributed to the extensive literature on the topic by exploring the value effect through the lens of "Clairvoyant Value," defined as ex post realized cash flow, discounted back to a historical point in time, with a discount rate based on a risk premium model.[1] In that article, we found that the market did a reasonably good job in differentiating between growth and value stocks, but that the market discounted the value companies too deeply and paid about 50% more premium for the growth companies, relative to the value companies, than a clairvoyant investor would have been willing to pay.

This study extends the analysis presented in Arnott, Li, and Sherrerd [2009] from addressing a single point in time (1956) to an intertemporal analysis over the entire time span 1956–2007. We also examine the dynamic relationship between the Clairvoyant Value and a metric called "Valuation Dispersion." We define this metric as the weighted standard deviation of the log of "Relative Valuation"—the growth-versus-value metric—across all stocks for the universe of companies; we examine it once a year, exploring its implications for subsequent relative performance of growth and value stocks. By construction, the standard deviation is size weighted and uses a blend of the "Company Size Weight" and the "Capitalization Weight."

The results for the entire period support the single-period results reported in our earlier article. In each of the 51 years—*without exception*—the market was able to assign higher valuation to stocks that subsequently exhibited faster growth than those that commanded lower valuation multiples. In the vast majority of the years, however, the market paid far more than the clairvoyant investor would have paid for growth stocks relative to value stocks. We also found that the widening and narrowing of the dispersion of valuation multiples plays a major role in driving the growth–value cycle observed in the market.

METHODOLOGY: A BRIEF RECAP AND MINOR REVISION

The research presented in this article builds on the methodology and results presented in Arnott, Li, and Sherrerd [2009] in which we also used three measures of size—capitalization, company size, and Clairvoyant Value—to extract some interesting results on market "behavior" over the past 51 years. To facilitate comparisons among these three size measurements, we convert each measure into a portfolio weight by expressing it as a percentage of the sum over the 1,000 largest U.S. companies, as follows:

- Market capitalization is the product of market price and total shares outstanding at the end of each calendar year. As a percentage of the market, this is the familiar *cap weight* for each company.
- Company size is based on four financial measures of company size: sales, cash flow, book value, and dividends.[2] We measure this as a percentage of the largest 1,000 publicly traded companies by averaging the sales weight, cash flow weight, book value weight, and dividend weight. The first of these, for instance, is a company's sales as a percentage of all companies' sales.
- Clairvoyant Value is the net present value of the subsequent cash flows, at a presumed purchase date, using all available cash flows and a market discount rate. We use the return on the S&P 500 Index as the market discount rate. In Arnott, Li, and Sherrerd [2009], we used the market return estimated over the entire clairvoyant span for all cash flows. 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. In this article, we modify that methodology slightly and use the discount rate *up to the point* of each cash distribution. Thus, the net present value of each distribution is "fixed" in time and is not influenced by future market movement. There is no systematic change in our results with this modification. We also use a CAPM-derived discount rate to test whether the results are affected by different individual risk levels.[3] Similar to the adjustment made for the market discount rate, we use the CAPM-derived discount rate up to the time of each distribution.

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.

Differences between the three size metrics provide particularly useful information. For example, the difference between Cap Weight and Company Size Weight indicates whether a company is priced at a higher or lower valuation multiple—measured relative to sales, cash flow, book value, and dividends—than the market,[4] and is known as 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.[5]

The difference between Clairvoyant Weight and Company Size Weight reveals whether the company delivered more or less future Clairvoyant Value to the shareholder, relative to its initial fundamental economic size, than the broad market delivered. We term this measure "Clairvoyant Growth."

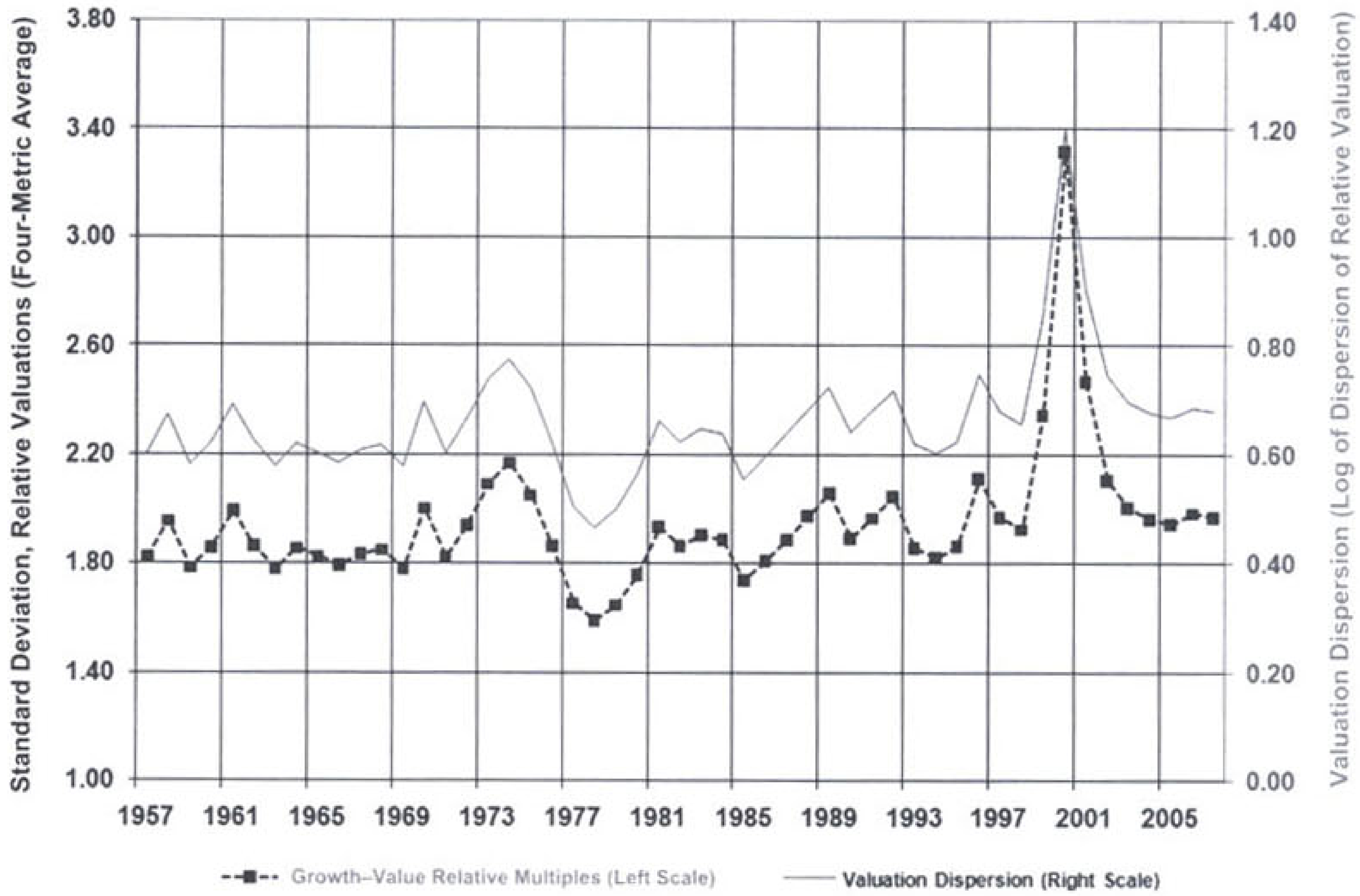
Using data from 1956 through 2007, we found that market capitalization has not historically (at least not in the past 51 years) represented an unbiased estimate of ex post realized value as measured by Clairvoyant Value. Based on our findings for 1956 and most subsequent years, although growth stocks (those trading at high multiples) do historically exhibit superior future growth, the premium carried in their market price is too high to be justified by subsequent Clairvoyant Growth.

INTERTEMPORAL RESULTS, IN DEPTH

Results, which are highly significant for one snapshot in time, may be sensitive to a particular start date or to various end dates. Furthermore, because one of the key engines of the growth-and-value cycle is rising and falling dispersion in the range of valuation multiples, we expect the excess premium for growth and the discount for value, as observed in 1956, to vary over time. Accordingly, in this article, we will extend the analysis from a point in time to an examination of the intertemporal results.

We examine the intertemporal results using a metric called Valuation Dispersion. Valuation Dispersion is the weighted standard deviation of the log of Relative Valuation (the growth-versus-value metric) across all stocks in our universe of companies. We calculate this at the end of each year based on the Cap Weight and Company Size Weight at that time. This standard deviation is, in terms of construction, size weighted by a blend of Company Size Weight and Cap Weight. Exhibit 1 shows that the gap

EXHIBIT 1
Market Premium Paid for Growth, 1957–2007



Note: "GVD" is the log of the average of a stock's valuation multiple (averaging sales, book, cash flow, and dividend to get the fundamental size) divided by the market capitalization for the multiple ratio, and "Valuation Dispersion" is the weighted standard deviation of Relative Valuation. The weight is the average of Company Size Weight and the Cap Weight.

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

between the valuation multiples for growth stocks relative to those for value stocks has varied over time.

Valuation Dispersion ranges from 0.47 in 1978, after the so-called Nifty Fifty bubble had burst and investors had lost confidence in growth stocks, to more than 1.20 at the peak of the tech bubble at year-end 1999. Simply put, the growth stocks averaged just 1.6 times ($e^{0.47}$) the valuation multiples of the value stocks in 1977 and soared to more than 3.3 times ($e^{1.20}$) the valuation multiples of the value stocks by the end of 1999, as shown by the dashed line on Exhibit 1.[6]

To assess whether the market has historically overpaid for growth, we regressed Clairvoyant Growth on Relative Valuation. Remember that Clairvoyant Growth is a measure of the *actual* future growth of a company, measured in terms of the ratio of future realized rewards relative to the initial economic scale of a company, whereas Relative Valuation is implicitly a measure of the market's *expectations* for future growth, measured in terms of the ratio of a company's market capitalization relative to the economic scale of that company.

In an efficient market, assuming the correct discount rate on future dividends, the beta of Clairvoyant Growth with respect to Relative Valuation should be 1.00; if the coefficient is 1.00, the subsequent performance of the premium-multiple growth stocks will match the performance of the discounted-multiple value stocks so that Relative Valuation maps one to one, plus or minus a random error term, with subsequent relative profit distributions to the shareholders. With a coefficient of 1.00, valuation multiples will be unrelated to subsequent performance (we will consider risk-adjusted returns later in the article).

Exhibit 2 plots the coefficient of this regression relative to the Valuation Dispersion metric for 10-year horizons (Panel A), 20-year horizons (Panel B), through the 2007 horizon (Panel C), and through 2007 using a CAPM-adjusted discount rate (Panel D). The striking result is that the coefficient is almost always below 1.00, regardless of start date and regardless of clairvoyance span. This means that the market almost always paid a higher premium for growth relative to value over the past half-century than subsequent events (clairvoyance) would have justified at the time. With hardly any exceptions, the more years of clairvoyance that we have, the more reliable this pattern becomes, and the lower the average regression coefficient becomes.

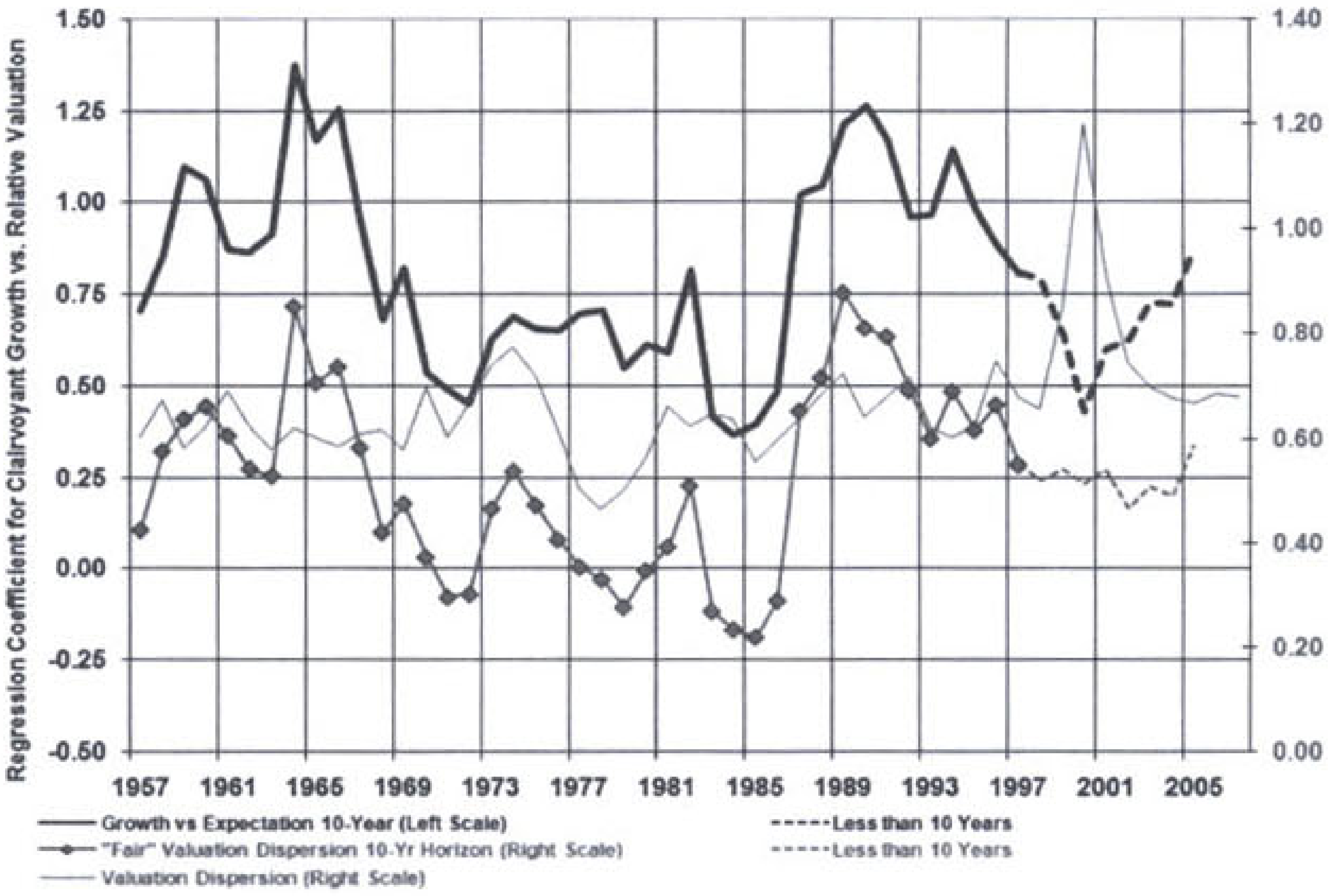
Equally striking is that the coefficient of Clairvoyant Growth, regressed against Relative Valuation, rises above 1.00 *only* in those periods that exhibit a distinct pattern—periods that begin with *low* Valuation Dispersion (with growth stocks priced at a small premium to value), followed by periods of *fast-rising* Valuation Dispersion (major rallies for growth stocks, notably the cresting of the Nifty Fifty in 1973 and the cresting of the tech bubble in 2000).

Even these coefficients are considerably higher for short clairvoyance spans than for the 20-year-plus spans. This result may mean that the investment community is getting better at discerning future growth, or it may mean that shorter spans are too short for Clairvoyant Value to be particularly accurate. We believe the latter; remember that Clairvoyant Value is still fuzzy in the shorter clairvoyance spans. For the 10-year and 20-year clairvoyance spans, the terminal price after 10 and 20 years still represents a very large share of the initial Clairvoyant Value. Recall, also, that 20 years of cash flows sufficed to explain only about 60% of the Clairvoyant Value, on average, in 1956. And 1956 was an era when stocks were typically priced at barely seven times their cash flow and the average dividend yield was more than 4%! As such, these shorter spans have quite a bit of uncertainty in the calculation of the original Clairvoyant Values.

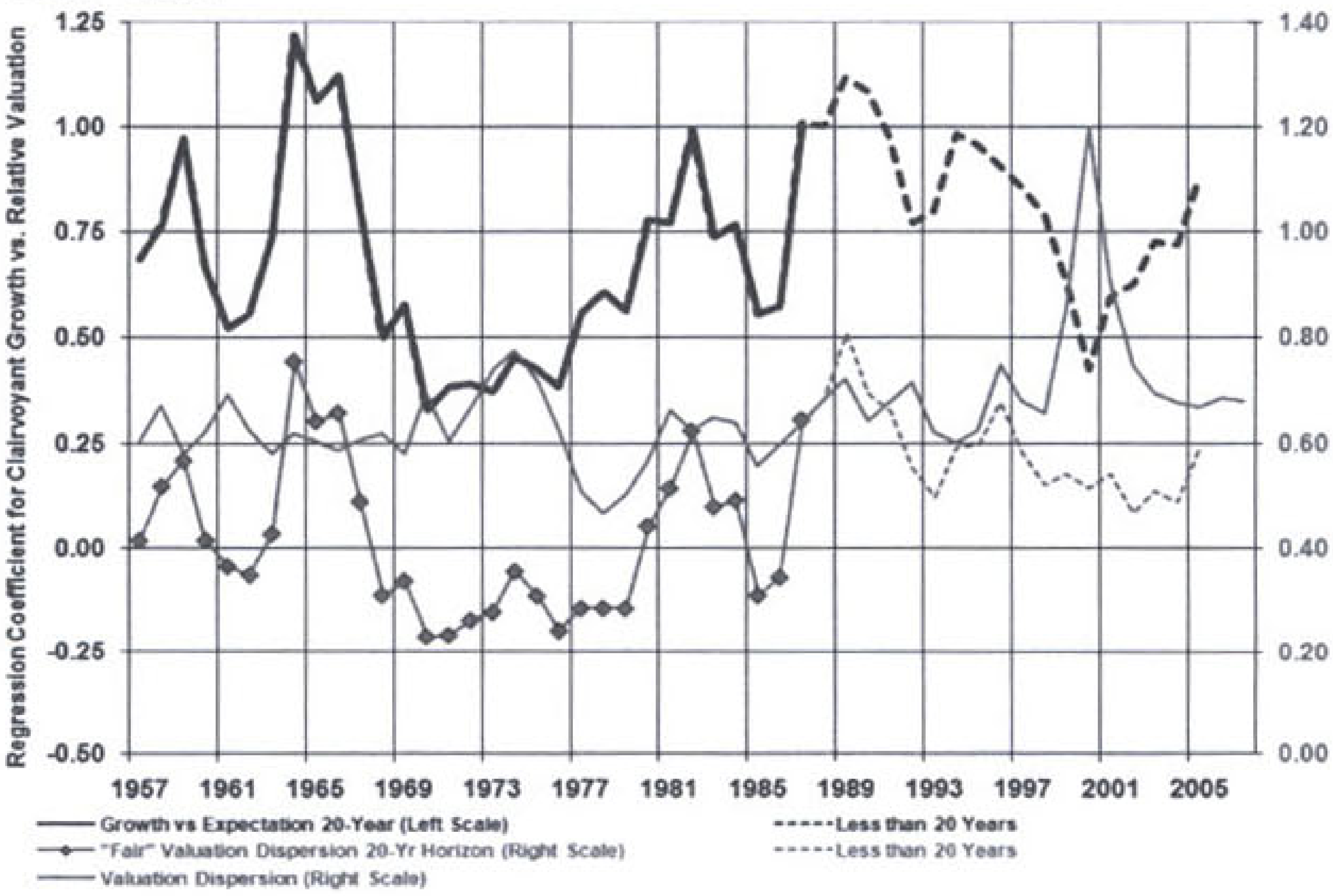
EXHIBIT 2

Deriving the Fair Valuation Premium for Growth

Panel A: 10-Year Clairvoyance Span, S&P Discount Rate, 1957–2007



Panel B: 20-Year Horizon Clairvoyance Span, S&P Discount Rate, 1957–2007

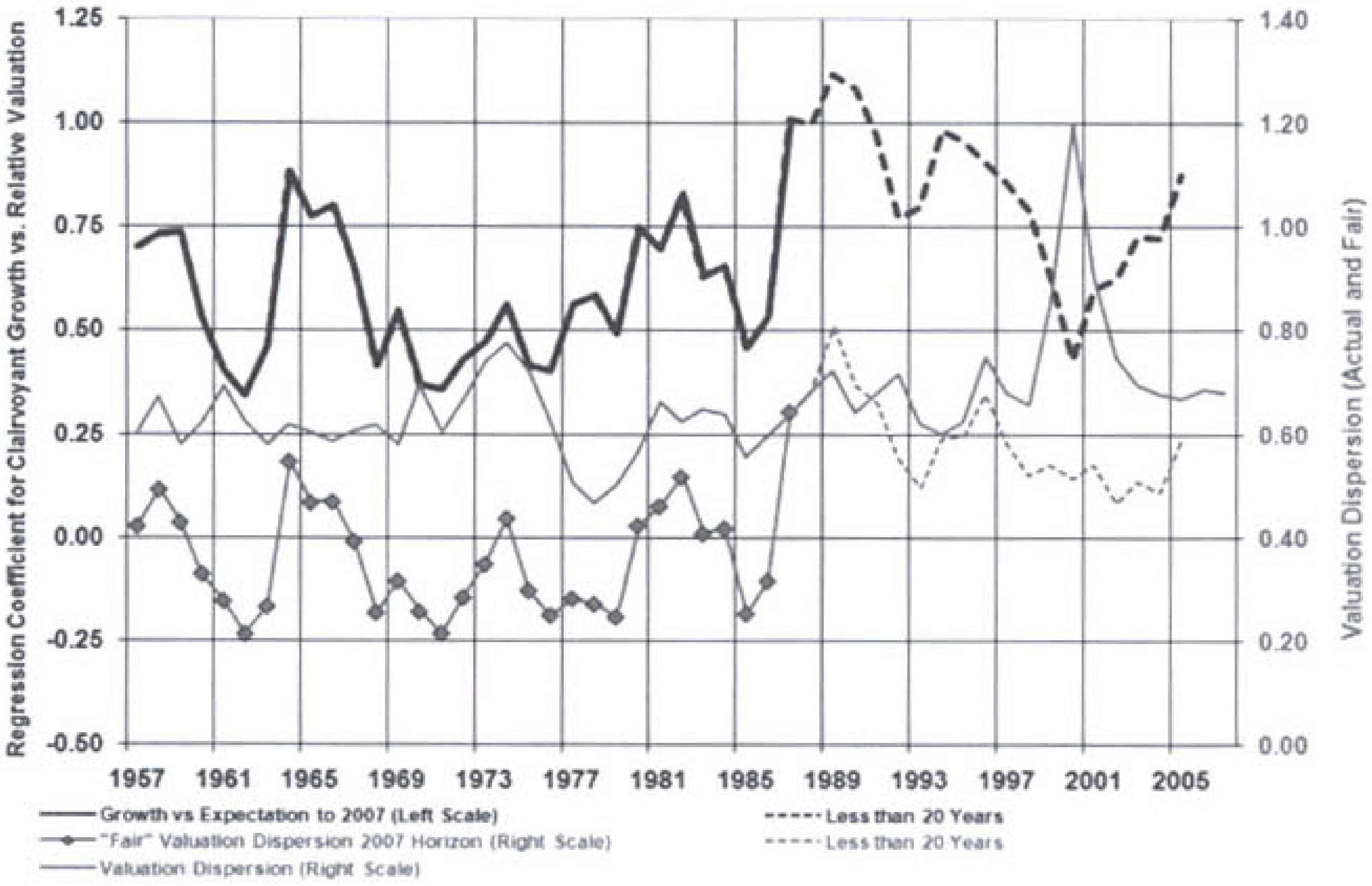


THE FAIR PREMIUM OF GROWTH TO VALUE

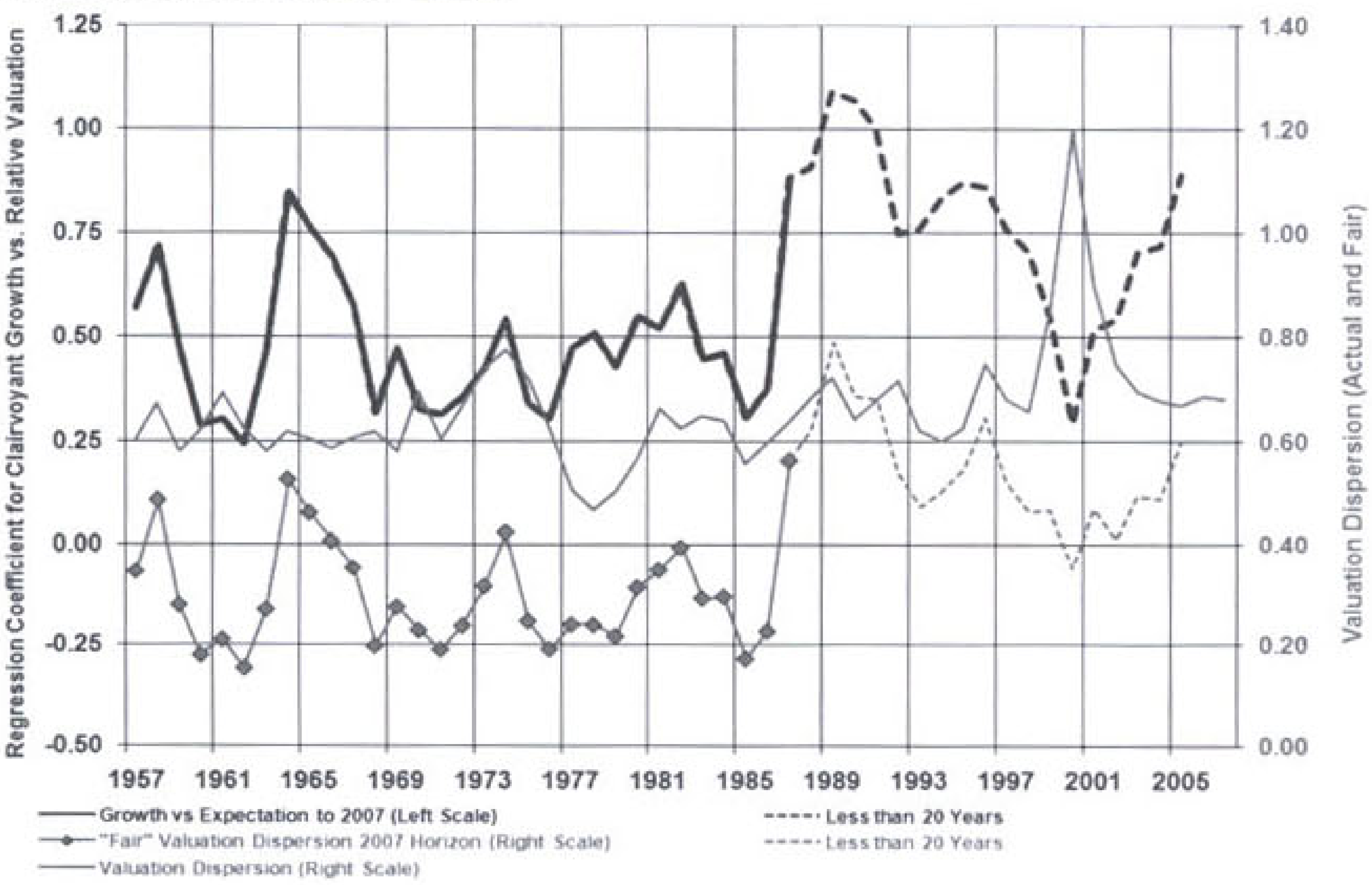
If the market does not price the premium "correctly" (from the vantage point of the clairvoyant investor), what would a fair premium for growth over value have been in this period? To answer this question, we calculate the premium which would have led to similar returns, on average, for growth and value stocks—the Fair Dispersion metric. This would be the Valuation Dispersion that, at any given point in (historical) time, would have eliminated the correlation between Clairvoyant Error with Relative Valuation. Put another way, it would be the Valuation Dispersion that would lead to a coefficient of 1.00 for Clairvoyant Growth regressed against Relative Valuation.

Exhibit 2 *(continued)*

Panel C: Clairvoyance Span through 2007, S&P Discount Rate, 1957–2007



Panel D: Clairvoyance Span through 2007, CAPM Risk-Adjusted Discount Rate, 1957–2007



Note: The dashed lines correspond to the periods when we had to settle for fewer than 20 years of data.

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

To compute Fair Dispersion, we take the product of the Valuation Dispersion metric and the coefficient of the regression of Relative Valuation on Clairvoyant Growth. For example, suppose Valuation Dispersion equals 0.7, which is equivalent to growth stocks priced at twice ($e^{0.7}$) the valuation multiples of value stocks, on average. Suppose also that the coefficient of Clairvoyant Growth, regressed against Relative Valuation, is also equal to 0.7, meaning that investors got 70% as much growth from the average growth stock relative to the average value stock as they had expected and embedded in the price. The product is 0.49. In other words, if Valuation Dispersion at the start of the period had been 0.49, then the regression coefficient for Clairvoyant Growth, regressed against Relative Valuation, would have been 1.0, and the correlation of Clairvoyant Error to Relative Valuation would have been zero. This, in turn, corresponds to efficient pricing of growth stocks relative to value stocks. In our illustrative example, "Fair Valuation Dispersion" is 0.49.

Note in Panels A, B, C, and D in Exhibit 2 that the Fair Dispersion metric varies over time and also depends on whether Clairvoyant Values were calculated over the subsequent 10 years, 20 years, or through 2007 (i.e., initially 51 years). For 10-year clairvoyance (Panel A), Fair Dispersion averaged only 80% of the actual dispersion at the start of each span. In other words, people *should* be paying a premium for growth stocks (and a discount for value stocks) that is only 80% of the premium (and discount) valuation multiples that actually prevail. The premium paid for growth stocks relative to value stocks was too small in only 7 out of the 42 years for which full 10-year clairvoyance was possible (1964, 1966, 1988–1991, and 1994). Most of these 10-year spans began with narrow Valuation Dispersion and were then dominated by a speculative growth-dominated market, such as the Nifty Fifty era of 1972–1973 and the technology bull market of 1998–2000, both of which many practitioners today view as bubbles.

Looking at 20-year clairvoyance (Panel B), the gap widens: the *fair* premium for growth stocks relative to value stocks would appear to be only about 73% of the actual Valuation Dispersion, on average. That is, with

20-year foresight, we can see that the market pays a larger premium for growth relative to value than the fair premium that a clairvoyant with 20 years of foresight would pay, and with more reliability than in the 10-year span. In only one time period, 1964 to 1966, the market paid less of a premium for growth than the fair premium for these companies, based on actual subsequent 20-year returns.

A plausible interpretation for this finding is that most of the companies that were overpriced relative to their Clairvoyant Values in the past were still overpriced 10 years later. This state of affairs is not surprising. For example, in 1956, people could not foresee the implosion that would affect General Motors from the 1980s through today. Nor could they have seen it even 20 years later. If clairvoyance reveals that General Motors was overpriced relative to the ex post realized fair value in 1956, it remained overpriced in 1966 and in 1976. It takes a long, long time for the market to correct pricing errors relative to Clairvoyant Value, because Clairvoyant Value cannot be known for a long, long time.

Perfect foresight through 2007 provides an even more powerful result—for spans of 20 or more years, the market *never failed to overpay* for the long-term realized successes of the growth companies, even though the market chose *which* companies deserved the premium multiples with remarkable accuracy, and even through the Nifty Fifty and tech bubbles. As Panel C of Exhibit 2 shows, nearly half of the price-implied relative growth expectations of the growth and value stocks failed to materialize, so investors were paying twice the fair premium for growth stocks relative to value.

In an efficient market, the Valuation Dispersion and the Fair Dispersion lines should be the same, with some allowance for random noise, but they are not. Indeed, the Valuation Dispersion is almost always too wide, as measured against the subsequent realized growth differences of the two portfolios. The market does a nice job of discerning companies with superior future growth prospects from those with inferior prospects, enough to have an impressive 50% and larger correlation with that future reality. But the market then goes on to overpay for that future growth relative to the value stocks by an average of roughly twice the fair premium that eventually can be measured with Clairvoyant Value.

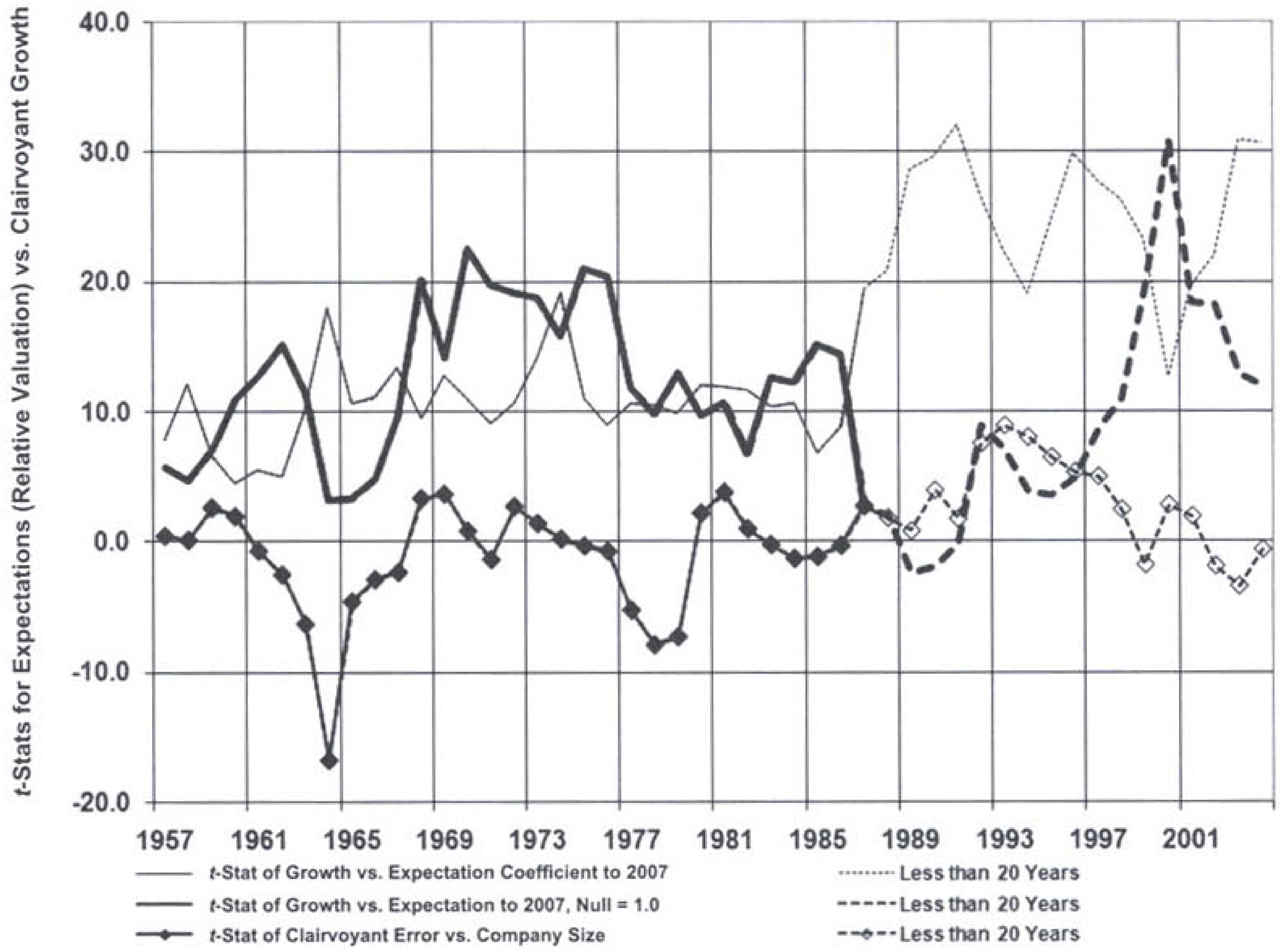
The CAPM risk adjustment does not help, as Panel D of Exhibit 2 shows. Indeed, a CAPM risk adjustment makes the difference between the Valuation Dispersion and the Fair Dispersion lines worse, not better, which may suggest that risk-adjusted errors are even larger than unadjusted errors.

The intertemporal variation in the statistical significance of these results, which is plotted in Exhibit 3, provides additional evidence of the power of the results. The thin line plots the t-statistic for Clairvoyant Growth through 2007 regressed against Relative Valuation. In effect, we are measuring the market's ability to discern future growth through 2007, and it is almost always highly significant, often with t-statistics in double digits.[7] These results are similar to those that we reported for end-1956. The market does pay a premium for companies that ultimately deliver superior growth, distinguishing between growth and value stocks with relative valuation multiples that are remarkably powerful indications of future relative growth in the enterprises. The average t-statistic for this relationship is 16.28, and it never fails to exhibit statistical significance in any year. This is reassuring; if the market could not distinguish good companies from bad, it would fail one of its central purposes!

The bold line in Exhibit 3 shows the statistical significance of the reciprocal result—the market's tendency to reliably overpay for subsequent growth. This line shows the significance of that same regression of Clairvoyant Growth against Relative Valuation through 2007, against the null hypothesis that the coefficient is 1.00 (as the EMH would imply). The market overpays for growth with t-statistics *in double digits* much of the time. These results are very nearly as impressive as the earlier test against a null hypothesis that the coefficient is zero. The average t-statistic for this relationship is 11.07 and, again, it never fails to exhibit statistical significance for any clairvoyant span of 20 years or longer.

Equally of interest in Exhibit 3 are the t-statistics for the correlation between the ex post realized error in the current price (the Clairvoyant Error) and Company Size Weight that is evidenced in the subsequent cash flows over the Clairvoyance Span. These t-statistics indicate no statistical significance; that is, these measures are largely uncorrelated, on average, over time. In an efficient market, Clairvoyant Error should be uncorrelated with market capitalization and with the growth-versus-value metric. But it is not. It is usually highly (and negatively) correlated with both. In an efficient market, Clairvoyant Error should be positively correlated with Company Size Weight.[8] It is not. Notwithstanding the anomalous results from 1956, it usually has little correlation at all. The average

EXHIBIT 3
Statistical Significance of Results: *t*-Statistics over Time



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

t-statistic is 0.25, indistinguishable from zero. This finding is consonant with a world in which: 1) large and small companies, based on the Company Size Weight, exhibit similar growth; and 2) valuation multiples substantially overcompensate for prospective relative growth in a fashion that is largely independent of a company's current economic scale.

The Fair Dispersion lines are not the same in the four panels of Exhibit 2. The longer our time span, the lower the Fair Dispersion, with very few exceptions. One interpretation of this result is that, because Clairvoyant Value takes decades to know with any accuracy, errors in the price relative to Clairvoyant Value take decades to correct. Companies that are priced with a large Clairvoyant Error, given an infinite clairvoyance span, probably still retain much of the same directional error after 10 years and even after 20 years.

Value has outperformed growth in most years, in most markets around the world, for decades. It would be natural to ask whether we have learned from this experience. Referring back to Exhibit 1, we can see that the Valuation Dispersion in the past 20 years has generally been higher than in the first 20 years of our study. One implication of this "trend"[9] is that investors are typically paying a larger premium for growth stocks, relative to value stocks, than they did in the early years of our study.[10]

If the Dispersion is generally getting wider, there are three possible explanations. Investors today may be getting smarter in gauging future growth prospects, that is, the Fair Dispersion may be increasing. Alternatively, the dispersion of future growth prospects may, itself, be getting wider; that is, growth companies may grow faster than value companies and by a wider margin than the historical norms. Finally, investors may be exhibiting more hubris, more excessive confidence in their ability to discern future growth prospects. Which is the correct explanation? We have our opinions, but we can't definitively know the answer to this question for several decades to come.

HOW VALUABLE IS CLAIRVOYANCE?

Most of us would be thrilled to have a secret source of Clairvoyant Value. Still, clairvoyance is a bit overrated. If we had 50-year clairvoyance in 1957, we would have bought Standard Oil of New Jersey (now part of Exxon Mobil) and would have avoided General Motors and AT&T. But, for the next 20 years, we'd have been better off with the opposite choice! Still, our reward for holding an investment will—*by definition*—converge to the Clairvoyant Value, *eventually*. Accordingly, even though it may lead us astray for long periods of time, most of us would pay a vast premium for a special version of *The Wall Street Journal* that lists the price *and* the discounted net present value of all future cash flows for every company. And, most of us would far prefer to invest accordingly.

This invites an interesting question: How do our various portfolios—Cap Weighted, Company Size Weighted, and various permutations of Clairvoyant Value Weighted—perform over time? How much value does a Clairvoyant Value Weighted portfolio add relative to the Cap Weighted portfolio, and how reliably? Exhibit 4 presents the results of our analysis. As expected, clairvoyance leads to higher returns than either Cap Weighted or Size Weighted portfolios, with some consistency and with considerable statistical significance.

To the casual observer, however, it may come as a surprise that the 10-year Clairvoyant Value Weighted portfolio beats both the 20-year Clairvoyant Value Weighted portfolio and the 1956–2007 Clairvoyant Value Weighted portfolio (which spans as much as 51 years of clairvoyance). But, this should be expected. Ten-year clairvoyance is based, in part, on the share price 10 years hence. For the 1957 investor, near-term performance should be far more correlated with the year-end price of 1966 than with the year-end price of 2007.

Risk adjusting the discount rate has a slight negative impact on returns. The returns using the CAPM discount rate are 0.6 percentage points lower than those for the S&P 500 discount rate (15.8% versus 16.4%). The risk exposure, measured by volatility, is also lower (13.6% versus 14.3%).

EXHIBIT 4

Comparative Performance of Cap Weighted, Company Size Weighted, and Clairvoyant Value Weighted Portfolios

Correlation Matrix	Cap Weight	Company Size Weight	CV Weight (S&P, 10 Yr)	CV Weight (S&P, 20 Yr)	CV Weight (S&P, 2007)	CV Weight (CAPM, 2007)
Cap Weight	1.000	0.970	0.984	0.985	0.985	0.975
Company Size Weight	0.970	1.000	0.983	0.984	0.983	0.984
CV Weight (S&P, 10 yr)	0.984	0.983	1.000	0.998	0.998	0.993
CV Weight (S&P, 20 yr)	0.985	0.984	0.998	1.000	0.999	0.995
CV Weight (S&P, 2007)	0.985	0.983	0.998	0.999	1.000	0.996
CV Weight (CAPM, 2007)	0.975	0.984	0.993	0.995	0.996	1.000
Annualized Return	11.1%	12.4%	16.6%	16.3%	16.4%	15.8%
Annualized Volatility	14.6%	14.2%	14.5%	14.3%	14.3%	13.6%
Skewness	–0.39	–0.34	–0.34	–0.35	–0.35	–0.33
Kurtosis	1.86	2.14	1.99	2.05	2.09	2.01
Beta with Cap Weight	1.00	0.94	0.97	0.97	0.97	0.91
Beta with CSW	1.00	1.00	1.00	1.00	1.00	0.94
Alpha vs. Cap Weight	0.0%	1.7%	5.6%	5.4%	5.4%	5.3%
t-Statistic	N/A	3.42	15.41	15.31	15.44	12.43
Alpha vs. CSW	–1.3%	0.0%	4.1%	3.9%	4.0%	3.8%
t-Statistic	–2.56	N/A	10.87	10.83	10.78	11.07
Bivariate Coeff with CW			0.51	0.50	0.51	0.33
Bivariate Coeff with CSW			0.49	0.49	0.48	0.61
Tracking Error with CW	0.0%	3.6%	2.6%	2.6%	2.5%	3.3%
Tracking Error with CSW	3.6%	0.0%	2.7%	2.6%	2.6%	2.6%

Notes: CW = Cap Weight and CSW = Company Size Weight.
Source: Research Affiliates based on data from CRSP and Compustat.

Readers who are familiar with the literature on the Fundamental Index concept will be unsurprised that the Company Size Weighted portfolio delivers better performance than the Cap Weighted portfolio over the entire Clairvoyant Value span. By construction, a Cap Weighted portfolio will overweight every stock whose price is above its Clairvoyant Value, relative to the Clairvoyant Value Weighted portfolio. And those stocks are destined to eventually underperform—by definition—on a net present value basis. Conversely, a Cap Weighted portfolio will also underweight each stock whose price is below its Clairvoyant Value, relative to its Clairvoyant Value Weight; each of these stocks will outperform. Mathematically, then, this formulation leads to a return drag over time, relative to the Clairvoyant Value Weighted portfolio.

By comparison, a Company Size Weighted portfolio delivers returns that are closer to the Clairvoyant Value weighted portfolio because, as we've already seen in Exhibit 3, Company Size is uncorrelated—on average, over time—with Clairvoyant Error. So, even though the Company Size Weight errors—relative to Clairvoyant Value Weight—are larger than the errors for a Cap Weighted portfolio, they will often cancel because they are uncorrelated, which improves the performance of the portfolio. It is still important to acknowledge, however, that neither Company Size Weighting nor Clairvoyant Value Weighting helps during bubbles, such as the Nifty Fifty bubble of the early 1970s or the tech bubble of 1999. A crystal ball is useless when stocks that ultimately prove to have been overvalued continue to get more and more expensive.

Exhibit 5 illustrates these results for both a linear scale (Panel A), to show how much cumulative incremental wealth Clairvoyant Value would provide, and a semi-log scale (Panel B), to show how reliably the value added compounds over time. Not surprisingly, the investors with a crystal ball can successfully avoid the performance drag created by both random errors (Company Size Weighted portfolio) and systematic errors (Cap Weighted portfolio). The Clairvoyant Value Weighted portfolios deliver superior returns with a similar volatility of Cap Weighted portfolios, regardless of the clairvoyant span used. The Company Size Weighted portfolio beats the Cap Weighted portfolio, as has been previously well documented, but is not nearly as powerful as Clairvoyant Value Weighting—if only we could see the future!

DOES VALUATION DISPERSION PREDICT THE GROWTH–VALUE CYCLE?

Much of our research is based on the fact that Valuation Dispersion varies widely over time. It is unsurprising that, when the dispersion in valuation multiples widens, usually growth concurrently beats value, and vice versa. At the peak of the tech bubble in early 2000, after a stellar period for growth stocks, Valuation Dispersion had widened more than at any time in U.S. capital markets history.[11] This laid the foundation for seven consecutive years of success for value investors. Then, after this seven-year winning streak for value stocks, the dispersion of valuation multiples was nearing all-time lows. This, in turn, laid the foundation for the debacle that occurred in value stocks from 2007 to early 2009.

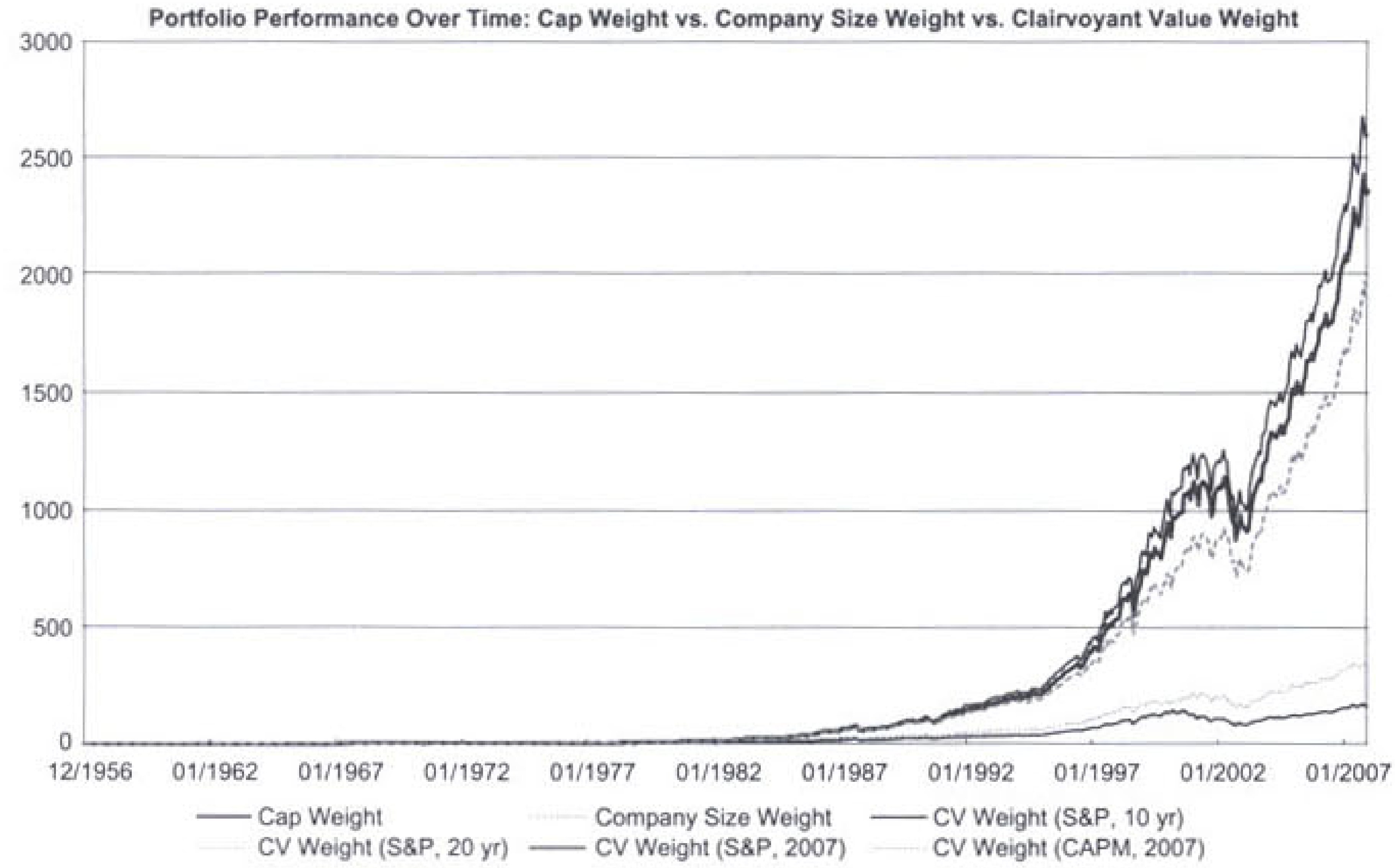
Of greater interest is the possible link between Valuation Dispersion and subsequent relative performance of growth and value stocks. In an efficient market, Valuation Dispersion should be an unbiased predictor of the difference in future growth prospects,[12] so the wide swings that we observe in Valuation Dispersion should be linked to changes in the *actual future prospects* of growth and value stocks. Valuation Dispersion should be linked to changes in Wall Street's collective ability to discern the future, not to changes in confidence about Wall Street's ability to discern the future. In such a world, Valuation Dispersion should not mean revert unless the relative growth rates of growth and value stocks change in an offsetting fashion, thereby allowing both portfolios to produce the same risk-adjusted return.

When Valuation Dispersion is wider than average, is the market overestimating its ability to forecast relative growth rates and do value stocks subsequently outpace growth? When narrower than average, is the market paying too little for growth and does growth subsequently outpace value? Alternatively, does Valuation Dispersion change over time either in response to changes in the relative prospective growth of growth and value stocks, or in response to changing "clarity" as to the relative growth prospects? If these last explanations are dominant, then Valuation Dispersion will not be *predictive* of prospective relative rewards for growth and value.

At least we can answer these questions in a historic context. We can calculate how much of the Valuation Dispersion can be attributed to differences in the growth rates between growth and value stocks, and how much can be attributed to changes in valuation multiples, with

EXHIBIT 5
Cumulative Returns of Cap Weighted, Company Size Weighted, and Clairvoyant Value Weighted Portfolios

Panel A. Arithmetic Scale



Panel B. Semi-Logarithmic Scale

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

little change in the underlying fundamental success of growth stocks relative to value stocks. For this exercise, we used the classic Fama–French [1992, 2004] earnings-to-price ratio (E/P) definition of growth stocks and value stocks, which is that

- the top 30% of all stocks, ranked by E/P multiple, are the value stocks and the bottom 30% are the growth stocks, and
- the returns of these two portfolios are tracked separately, and the return difference (Growth–Value Relative Return, or GVRR) is defined as

$$\ln[(1 + \text{Growth Return})/(1 + \text{Value Return})]$$

The use of log ratios allows us to correctly treat these two relative returns; for example, the returns cancel one another if Growth beats Value by 25% and then underperforms by 20%.

We find that the widening or narrowing of Valuation Dispersion is largely tied to changes in the confidence that the consensus has in its collective ability to discern future long-term growth differentials between growth and value stocks, not to changes in the relative growth rates themselves. As Exhibit 6 shows, when the Valuation Dispersion widens, it exhibits an 87% correlation with the concurrent return differential of the growth portfolio versus the value portfolio. This relatively high correlation leaves comparatively little room for *actual* differences in realized growth rates in these two portfolios, one relative to the other, to have played much of a role. As we shall see, this inference has some merit.

We also find that the Valuation Dispersion—we call this time series GVD for Growth–Value Dispersion—exhibits both persistence and mean reversion, as illustrated in Exhibit 7; both characteristics are evident in the 0.69 coefficient for predicting GVD_{t+1} from GVD_t. The mean reversion would appear to be toward a value that is statistically indistinguishable from the sample mean of 0.68, which corresponds to growth stocks "normally" being priced at $e^{0.68}$ or almost exactly 2.0 times the price-to-earnings (P/E) multiple of the value stocks. The correlation is strong despite the two outlier plot points from the peak of the bubble. The end-1998 Valuation Dispersion of 0.86—an all-time high to that point—did not mean revert until after it soared to 1.12 by the end of 1999, then collapsed back to 0.91 at the end of 2000.[13]

Both persistence and mean reversion are further confirmed statistically in Exhibit 8. We added two additional components—the prior change in Valuation Dispersion and the prior Growth–Value relative return differential—to the univariate regression used in Exhibit 8. The two forms of the regression are

$$GVD_t = c + b_1 \times GVD_{t-1}, \text{ and}$$
$$GVD_t = c + b_1 \times GVD_{t-1} + b_2 \times (GVD_{t-1} - GVD_{t-2}) + b_3 \times GVRR_{t-1}$$

The second form allows us to introduce a second lag—an AR(2) test—and to examine how much of the change in Valuation Dispersion was a consequence of the growth stocks actually *outgrowing* the value stocks. We chose to use the *change* in Valuation Dispersion $(GVD_{t-1} - GVD_{t-2})$ rather than the second lag (GVD_{t-2}) because we wanted to explicitly measure any momentum

EXHIBIT 6
Growth–Value Performance Differential vs. Changes in Valuation Dispersion

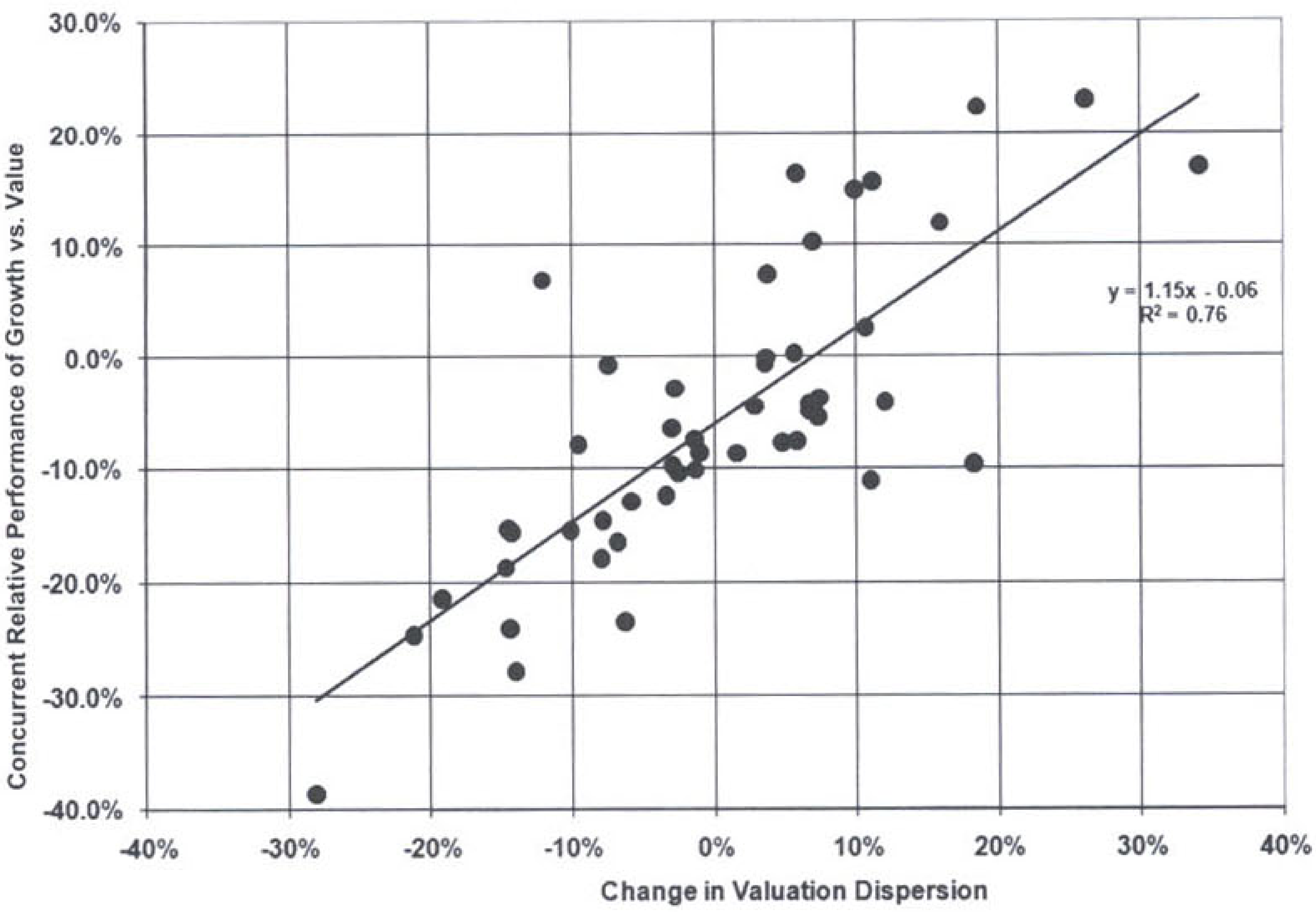
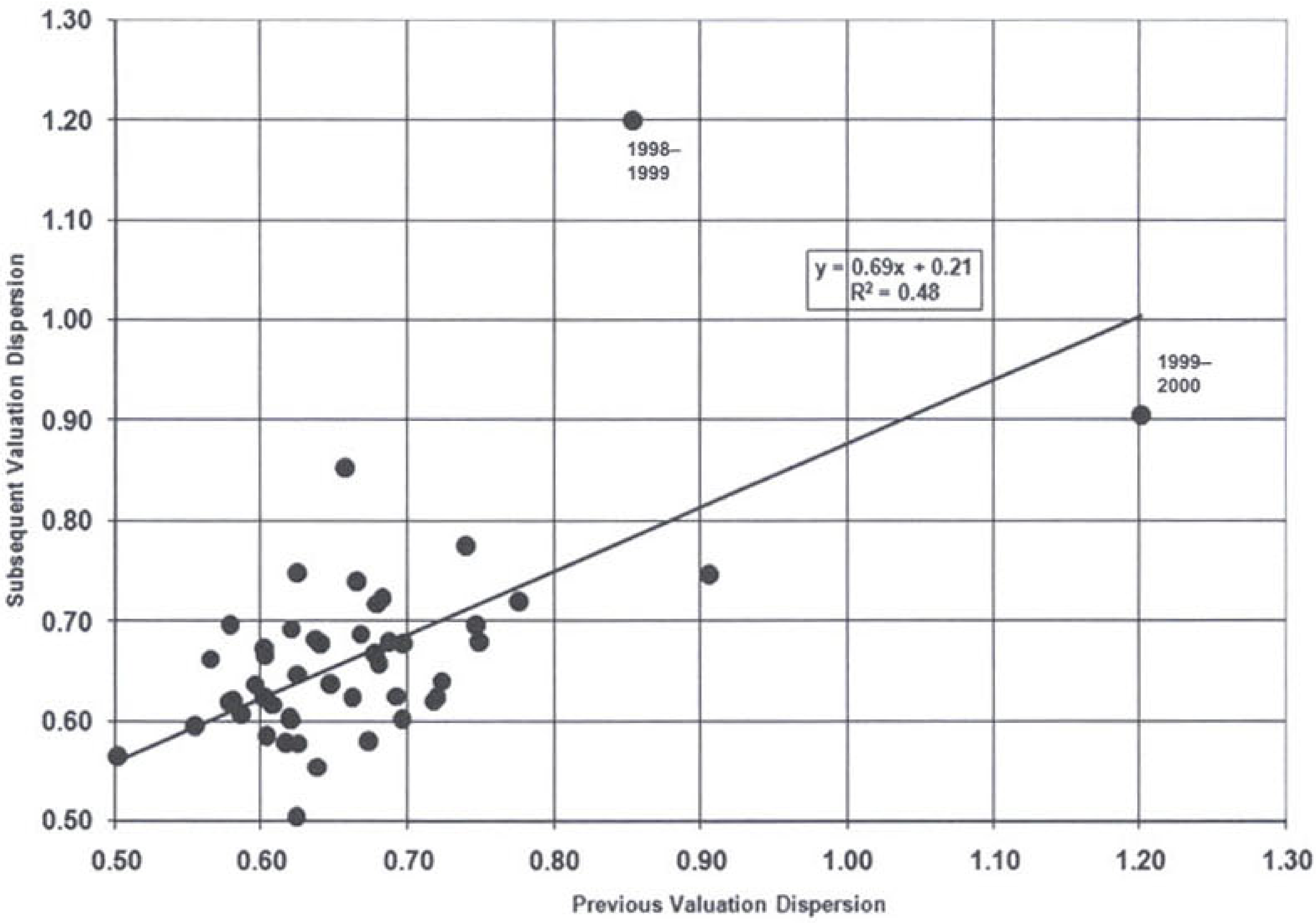


EXHIBIT 7
Serial Correlation and Mean Reversion in Valuation Dispersion



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

component in Valuation Dispersion changes. If the coefficient for ($GVD_{t-1} - GVD_{t-2}$) is insignificant, we have a simple AR(1) serial correlation of the Valuation Dispersion; if it is significantly positive, we have a tendency for growth and value stocks to exhibit trends—something that many practitioners believe to be true.

Recall that changes in Valuation Dispersion and the relative performance of growth stocks versus value stocks exhibits an 87% correlation. Because the comparative Growth–Value Relative Returns contribute to that change in dispersion, a negative coefficient in prior Growth–Value Relative Returns ($GVRR_{t-1}$) suggests that some of the mean reversion in Valuation Dispersion may be a consequence of the market correctly discerning the comparative growth opportunities for both the growth and the value companies.

The data in Exhibit 8 suggest that some modest serial correlation in Valuation Dispersion exists, meaning that when growth stocks outperform value stocks, or vice versa, there is a moderate tendency for this to repeat in the next year. However, this tendency is mild and lacks statistical significance. The coefficient on the "trend variable," the previous change in GVD, is partly offset by the negative coefficient in the prior $GVRR_{t-1}$; these coefficients are not remotely significant. So, at best, these results mildly support the conventional view that 1) growth-versus-value returns may have a mild tendency to persist, and 2) the relative business growth rates of both the growth and the value portfolios may be slightly predicted by the relative valuation differential.

Panel C of Exhibit 8 suggests that Valuation Dispersion may be a useful predictor for the performance of growth stocks, measured relative to value stocks, even over a short one-year span. Results are significant, although not highly so. We find that the Valuation Dispersion (GVD_{t-1}) has historically been *predictive* of the subsequent one-year Growth versus Value Relative Return ($GVRR_t$), with a t-statistic over the past 51 years of 2.1. This is above and beyond the already well-examined "value anomaly" in which the average GVRR is negative. Exploring the linkage is presumably worthy of further study.

This strong one-year correlation invites an interesting question: Does Valuation Dispersion predict longer-horizon relative opportunities in growth and value stocks? Exhibit 9 approaches this analysis from a different, rather provocative, angle. Suppose we focus on the *difference*

EXHIBIT 8
Forecasting Valuation Dispersion, 1957–2007

	Variable	Coefficient	Std Err	*p*-Value
Panel A. Persistence and Mean Reversion in Growth–Value Dispersion Dependent Variable: GVD_t				
Constant	c	0.24	0.08	0.004
Prior Valuation Dispersion	$b_1 \times GVD_{t-1}$	0.64	0.12	0.000
Prior Change in GVD	$b_2 \times (GVD_{t-1} - GVD_{t-2})$	0.21	0.11	0.070
Panel B. Persistence and Mean Reversion in Growth–Value Dispersion Dependent Variable: GVD_t				
Constant	c	0.30	0.08	0.001
Prior Valuation Dispersion	$b_1 \times GVD_{t-1}$	0.55	0.12	0.000
Prior Change in GVD	$b_2 \times (GVD_{t-1} - GVD_{t-2})$	0.09	0.17	0.615
Prior G–V Return	$b_3 \times GVRR_{t-1}$	0.13	0.15	0.406
Panel C. Does Growth–Value Dispersion Predict Growth–Value Relative Returns? Dependent Variable: $GVRR_t$				
Constant	c	0.16	0.11	0.159
Prior G–V Relative Return	$b_1 \times GVRR_{t-1}$	–0.16	0.15	0.278
Prior Valuation Dispersion	$b_1 \times GVD_{t-1}$	–0.35	0.17	0.050

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

between Cap Weight and Company Size Weight (our Relative Valuation measure), *summed across all companies that subsequently prove to have been overvalued.*

If this measure is positive, which it almost always is, this suggests that a Cap Weighted index loads up on the overvalued companies (companies that ultimately are discovered to have a negative Clairvoyant Error from the perspective of our clairvoyant investor) when compared with our valuation-indifferent Company Size Weighted portfolio. It's a bit of a shock that this difference is relentlessly positive, almost regardless of whether we are using a clairvoyance span of 10 years, 20 years, or the full span of 51 years ending in 2007. Cap Weighting, at least on a historical basis, reliably puts more of our money in overvalued stocks than a Company Size Weighted portfolio.

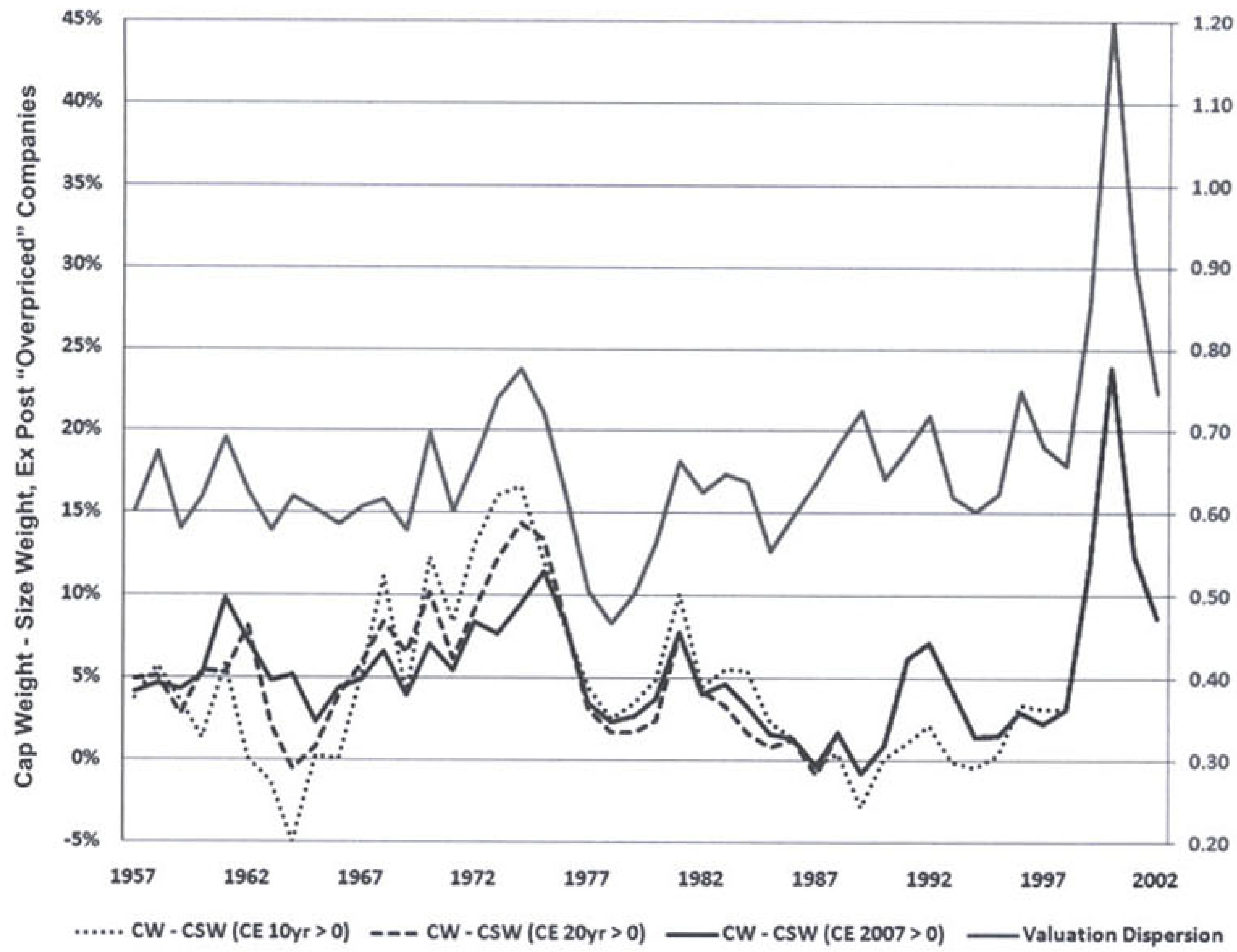
Given the evidence we have reviewed, it is unsurprising that a Cap Weighted portfolio puts the majority of money in stocks that subsequently prove to have been overvalued,[14] that is, in companies for which the Clairvoyant Error is negative. Nor is it surprising that the valuation-indifferent Company Size Weighted portfolio is less susceptible to this bias.

Suppose we go one step further, comparing Valuation Dispersion with this ex post assessment of Cap Weighting overreliance on overvalued companies. In this case, we are asking if the Cap Weighted portfolio's historical overreliance on overvalued companies increases when the market is paying a larger premium for growth stocks relative to value stocks. The data strongly support this hypothesis. The most interesting finding on this graph is that the overreliance on overvalued companies in a Cap Weighted portfolio, relative to a valuation-indifferent Company Size Weighted portfolio, is largest when the market is paying a large premium for growth stocks relative to value stocks, and smallest when the market is paying a small premium for growth, with unusual statistical significance.

The results presented in Exhibit 9 supports two ideas. First, the widening and narrowing of the Growth–Value Dispersion measure is linked to the extent to which growth stocks are likely to underperform. It would appear that there is a historical link between Valuation Dispersion and the subsequent relative performance of growth and value stocks. Second, this result supports the idea that changes in Valuation Dispersion are not as much a reflection of changing relative growth prospects between growth and value stocks as they are a reflection of the market having more or less confidence in its ability to forecast the future. In effect, this

EXHIBIT 9

Valuation Dispersion and Clairvoyant Error, 1957–2002



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

gap may serve as a simple measure of the hubris that the market exhibits in discriminating between growth and value stocks.

CONCLUSION

The intertemporal results on Clairvoyant Value reveal the time variation in the market's capacity for estimating future growth. Although the market does a marvelous job at discerning growth opportunities, it pays far more for the perceived growth than a clairvoyant investor would have been willing to pay, and the premium varies over time. The dispersion of valuation multiples justified by clairvoyance is almost always below the actual dispersion observed in the market. Furthermore, the market subsequently rewards growth when Valuation Dispersion is unusually narrow and rewards value when Valuation Dispersion is wide, with good statistical significance. Although this result is inconsistent with an efficient market, it will not surprise many practitioners.

An analysis of the risk–return characteristics of a Clairvoyant Value Weighted portfolio compared to a Company Size Weighted Portfolio and a Cap Weighted Portfolio also shows that clairvoyance is valuable. It would be shocking if this were not true! The analysis also shows that the *performance* of the Company Size Weighted portfolio is closer to that of the Clairvoyant Value Weighted portfolio than that of the Cap Weighted portfolio, even if its *holdings* are not.

Finally, we found that the so-called growth–value cycle has, at least historically, largely been a function of changes in the dispersion of valuation multiples. Changes in forward-looking growth rates played a very limited role. This, in turn, means that investors can profit by focusing on growth stocks when the dispersion of valuation multiples is exceptionally narrow, and by focusing on value stocks when the dispersion of valuation multiples is wider than usual.

ENDNOTES

[1]Please refer to Arnott, Li, and Sherrerd [2009] for a review of the literature on value investing, or intrinsic value.

[2]For those unfamiliar with our previous articles, a company's financial scale in the economy differs markedly from its size in the stock market— its market capitalization. Our fundamental economic size measure 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, 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. For the nuances of calculating a Fundamental Index portfolio, please see Arnott, Hsu, and Moore [2005]. Research Affiliates, LLC, owns the copyright on many variants of "Fundamental Index®" and has patents pending on the methodology. We respectfully request the readers to respect these copyrights and pending patents.

[3]The CAPM discount rate allows us to risk-adjust our return expectations for each stock in accordance with the non-diversifiable risk of that stock. We use the classic form of the CAPM model, which is $r_0 + \beta(r_m - r_0)$, where r_0 is the risk-free interest rate, β is the beta coefficient, or the sensitivity of the stock returns to the market returns, and r_m is the return on the market. We use data starting from 60 months before the clairvoyant estimate point and the entire clairvoyant span (from the clairvoyant estimate point to the cash distribution date) for the regression. The estimation is done over each cash distribution's corresponding future clairvoyant span. An additional 60 months data is used to guarantee statistical significance of the regression model, especially for the cash flows close to the clairvoyant estimate date.

[4]Harry Markowitz likes to view this from the opposite perspective: Company Size Weight relative to Cap Weight tells us which stocks give us more—or less—sales, profits, net assets (book value), and dividends for each dollar we invest. Accordingly, he prefers to term our Company Size Weighted portfolio an "efficiency-weighted portfolio." See his foreword to *The Fundamental Index: A Better Way to Invest* by Arnott, Hsu, and West [2008].

[5]As detailed in Arnott, Li, and Sherrerd [2009], our construction differs from the classic Fama–French formulation, in which growth stocks are defined as the 30% of the market with the highest valuation multiple and value stocks are defined as the 30% of the market with the lowest valuation multiple, all capitalization weighted and using a single valuation metric.

[6]Siegel [1995] found evidence of time-period sensitivity in his analysis of the performance of the Nifty Fifty stocks over time. He also found evidence that the premium for growth varies over time. However, our results do not support his conclusion that—at least collectively—the Nifty Fifty stocks were not overvalued.

[7]Readers should be aware that this graph reflects the full clairvoyance span ending 2007. The shared end date might be an atypical end point, but the rolling 10-year and 20-year clairvoyance spans delivered similar results.

[8]Note that Cap Weight, Relative Valuation, and Company Size Weight are interrelated (e.g., Relative Valuation equals Cap Weight minus Company Size Weight). Accordingly, a zero correlation between the Clairvoyant Error and both the Cap Weight and Relative Valuation, as should be the case in an efficient market, should require a positive correlation between Clairvoyant Error and Company Size Weight, except in the trivial cases in which Relative Valuation and Clairvoyant Error have either zero or infinite standard deviation. Reciprocally, if Clairvoyant Error is uncorrelated with Company Size Weight—that is, if error in today's price is uncorrelated with company size—then the correlation between Clairvoyant Error and both Cap Weight and Relative Valuation should be negative. A market that punishes stocks with a high Cap Weight or a high Relative Valuation, unless those high metrics proxy for a reduction in some hidden risk, is not an efficient market, but is consonant with countless empirical tests, including the seminal works of Fama and French [1992, 2004].

[9]We use the word "trend" advisedly because the slope is not statistically significant.

[10]This situation has not changed in the market crash of 2008–2009; indeed, the Valuation Dispersion in early 2009 is wider than any time since the peak of the tech market in 2000.

[11]This is true, at least covering the span over which financial metrics of company size are readily available, and very likely true relative to earlier spans as well.

[12]Specifically, the net present value of future cash flows from both growth stocks and value stocks, with an appropriately risk-adjusted discount rate, should match the starting price, on average, for the full growth–value spectrum.

[13]This corresponds to the P/E ratio for the average growth stock rising from an already high 237% of the P/E for the average value stock to 308% and settling back to 248%, all in a 24-month span. Most of us remember this peculiar market very well!

[14]Not shown here, the average percentage of the Cap Weighted portfolio that is invested in stocks that subsequent clairvoyance reveals to have been overvalued is 60%–62% of the portfolio, more or less regardless of clairvoyance span (i.e., over the next 10 years, 20 years, and through 2007), with a standard error of *less than 1%!*

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