ACADIAN

Investor Sentiment for Value and Growth

December 2024

- Vanguard launched the first value- and growth-labeled index funds in 1992, soon after Russell created its style indexes. While value index funds initially attracted more assets, growth index funds have consistently held a market share advantage. Flows into and out of these funds over the past 30 years can be used to gauge investor beliefs about value and growth returns.
- Estimates suggest that in the late 1990s, investors believed growth index funds would deliver returns up to 75 basis points higher per year than value funds, with that figure standing at 30 basis points in March 2024.
- Investor beliefs about future returns have not been useful predictors of future returns. When growth returns have been relatively higher, subsequent returns on Russell 1000 growth stocks have been relatively lower. Investor allocations to Vanguard growth and value index funds since their 1992 inception show a modest wealth loss of 8% over the period from 1992 through 2024.

The Origins of Index Investing

The first Vanguard index fund was launched in August 1976 with the goal of closely tracking the return of the S&P 500 index at the lowest possible cost.[1] The new product had a natural justification rooted in the academic theory of market efficiency, developed and tested in the 1960s and 1970s. If the market is efficient, and beating the market by picking individual stocks is therefore impossible to do consistently, why not simply hold the overall market at the lowest cost? In 1978, the late Michael Jensen said, "I believe there is no other proposition in economics with more solid evidence supporting it than the Efficient Market Hypothesis." Studies of U.S. and international returns, including Jensen's own work on mutual funds, found that stock returns were unpredictable and concluded that attempts to beat the market were not worth the associated transaction costs and management fees.

The academic pendulum swung back as evidence of return predictability accumulated. In the leading examples, small stocks outperformed large ones, cheap stocks—defined by their prices relative to earnings, book value, or prices five years prior—outperformed expensive ones, and stocks with high one-year returns continued to outperform those with low one-year returns. Gene Fama and Ken French summarized a decade of research from the 1980s in two papers published in 1992 and 1993, proposing two factors: one capturing the high returns of small stocks and the other capturing the high returns of value stocks. By labeling these as "factors" and not "mispricings," and describing stocks as "value" and "growth" instead of cheap and expensive, Fama and French focused on the possibility that market efficiency was alive and well. Small stocks outperformed because they were riskier than their larger counterparts, and value stocks were not cheap but rather riskier than stocks with better prospects for fundamental growth. Momentum and other more dynamic strategies were harder to link to risk and left out of the original Fama-French synthesis.

The academic research of the late 1970s and 1980s had the side effect of making the common practices of stock picking into systematic, or rules-based, portfolio choice. Discretionary investment strategies that advocate buying stocks with low multiples to earnings and book value emerged long before Fama and French, dating at least to *Security Analysis* by Benjamin Graham and David Dodd in 1934. Growth investing has also had longstanding appeal. Philip Fisher popularized the strategy with *Common Stocks and Uncommon Profits* in 1958.

RUSSELL VALUE AND GROWTH INDEXES

With this backdrop, Russell invented passive style *indexes* in 1987. Soon after, Vanguard invented passive style *index funds* in 1992. Barnes (2021) summarizes Russell's rationales:

Benchmarking. As a consultant to pensions, endowments, and foundations, Russell's core rationale was to "help its clients identify successful active managers." In so doing, Russell encouraged clients to compare their managers' performance with funds that had similar tilts toward value or growth stocks. Value and growth stocks tended to move in separate packs, meaning that a manager's returns might be attributed to a bias towards value or growth, not the stock-picking skill that Russell's clients expected.

[1] Wells Fargo introduced the world's first index fund five years earlier for its institutional clients.

Russell also anticipated the possibility that these indexes would become investment products, citing three more rationales:

Strategic preference. Had Russell cared only about the alignment of its index development with insights from academic research, it might have created only an investable value index, and not a growth index, to help investors to take advantage of an "expected long-run outperformance of value stocks."

Tactical preference. But instead, by offering both value and growth, Russell allowed investors to speculate on a "view that one style will outperform over a certain period." Although the value and growth funds' labels suggested that both had independent appeal, they were designed so no investor would rationally buy both simultaneously. An equal-weighted portfolio of Russell value and growth indexes delivered *exactly* the returns of a fully passive Russell 1000 market portfolio, albeit with a higher overall expense ratio and a higher tax bill.[2]

Portfolio completion. Russell's final rationale was risk management. If investors found it easier to locate active managers focused on value stocks than on growth stocks, for example, they could use Vanguard's growth index fund to "fill the hole in their portfolio" thereby taking a neutral view overall on the relative performance of growth and value.

VANGUARD VALUE AND GROWTH INDEX FUNDS

Five years later, in 1992, Vanguard followed Russell's lead, launching a *pair* of style index funds that allowed investors to express a strategic or tactical preference for one or the other. According to Rekenthaler (2022), Bogle initially "bemoaned his progeny. He came to believe that they led to poor investor choices by tempting customers into buying the fund that had the higher recent returns."[3]

Continued on page 3 ➔

[2] See "Russell US Equity Indexes: Construction and Methodology," July 2024. See pages 21-25 for the index definition.

[3] For evidence on the response of investor flows to past performance, see Frazzini and Lamont (2008), Ben-David et al. (2022) and Dannhauser and Pontiff (2024).

Table 1: Top Index Funds in March 2024 by Total Net Assets

Eight of the top 40 domestic index funds tracked by the Center for Research on Security Prices by total net assets are value-labeled or growth-labeled index funds.

	ETF	Investor Class	Ticker	Inception	Expense Ratio	TNA ($B)
Vanguard Total Stock Market Index Fund	N	Institutional	VSMPX	Apr-15	0.020%	656.2
SPDR S&P 500 ETF Trust	Y	Institutional	SPY	Jan-93	0.040%	536.1
Fidelity 500 Index Fund	N	Retail	FXAIX	May-11	0.020%	534.0
Vanguard 500 Index Fund	N	Retail	VFIAX	Nov-00	0.040%	505.2
iShares Core S&P 500 ETF	Y	Institutional	IVV	May-00	0.030%	454.6
Vanguard 500 Index Fund	Y	Institutional	VOO	Sep-10	0.030%	435.9
Vanguard Total Stock Market Index Fund	Y	Institutional	VTI	May-01	0.030%	389.8
Vanguard Total Stock Market Index Fund	N	Retail	VTSAX	Nov-00	0.040%	373.3
Invesco QQQ Trust, Series 1	Y	Institutional	QQQ	Mar-99	0.200%	259.3
Vanguard Institutional Index Fund	N	Institutional	VIIIX	Jul-97	0.020%	168.8
Vanguard 500 Index Fund	N	Institutional	VFFSX	Jun-16	0.010%	168.5
Vanguard Institutional Index Fund	N	Institutional	VINIX	Jan-90	0.040%	121.5
Vanguard Growth Index Fund	Y	Institutional	VUG	Jan-04	0.040%	118.6
Vanguard Value Index Fund	Y	Institutional	VTV	Jan-04	0.040%	116.2
Schwab S&P 500 Index Fund	N	Retail	SWPPX	May-97	0.020%	91.4
Fidelity Total Market Index Fund	N	Retail	FSKAX	Sep-11	0.010%	91.0
iShares Russell 1000 Growth ETF	Y	Institutional	IWF	May-00	0.190%	89.2
Vanguard Total Stock Market Index Fund	N	Institutional	VITSX	Jul-97	0.030%	88.8
iShares Core S&P Small-Cap ETF	Y	Institutional	IJR	May-00	0.060%	80.3
Vanguard Growth Index Fund	N	Retail	VIGAX	Nov-00	0.050%	75.4
Vanguard Total Stock Market Index Fund	N	Institutional	VSTSX	Jun-16	0.010%	70.0
Fidelity Series Total Market Index Fund	N	Institutional	FCFMX	Apr-19	0.000%	68.7
iShares Russell 2000 ETF	Y	Institutional	IWM	May-00	0.190%	65.5
Vanguard Mid-Cap Index Fund	Y	Institutional	VO	Jan-04	0.040%	64.6
Vanguard Mid-Cap Index Fund	N	Retail	VIMAX	Nov-01	0.050%	61.1
Vanguard Small-Cap Index Fund	Y	Institutional	VB	Jan-04	0.050%	56.6
iShares Russell 1000 Value ETF	Y	Institutional	IWD	May-00	0.190%	56.3
Vanguard Small-Cap Index Fund	N	Retail	VSMAX	Nov-00	0.050%	55.2
Invesco S&P 500 Equal Weight ETF	Y	Institutional	RSP	Apr-03	0.200%	54.6
iShares Core S&P Total US Stock Market ETF	Y	Institutional	ITOT	Jan-04	0.030%	54.3
iShares S&P 500 Growth ETF	Y	Institutional	IVW	May-00	0.180%	44.2
iShares MSCI USA Quality Factor ETF	Y	Institutional	QUAL	Jul-13	0.150%	42.8
Schwab US Large-Cap ETF	Y	Institutional	SCHX	Nov-09	0.030%	40.2
Fidelity Extended Market Index Fund	N	Retail	FSMAX	Sep-11	0.030%	39.8
Vanguard Value Index Fund	N	Retail	VVIAX	Nov-00	0.050%	36.4
iShares Russell 1000 ETF	Y	Institutional	IWB	May-00	0.150%	35.4
Fidelity Mid Cap Index Fund	N	Retail	FSMDX	Sep-11	0.020%	34.9
Vanguard Large-Cap Index Fund	Y	Institutional	VV	Jan-04	0.040%	34.5
SPDR Dow Jones Industrial Average ETF Trust	Y	Institutional	DIA	Jan-98	0.160%	34.4
iShares S&P 500 Value ETF	Y	Institutional	IVE	May-00	0.180%	33.7

Source: Acadian based on data from CRSP® (Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved. Crsp.uchicago.edu.) For illustrative purposes only.

The Market for Index Funds

From these beginnings in 1992, value- and growth-labeled index funds have grown to become some of the largest in the world. Of the top 40 domestic index funds shown in Table 1, which include both traditional mutual funds and exchange-traded funds (ETFs), nine or 23% by count are growth or value funds. These nine taken together account for $823.3 billion in net assets or 13.1% of the total assets under management for these 40 funds. Net assets for all value- and growth-labeled index funds tracked by the Center for Research on Security Prices (CRSP) now total nearly $1.6 trillion.

The provision of style index funds is a concentrated but competitive business, perhaps not surprising given the economies of scale. Eight fund complexes—Charles Schwab, Dimensional Fund Advisors, Fidelity Investments, Invesco QQQ, State Street SPDRs, TIAA, Vanguard, and BlackRock iShares—account for 97% of the assets under management, as shown in Figure 1-left. Vanguard, the dominant player across all indexed mutual funds, holds a 40% share. BlackRock is second, with its iShares brand focused on ETFs. Most of the value- and growth-labeled indexed assets are now in ETFs, with only 25% in traditional mutual funds, which are disadvantaged in terms of taxes and liquidity. Despite this concentration, the largest index funds by total net assets (TNA) charge ultralow expense ratios: Figure 1-right shows that 94% of assets have an expense ratio of less than 25 basis points per year, with many funds below five basis points. The analysis that follows narrows the focus to these eight large fund complexes, excluding an eclectic set of mostly higher-fee index funds that are numerous but have very little market share. Appendix 1 provides a description of this sample and the rationale for focusing on the market leaders.

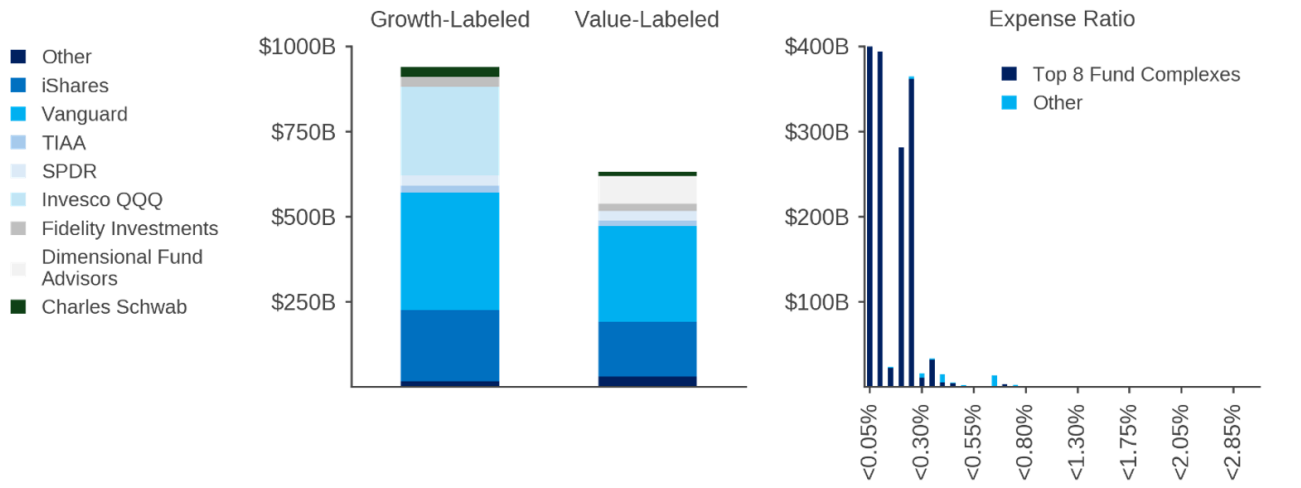
A significant 60% of the total net assets in the sample now reside in growth, rather than value, index funds. This was not the case when these style funds were launched in 1992. Given Fama and French's seminal work in 1992 and 1993, it may come as no surprise that the growth share of total net assets was less than 20% in the third quarter of 1996, as shown in Figure 2. However, this imbalance was short-lived. Growth surged to a 78% share at the peak of the Internet-fueled bull market in growth stocks that followed and never looked back. Since then, the growth-labeled share has only briefly dipped below 50% during a two-year period from 2016 through the end of 2017.[4] Cumulative flows into value and growth funds, also shown in Figure 2, tell a similar story.

Figure 1: Style Index Funds — Total Net Assets by Fund Complex and Expense Ratio

As of March 2024

Eight fund complexes have a combined 97% share of the net assets in value- and growth-labeled domestic index funds tracked by CRSP ...

... and they have expense ratios that mostly lie below 25bps. Other value- and growth-labeled funds have a long tail of expense ratios as high as 300bps albeit with no significant assets.



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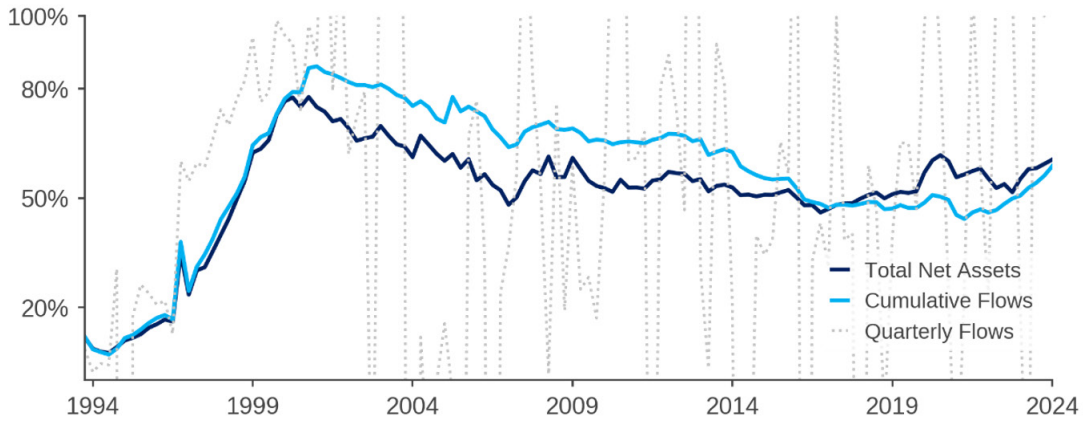
[4] We estimate quarterly flows by calculating the difference between a fund's total net assets at quarter end less hypothetical assets calculated assuming that there had been no inflows or outflows during the quarter (i.e., starting net assets multiplied by the fund's reported return). Figure 2 shows that individual quarterly flows are volatile, with the share of growth-labeled index fund flows oscillating between less than 0% and more than 100% of total net flows. Accumulating these flows over time smooths out the fluctuations.

Figure 2: Market Share of Growth-Labeled Index Funds—Total Net Assets and Flows

After a slow start, growth-labeled index funds have consistently garnered more net assets than value-labeled index funds.



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Inferring Investor Beliefs from Their Investment Choices

In recent years, the financial economics profession has adopted methods from industrial organization to study how consumers choose among financial products, including mortgages and index funds. Like markets for physical goods, such as new cars, the financial product market clears when supply equals demand. As a result, it's no great leap to extend the same statistical tools that researchers apply to estimate the dollar value that New England car buyers place on heated seats to reveal what investors believe about relative rates of return as they allocate their portfolios between value- and growth-labeled index funds.[5]

Our analysis starts with the simple premise that each investor weighs a fund's attributes against its expense ratio, which is measured in terms of annual foregone return. To infer aggregate investor beliefs about the expected returns of value- versus growth-labeled index funds, we run the following regression, where each observation represents a given style fund i at time t:

$$\log(Share)_{it} = -\alpha ExpenseRatio_{it} + \beta_{vt} + (\beta_{gt} - \beta_{vt}) IsAGrowthLabeledIndexFund_i + \cdots$$

While Appendix 2 provides technical details and methodological caveats for readers interested in a deeper dive, we can express the four main elements of the expression in intuitive terms:

1. The left side measures the fund's share of either total net assets or cumulative flows among style funds at each point in time.
2. The first term on the right side is the annual expense ratio expressed in basis points of initial investment.[6]
3. The coefficients β_{vt} and β_{gt}, which are estimated via the regression, measure investor preferences for value and growth funds, respectively.
4. "+ …" represents control variables included in our preferred specification, including four past quarterly returns that may influence return-chasing or rebalancing flows, fixed preferences for the eight fund complexes, and—since older funds typically have more net assets than newer ones—each fund's inception date.

This regression produces a time series of $(\beta_{gt} - \beta_{vt})$ that reveals the relative preference for growth-labeled index funds. Dividing by $(\beta_{gt} - \beta_{vt})$ converts this preference into basis points of annual return.

Figure 3 presents the results for the traditional mutual fund subsample, analyzed with cumulative flows, and shows the greatest variation in estimates of investor beliefs for growth-labeled index funds. The estimated beliefs about growth-labeled index fund returns peaked at 75 basis points higher than value-labeled funds in the late 1990s. By the first quarter of 2024, investor beliefs had settled at 30 basis points, perhaps reflecting the impact of artificial intelligence driving interest in growth stocks.

[5] Some examples are Buchak et al. (2018), Xiao (2020), An et al. (2021), Egan et al. (2021), Benetton and Compiani (2024), Baker et al. (2024). This analysis is a simplified version of Baker et al. (2023).

[6] We add the negative sign to the coefficient simply to emphasize that investors dislike the drag from (positive) expenses.

Figure 3: Investor Preferences for Value and Growth-Labeled Index Funds

Preference for growth funds over value funds versus historical average, measured in basis points of return per year

Investor preferences for growth-labeled index funds peaked in the late 1990s and stand at 30 basis points in 2024.

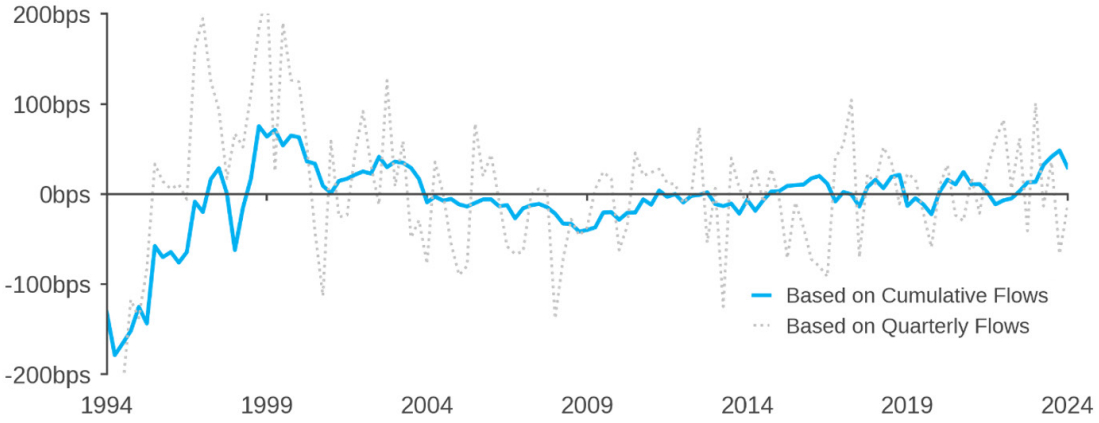

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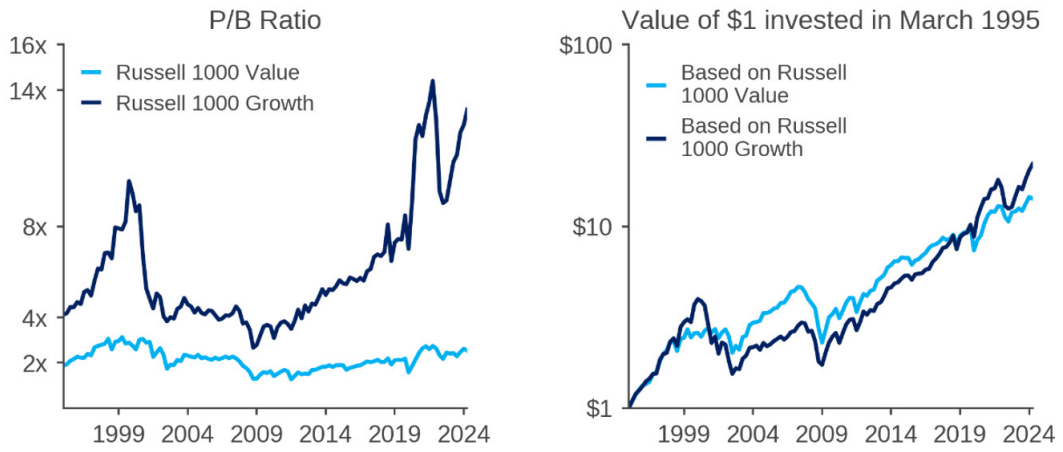
Figure 4: Relative Valuations and Returns—Value Versus Growth Indexes

Russell 1000 growth stocks have traded at much higher ratios of book value since the onset of Covid in 2020 ...

... and they have variably outperformed and underperformed Russell 1000 value stocks from March 1994 - March 2024.



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Four Discussion Points

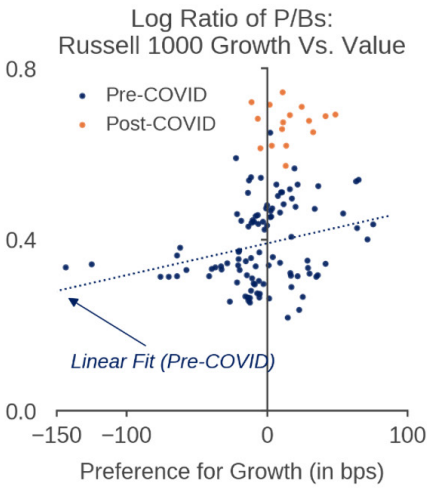
1. RATIONAL EXPECTATIONS OR SENTIMENT?

In a sense, Figure 3 treats the market for index funds as a prediction market. While investor beliefs are not directly surveyed, the regression infers the average beliefs of market participants indirectly from their behavior. Based on our 30 years of results, we see a mixed picture of the accuracy of those beliefs about future style returns.

Figure 4 presents two variables that we use to gauge the nature of investor expectations. The first, in Figure 4-left, is the relative market-to-book ratio. Since COVID, the price-to-book ratios of growth stocks have been stratospheric, as firms with limited assets but strong earnings have driven the Russell 1000 Growth Index higher. The second variable, in Figure 4-right, is the relative returns of the Russell value- and growth-labeled indexes. Both figures highlight the booms and busts in the relative performance of growth stocks over the past thirty years.

Figure 5: Valuations and Future Returns as Functions of Preferences for Growth Funds

Greater investor preference for growth-labeled index funds is associated with higher valuation ratios for growth stocks ...



... and is correlated with lower future returns on growth stocks.

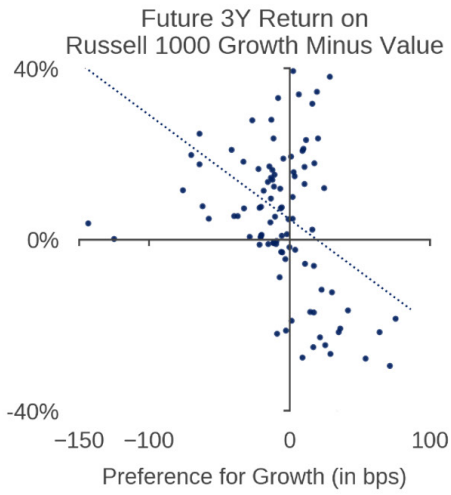


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Figure 5 correlates these two measures with investors' inferred *ex ante* expectations. Are investor beliefs about growth funds more positive when growth stocks are a bargain or when they are expensive relative to book value? Do growth stocks subsequently perform well or poorly when investors favor growth funds to a greater degree?

Figure 5-left shows that investors express the greatest preference for growth funds when growth stocks' prices are relatively *high* in relation to book or earnings. Figure 5-right shows that when investors favor growth-labeled index funds their subsequent three-year returns are *lower* than those on value-labeled funds. The poor predictive accuracy of investor preferences suggests that "sentiment for growth" is a more fitting description of Figure 3 than "reliable predictions for growth." While these results are not particularly strong statistically—with correlations ranging from 26% to 49% in absolute value—there is no sign in Figure 5-right of the upward slope that we would expect from a reliable prediction.

2. WHY DO ANOMALIES PERSIST?

An open question in financial economics is whether anomalies, once discovered, persist. The logic goes like this: Rational investors might see a newly discovered anomaly as an opportunity, then trade aggressively, and in so doing drive prices to converge and thereby eliminate the anomaly on a go-forward basis. The anomaly is said to be "arbitraged away" in a nod to the textbook definition of arbitrage that eliminates pricing differentials among identical securities. Securities that were once under- or over-valued become correctly priced as investors pursue strategies to capitalize on what was once considered anomalous mispricing.[7]

Some of the facts in our study of value and growth index funds are aligned with this logic of fleeting anomalies. Back in 1992, Fama and French observed that value stocks delivered anomalously higher average returns than growth stocks over the preceding 30 years. Russell and Vanguard responded by offering investors a low-cost way to capitalize on this evidence with the introduction of the value index fund. By the mid-1990s, investors had done what might be expected—they favored value.

But not *all* the facts are aligned. The allure of growth remained strong, whether in individual stocks with rapid growth in revenue or funds of stocks labeled as "growth." Since the late 1990s, Figure 2 shows that investors have almost always favored growth. If growth has fared relatively better in the last 30 years than in the previous 30, it has not been because investors "arbitraged" the value anomaly. They have done the exact opposite, making growth more expensive and value cheaper. Quite possibly, the introduction of both value- and growth-labeled index funds has caused the prices of the underlying stocks to *diverge* instead of to *converge*.

[7] See Pontiff and McLean (2016).

3. HAVE THE STYLE INDEX FUNDS HELPED OR HARMED VANGUARD INVESTORS AS A GROUP?

Recall that Bogle "bemoaned his progeny. He came to believe that they led to poor investor choices by tempting customers into buying the fund that had the higher recent returns." How did Bogle's customers do? The structural tilt towards growth *on average* has been beneficial, at least in part because of the tailwind of investor flows into growth. The dynamic variation in enthusiasm for growth *over time* has been less beneficial, illustrated by the relationships in Figure 5-right. Relatively more positive beliefs about growth and market shares of growth index funds have not been rewarded with relatively higher growth index fund returns. This wealth loss has been modest. Appendix 3 examines the returns of the original 1992 Vanguard index funds in isolation. Investors ended up with 8% less wealth in 2024 than they would have otherwise, had all their flows into growth and value stocks been invested in a constant proportion through time, starting in 1992. This is a relatively small 29 basis points per year. Perhaps Vanguard investors, and index fund investors in general, are less prone to sentimental shifts across value and growth.

4. A DIFFERENT TAKE: WHO IS MORE SENTIMENTAL, VANGUARD'S VALUE INVESTORS OR ITS GROWTH INVESTORS?

Considering Vanguard's style index fund investors to be a homogenous group is partly missing the point. Recall that Vanguard adopted the Russell style indexes, which were constructed so that no rational investor would hold both at the same time: It is always more efficient to aggregate overlapping holdings in Russell 1000 Growth and Value into a single position in the overall Russell 1000.

So, it might be natural to view these investors as two distinct groups, allowing us to ask a different question: Have their flows, taken separately, been timed well over the period from 1992 through 2024? The short answer is that neither group has done particularly well, but growth investors have fared worse by this yardstick. Appendix 3 provides details. Growth investors as a group lost 156 basis points per year in poorly timed flows, adding more to their positions at relatively high valuations and adding less or subtracting from their positions at relatively low valuations. Value investors as a group also had poor timing, albeit losing only 82 basis points per year.

Conclusion

Vanguard launched a pair of index funds in 1992, giving us more than 30 years of data to examine investor beliefs about the returns to value and growth. After an initial market share advantage, investors have reliably preferred growth to value, measured either by the share of assets under management or cumulative flows. Our estimates of investor beliefs about the relative returns to growth peak at 75 basis points per annum in 1999 and now stand at 30 basis points. Those past beliefs have not been predictive of future returns, however. Analysis of Vanguard's products from 1992 to the present shows that value and growth index fund investors, taken together, suffered a modest wealth loss of 8% through their timing of value and growth. Among them, growth investors are more prone to sentiment, with greater inflows at peak valuations.

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Appendix 1: Data and Sample Selection

The data come from the Mutual Fund Database from the Center for Research on Security Prices (CRSP), which provides comprehensive information on mutual funds, including returns, fund characteristics, and assets under management.

SAMPLE

The initial sample is restricted to mutual funds that meet the following criteria:

- **Fund Type**: The sample includes both exchange-traded funds (ETFs) and traditional mutual funds.
- **Investment Strategy**: The funds are limited to domestic U.S. funds that are either pure-index or index-based, as indicated by the CRSP classifications.
- **Asset Management Firms**: The sample is further restricted to mutual funds managed by the following eight fund complexes: Dimensional Fund Advisors, Fidelity Investments, iShares (the ETF arm of BlackRock), QQQ (which tracks the Nasdaq-100 Index and is managed by Invesco), Charles Schwab, SPDR (a brand of ETFs managed by State Street Global Advisors), and TIAA (with its focus on retirement services). Limiting the sample to these fund complexes ensures a degree of comparability across the value- and growth-labeled index funds studied in Figure 2 and Figure 3.

VARIABLE DEFINITIONS

The key independent variables used in the analysis are defined as follows:

- **Expense Ratio**: The annual expense ratio, as provided by the fund's disclosures, which reflects the operational costs incurred by investors.
- **Fund Style**: A categorical variable that identifies whether a fund's investment strategy aligns with "growth" or "value." This flag is generated based on the presence of the words "growth" or "value" in the fund's name. The sample is further narrowed to include only value- and growth-labeled index funds, allowing for a clean comparison between the two options.

The dependent variables are defined as follows:

- **Asset Under Management**: Total net assets (TNA) in millions of dollars, indicating the size of the fund.
- **Quarterly Flows**: Fund flows are estimated on a quarterly basis using the following formula:

$$Flow_t = TotalNetAssets_t - TotalNetAssets_{t-1}(1 + FundReturn_t)$$

- **Cumulative Quarterly Flow**: The cumulative quarterly flow is the sum of the quarterly flows from fund inception.

The control variables are defined as follows:

- **Fund Return**: Monthly net return (in percentage) reported by CRSP for each fund.
- **Fund Age**: The age of the fund in years, calculated as the difference between the current date and the fund's inception date.

The dependent variables are expressed as the log of their market share, where the "market" is alternately total net assets, cumulative flows, and quarterly flows.

- **Share of Total Net Assets**: For each fund *i*, the share of total net assets is computed relative to the sum of all funds' total net assets in a given quarter *t*. The share is calculated as:

$$\frac{TNA_{it}}{\sum_j TNA_{jt}}$$

- **Share of Cumulative Flows**: Estimated analogously.
- **Share of Quarterly Flows**: Estimated analogously.

In regressions used to infer expectations, the share variables are transformed by taking their logarithms.

Appendix 2: Methodology

This methodology mirrors Baker et al. (2024), who model investor choice between ESG and non-ESG funds using a discrete choice framework, adapted for value- and growth-labeled index funds. The goal is to estimate how much investors value these fund strategies on a relative basis.

FRAMEWORK FOR INVESTOR CHOICE

Each investor is assumed to select the fund that maximizes utility, which is influenced by fund characteristics such as expense ratio, past performance, and whether the fund is classified as *value* or *growth*. The indirect utility for investor *k* from choosing fund *i* at time *t* is given by:

$$u_{kit} = -\alpha ExpenseRatio_{it} + \beta_{vt} + (\beta_{gt} - \beta_{vt}) IsAGrowthLabeledIndexFund_i + \cdots$$

MARKET SHARE ESTIMATION

The probability that an investor chooses a particular fund is modeled using a multinomial logit framework, a valid assumption if the shocks in indirect utility are distributed T1EV (type 1 extreme value). The market share of a given fund *i* in its category (both value- and growth-labeled index funds) can then be derived from the relative utility of that fund compared to others in the same category. The log of the market share for fund *i* is given by:

$$\log(Share)_{it} = -\alpha ExpenseRatio_{it} + \beta_{vt} + (\beta_{gt} - \beta_{vt}) IsAGrowthLabeledIndexFund_i + \gamma_t \cdots$$

where the share is defined alternately as the share of total net assets, cumulative flows, and quarterly flows, and the "…" indicates a set of fund-level control variables, including the fund complex, the investor class, a flexible functional form for fund age, and fund and fund-time error terms.

- A positive coefficient $(\beta_{gt} - \beta_{vt})$ indicates that investors prefer growth funds, while a negative $(\beta_{gt} - \beta_{vt})$ indicates a preference for value funds.
- The coefficient α reflects how sensitive investors are to fees, measured in basis points per year, with a larger magnitude indicating higher sensitivity.
- In computing shares and taking logs, a time fixed effect, γ_t, is added, which prevents the separate identification of the level of β_{vt}.
- The ratio of $(\beta_{gt} - \beta_{vt})$ to α puts the preference for growth into units of basis points of return per year and eliminates the fund and time invariant constant *C*.

Tracking this ratio over time allows for an assessment of how investor preferences for value versus growth funds evolve.

A CAVEAT ON IDENTIFICATION

An important caveat is that expense ratios may be endogenous, meaning they could be correlated with unobserved factors that also influence investor demand. For instance, fund managers might raise fees if they anticipate high demand due to unobservable factors, such as reputation or expected performance. This creates the potential for reverse causality: high demand could lead to higher fees, biasing the estimate of how sensitive investors are to fees. Baker et al. (2023) address this by using the average fee of the fund complex, excluding the fund of interest, as an instrument for fees. They find similar results to a reduced-form estimation, suggesting that much of the variation in fees reflects exogenous cost differences rather than being demand driven.

Appendix 3: Analysis of Vanguard Funds Only

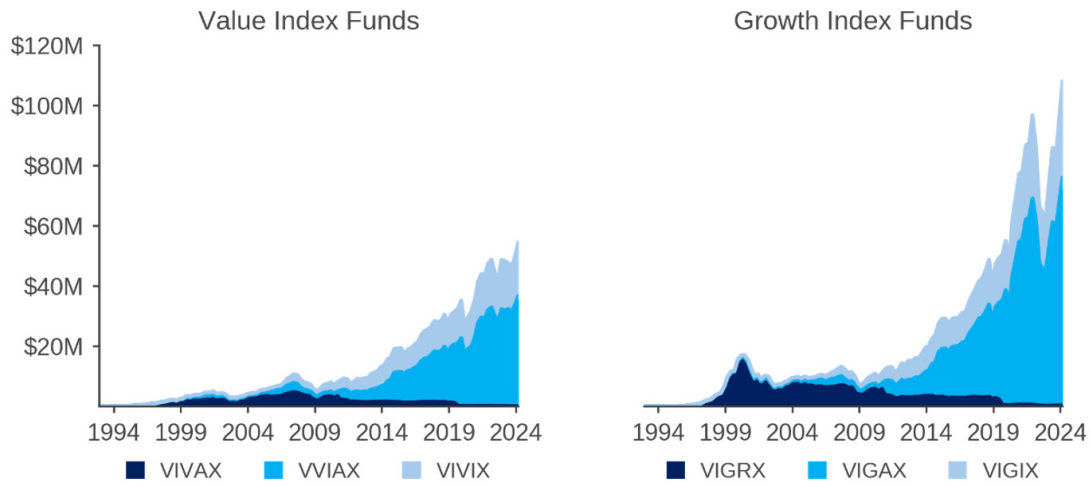
Vanguard has the longest history of matched value and growth index funds. Figure A-1 shows six tickers:

- **VIVAX** (Vanguard Value Index Fund Investor Shares)
  VVIAX (Vanguard Value Index Fund Admiral Shares)
  VIVIX (Vanguard Value Index Fund Institutional Shares)
  These funds seek to track the performance of a benchmark index that measures the investment return of large-capitalization value stocks in the U.S., with VVIAX and VIVIX having successively lower expense ratios and higher minimum required investments.
- **VIGRX** (Vanguard Growth Index Fund Investor Shares)
  VIGAX (Vanguard Growth Index Fund Admiral Shares)
  VIGIX (Vanguard Growth Index Fund Institutional Shares)
  These funds seek to track the performance of a benchmark index that measures the investment return of large-capitalization growth stocks in the U.S., with VIGAX and VIGIX having successively lower expense ratios and higher minimum required investments.

Over time, there has been a trend toward the lower expense ratio Admiral Shares from the original Investor Shares. Meanwhile, Vanguard's institutional business has grown more steadily over time. (The results below are slightly larger in magnitude if we focus only on Investor and Admiral Shares.) The market share within the Vanguard complex mirrors the overall market share of growth index funds.

Figure A-1: Vanguard Index Funds–Total Net Assets

Flows into Vanguard growth funds have been higher and more variable



Source: Acadian based on data from CRSP® (Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved. Crsp.uchicago.edu.) For illustrative purposes only.

COLLECTIVE INVESTOR TIMING OF VALUE AND GROWTH

The return to Vanguard investors collectively in any one period is:

$$R_t = R_{mt} + (w_{Gt} - 0.5)(R_{Gt} - R_{Vt})$$

Where the weight on growth is equal to:

$$w_{Gt} = \frac{TNA_{VIGRXt} + TNA_{VIGAXt} + TNA_{VIVIXt}}{\sum_j TNA_{jt}}$$

and R_{mt}, R_{Gt}, and R_{Vt} are the per-period returns on the Russell 1000, the Russell 1000 Growth, and the Russell 1000 Value Indexes. The returns are further divided into a static tilt toward growth and a dynamic tilt toward growth:

$$R_t = R_{mt} + (w_{Gt} - \overline{w}_G)(R_{Gt} - R_{Vt}) + (\overline{w}_G - 0.5)(R_{Gt} - R_{Vt})$$

They are compounded in three ways:

$$Wealth_{dynamic+static} = \prod_{s=1}^{t} 1 + R_{mt} + (w_{Gt} - \overline{w}_G)(R_{Gt} - R_{Vt}) + (\overline{w}_G - 0.5)(R_{Gt} - R_{Vt})$$

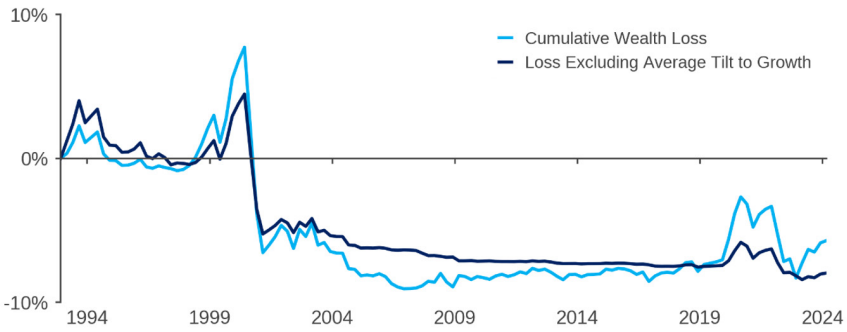
$$Wealth_{dynamic} = \prod_{s=1}^{t} 1 + R_{mt} + (w_{Gt} - \overline{w}_G)(R_{Gt} - R_{Vt}),$$

$$Wealth_{base} = \prod_{s=1}^{t} 1 + R_{mt}$$

Figure A-2 shows the compounding effects of both the dynamic and static tilts to growth in the light-blue line. This is the ratio of $Wealth_{dynamic+static}$ to $Wealth_{base}$ minus 1, a cumulative ending wealth loss of 5.7%. This includes an average benefit from the static tilt in the third term $(\overline{w}_G - 0.5)(\overline{R_{Gt} - R_{Vt}})$ of 2.2%: Growth outperformed value over the entire period, and the average tilt was 59% growth. This also includes a loss from the second term $\overline{(w_{Gt} - \overline{w}_G)(R_{Gt} - R_{Vt})}$ of 8%: Vanguard investors as a group lost wealth through poor timing of growth and value. Figure A-2 also shows compounding effects of only the dynamic tilts to growth in the dark-blue line. This is the ratio of $Wealth_{dynamic}$ to $Wealth_{base}$ minus 1, a cumulative ending wealth loss of 8%. Equivalently, investors would have been 9% richer without dynamically timing value and growth index funds.

Figure A-2: Wealth Loss from Timing Vanguard Value and Growth Funds

Greater investor preference for growth-labeled index funds is correlated with lower future returns on growth stocks, leading to wealth losses.



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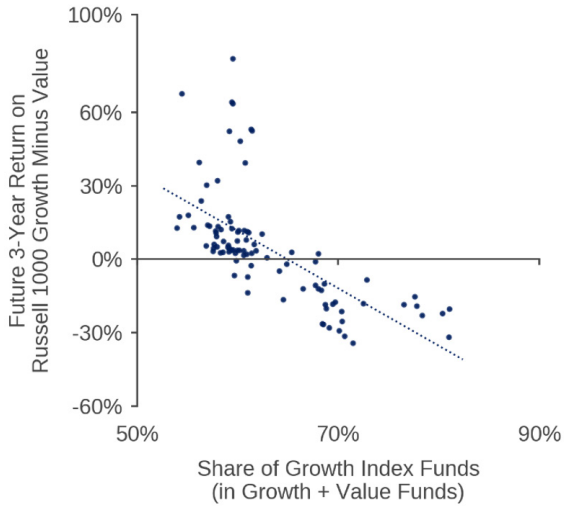
Intuitively, this latter effect comes from the covariance between investor weights w_{Gt} and the relative returns $(R_{Gt} - R_{Vt})$ of growth and value funds. The scatter plot appears in Figure A-3.

Figure A-3: Future Returns of Growth Stocks Minus Value Stocks vs. Vanguard Growth Fund Share

Greater share in Vanguard growth-labeled index funds is correlated with lower future returns on growth stocks than value stocks.



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A DIFFERENT TAKE ON THE SAME DATA: VALUE AND GROWTH INVESTORS TIMING VALUE AND GROWTH RETURNS

Growth and value investors might be considered as two separate groups, each with differing tendencies to "time the (separate) markets" for value and growth. With this in mind, we can consider the dynamic weighting over time of two separate groups.

When flows into growth funds were relatively high compared to their overall average, were the subsequent returns to growth high compared to their overall average? We can ask the same of value investors as a group.

Actual rate of return. What did growth investors earn over the period from 1992 through 2024? Each year, growth investors' wealth grew as follows:

$$TNA_{Gt} = TNA_{Gt-1}(1 + R_{Gt}) + Flow_{Gt} = (TNA_{Gt-2}(1 + R_{Gt-1}) + Flow_{Gt-1})(1 + R_{Gt}) + Flow_{Gt} =$$
$$\sum_{s=0}^{t} Flow_{Gs} \prod_{k=s+1}^{t} (1 + R_{Gt})$$

The *actual compound annual average return* that growth investors earned on quarterly flows can be computed as an internal rate of return:

$$TNA_{Gt} = TNA_{Gt-1}(1 + R_{Gt}) + Flow_{Gt} = (TNA_{Gt-2}(1 + R_{Gt-1}) + Flow_{Gt-1})(1 + R_{Gt}) + Flow_{Gt} =$$
$$TNA_{Gt} - \sum_{s=0}^{t} Flow_{Gs} \prod_{k=s+1}^{t} (1 + Actual\ Annual\ IRR_G)^{\frac{1}{4}} = 0$$

Intuitively, the wealth accumulation is enhanced or diminished with the correlation between flows into growth funds and future returns.

Potential rate of return investing at any constant share of TNA. What could growth investors have earned if they had invested at a constant rate *p* after each return was realized? Each year, growth investors' wealth grew as follows, with the initial portfolio value TNA_{G0} normalized to be 1:

$$TNA_{Gt} = TNA_{Gt-1}(1 + R_{Gt}) + Flow_{Gt} = TNA_{Gt-1}(1 + R_{Gt})(1 + p) = TNA_{Gt-1}(1 + R_{Gt})(1 + p)$$
$$= \prod_{s=1}^{t} (1 + R_{Gt})(1 + p)$$

The *potential compound annual average return* that growth investors might have earned with constant proportional flows is:

$$TNA_{Gt} - \prod_{s=1}^{t} \left((1 + Potential\ Annual\ Return_G)(1 + p)\right)^{\frac{1}{4}} = 0$$

$$Potential\ Annual\ Return_G = \left[\prod_{s=0}^{t} (1 + R_{Gt})\right]^{\frac{4}{t}}$$

This method is in the same spirit as Dichev (2007), who compares the internal rate of return of fund investors collectively to a buy-and-hold return. For growth investors, the Actual Annual IRR was 9.3% or 156 basis points less per annum than the Potential Annual Return of 10.8%. For value investors the gap is from 9.7% to 8.9% or a loss in return of 82 basis points.

A conclusion from this analysis is that growth investors have exhibited poorer timing than value investors, with greater inflows at peaks in growth index valuations. This buy-high-sell-low tendency has been less pronounced for value investors.

BIOGRAPHY

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Malcolm has been a research consultant with the firm since 2006 and plays a key role in formulating Acadian's investment research agenda. He is the Robert G. Kirby Professor of Finance at Harvard Business School, and he is the author of articles published in the Journal of Finance, the Journal of Financial Economics, Quarterly Journal of Economics and other well-known academic journals. He has been awarded numerous prizes for his research, including the Brattle Prize for best corporate finance paper in the Journal of Finance. Malcolm has served as a program director at the National Bureau of Economic Research, and as an editor of the Journal of Finance and the Review of Financial Studies. Malcolm holds a Ph.D. from Harvard University; a M.Phil. from Cambridge University; and a B.A. from Brown University.

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