Fundamental Growth*

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ABSTRACT

Conventional growth indices suffer from two important shortcomings. First, stocks that are anti-value (very expensive) are not necessarily growth stocks. The decision to include a stock in a growth index should be based on fundamental growth measures, such as growth in sales, profits, or R&D spending rather than price-based measures. Second, when these indices are weighted by objective measures of growth, rather than by market value, performance markedly improves. Overpaying for growth is unhelpful. We also assert that some stocks with poor growth prospects and unattractive valuations may have no place in either value or growth indices.

Keywords: Growth investing, Value investing, Graham and Dodd, Intangibles, Research and Development, R&D, Fundamental weighting, Fundamental index, Capitalization weighting.

JEL classification: G11, G12, G15, G23

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1 Introduction

In the past, the finance community divided stocks into two categories: cheap and expensive. Initially, the book-to-price ratio was used to allocate stocks into growth (expensive) or value (cheap) indices. What was not value was growth and vice versa, with some crossover stocks allocated partly to growth and partly to value. A good example is the Russell classification.[1]

In recent decades, these indices have evolved to incorporate some growth measures in order to improve on the naïve notion that expensive equates to growth. The peculiarity of this choice is perhaps best framed with a simple question: Why should value *or* growth investors want to invest in companies that are both expensive *and* growing slowly?

Our paper seeks to reframe the conversation. Expensive does not equate to growth. When investing in growth, perhaps we should focus on the fundamental information that indicates that a company is growing, or poised to grow because of innovations, not whether the valuation multiples are high. Just as value need not be anti-growth, growth need not be anti-value. In other words, there could be "cheap" companies that are growing fast and deserve a place in both growth and value portfolios, and expensive companies that are growing slowly that do not deserve a place in either.

A key distinction between our approach and traditional growth strategies lies in the type of information used. Many growth indices incorporate short-horizon analyst forecasts, such as two-year forward earnings estimates, to assess future growth potential. These forecasts, while widely used, are inherently subjective and prone to optimism and revisions are usually downward. For example, La Porta (1996) and Bradshaw, Richardson, and Sloan (2006) document persistent optimism in analyst earnings

[1] Russell style indices currently classify stocks as value or growth using a composite score that blends valuation and growth signals. The composite score incorporates three components: book to price, five-year historical sales per share growth, and two-year forward earnings per share growth forecasts from I/B/E/S. Equal allocations to the capitalization-weighted Russell 1000 Value and Growth indices combine to equal the Russell 1000. MSCI, FTSE, and S&P now use a conceptually similar blend of relative valuation and relative growth rates to allocate stocks to their respective Growth and Value indices. The history of the Russell, S&P, MSCI, and FTSE growth and value indices is briefly summarized in Appendix A.

forecasts and limited predictability beyond short horizons. Furthermore, these expectations are already reflected in current share prices. In order to 'beat the market', a growth stock must outperform those expectations. In contrast, we rely exclusively on historically observed fundamental measures that reflect actual, realized business performance. This emphasis on verifiable data seeks to avoid the noise embedded in speculative projections and offers a potentially more reliable foundation for portfolio construction.

Our paper offers two main insights. First, selecting "growth" stocks primarily because they are expensive (e.g., high P/B or P/E) is a mistake. Expensive stocks will not outperform the market merely because they are popular and expensive, nor is their presumed superior growth assured by the fact that they are expensive. We focus *solely* on growth fundamentals when creating a growth portfolio. Think of the most obvious candidates, such as growth in sales, profitability, and R&D spending. These are among the key characteristics that we weight heavily in choosing stocks for a growth portfolio. The second idea is not new but often underappreciated. We attempt to minimize the influence of price on both the selection and the weighting criteria.

The existing binary classification of stocks into value and growth, often defined by book-to-price ratios, is increasingly problematic in a modern economy where intangible assets often drive value creation. Traditional measures like book value, which dates back at least 500 years to the era of Luca Pacioli, poorly capture the contributions from innovation, brand equity, and intellectual property (Lev and Srivastava, 2019; Amenc, Goltz, and Luyten, 2020; Arnott et al., 2021; Dugar and Pozharny, 2021; Eisfeldt et al., 2022). Price-based valuation measures, such as book to price or earnings to price, treat intangible assets perversely. For example, unlike tangible assets, R&D is treated as an expense and detracts from rather than adding to both book value and earnings.

As for having price play a major role in selecting and weighting stocks in the portfolio, Arnott et al. (2005) challenged the key implication of Sharpe's (1964) Capital Asset Pricing Model (CAPM), that investors should hold the market capitalization-weighted portfolio. This implication of the CAPM is correct only if all assets are correctly priced (an efficient market), if there are no trading costs and no taxes, if all investors share a common set of return and risk expectations, and if other simplifying assumptions hold. Market-cap weighting is, in general, suboptimal if any of these assumptions is incorrect. Suppose that even in the most efficient market in the world, there is a little bit of mispricing. It could be 1% or less; it does not matter. A market capitalization-weighted portfolio will—by virtue of construction—overweight overvalued stocks and underweight undervalued stocks. Treynor (2005) showed that any pricing error creates a performance drag for an index that weights stocks proportional to price (as cap weighting does) relative to an index that does not link the weight to the price.

The reliance on price-based classifications in growth investing obscures a key distinction between firms that are genuinely growing their business and innovating versus those that are simply expensive. Considerable past research shows that innovation-intensive firms are frequently mispriced, either because markets undervalue intangible investments or because they fail to recognize the persistence of original innovation (Chambers, Jennings, and Thompson, 2002; Chan, Lakonishok, and Sougiannis, 2001; Eberhart, Maxwell, and Siddique, 2004; Cohen, Diether, and Malloy, 2013; Hirshleifer, Hsu, and Li, 2018). Traditional measures of profitability and valuation, such as earnings, book value, and return on equity, are often distorted by accounting conventions and fail to reflect economic reality, especially in the presence of accruals and retained earnings (Ball et al., 2015, 2016, 2020; Novy-Marx, 2013).

These issues are magnified in settings where intangible capital plays a major role yet remains unrecognized in book equity (Peters and Taylor, 2017). While models such as the augmented q-factor model (Hou et al., 2021) aim to incorporate expected investment and profitability, they still depend on forecasted rather than realized business performance. There's nothing inherently wrong with using forecasted data. However, behavioral frictions, such as sticky expectations and investor overreaction to near-term trends, help explain why firms with persistent operational improvement are often underappreciated (Bouchaud et al., 2019).[2]

Our approach moves beyond price-based measures, grounding growth investing in observable economic fundamentals independent of market price. Specifically, we propose constructing growth indices using direct measures of company performance and innovation: sales growth, R&D investment, and profitability enhancements. Lakonishok, Shleifer and Vishny (1994) is the foundational paper examining sales growth; they find that returns associated with this characteristic are poor. However, this analysis was conducted explicitly excluding Nasdaq stocks. Our analysis is also informed by Cooper, Gulen and Schill (2008) as well as Anderson and Garcia-Feijoo (2006) who study asset growth and capital expenditures growth. Our approach focuses on top-line profitability (before accounting magic) and R&D growth which we believe is cleaner than CAPEX growth.

We construct a growth portfolio based on fundamental information – and make sure the weightings of stocks in the portfolio are minimally affected by current prices. Our findings show an additional annualized return between 2% and 6% compared with traditional market capitalization-weighted growth indices across major markets, including the United States, United Kingdom, Europe ex-UK, and Japan. Further, these portfolios consistently outperform traditional cap-weighted growth benchmarks across decades, regions, and risk regimes.

2 Value vs. Growth: A False Dichotomy

The distinction between value and growth investing has long dominated investment discourse, strongly influenced by the widely adopted Fama-French three-factor model. Historically, value investing, popularized by Graham and Dodd (1934), advocated selecting stocks that were trading at significant discounts to their intrinsic value as

[2] See also Kung and Schmid (2015) on the macroeconomic pricing of innovation and Huang, Zhang, and Zhou (2019) on fundamental momentum. These studies further underscore the importance of distinguishing fundamental growth from price-driven classifications.

measured by fundamentals such as earnings, cash flows, dividends, and book value. In contrast, growth investing emerged as an approach focusing on firms demonstrating above-average earnings or sales growth, albeit often combined with high valuations. The two approaches are not mutually exclusive, so the binary classification has always been problematic.

Behavioral finance research underscores another significant limitation. Studies show that markets frequently mislabel fundamentally weak but expensive stocks as "growth," conflating fundamentally robust growth stocks with "glamour" stocks whose high valuations often reflect overly optimistic expectations (e.g., Lakonishok, Shleifer, and Vishny, 1994; Campbell et al., 2010; Daniel and Titman, 1997). Consequently, many investors unintentionally allocate capital to overpriced stocks with poor underlying fundamentals, undermining performance and portfolio efficiency.

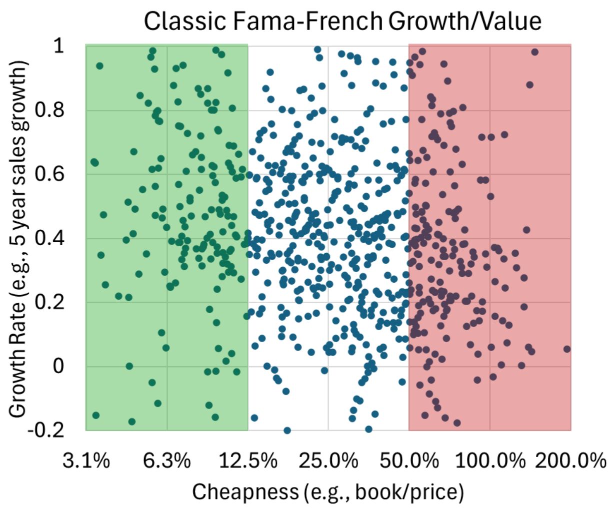
Figure 1 illustrates the shift from early growth/value classifications to the conventional growth/value classification that dominates today's index landscape and then to our proposed fundamental growth framework. We are deliberately oversimplifying for illustrative purposes, using only five-year sales growth to measure growth and only book/price to measure valuation levels. Later we will add more value and growth characteristics. The data are end-2024 growth and valuation characteristics for the capitalization weighted (CW) 1000. Thus, while this analysis is for illustrative purposes, we use real data.

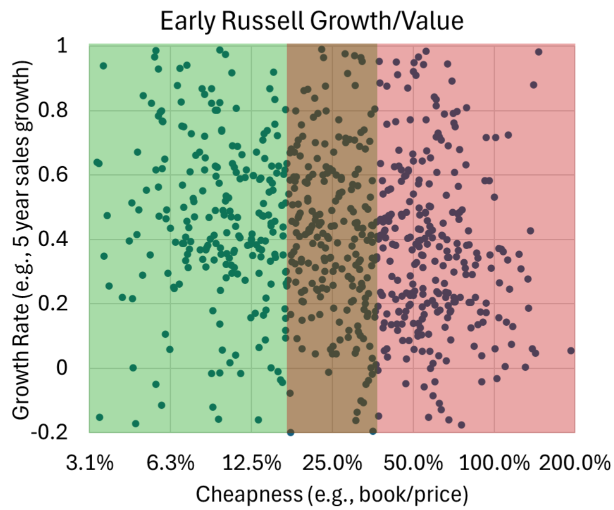
In the earliest formulations, growth meant expensive and value meant cheap, typically on the basis of a ratio of book value to market value (often shorthanded as book to market, or B/M, Panels A and B). Today's leading index providers (Russell, MSCI, S&P and FTSE) looks for some combination of fast growth or high valuation multiples to populate the growth universe; some blend of slow growth and cheap valuation multiples then define value (Panel C). Our approach (Panel D) defines growth as fast growing, regardless of valuation ratios, and defines value as cheap, regardless of growth rates. The traditional approach (panels B and C) includes all stocks, though some crossover stocks may get partial weight in both growth and value. An equal allocation to the Russell 1000 Growth and Russell 1000 Value indices equals the Russell 1000; the same applies for the standard growth and value indices offered by MSCI, S&P and FTSE. We propose a simple thought experiment: why include stocks in value or growth portfolios if they have both sluggish growth and unattractive valuations?

Figure 1: Stylized Classification of Growth and Value Stocks

Panel A. Classic Fama-French
The richest (lowest 30% by B/P) are growth (green). The cheapest (highest 30% by B/P are value (red). The middle 40% are ignored.

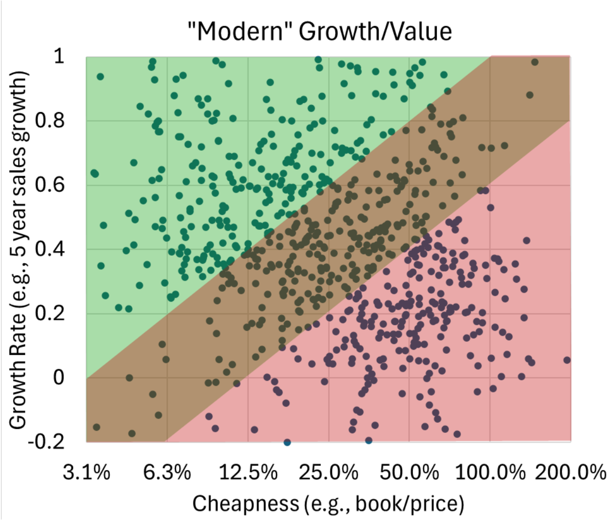
Panel B. Early Russell
The richest half (lowest B/P) are growth (green). The cheapest (highest B/P) are value (red). Some crossover in the middle (brown). Nothing left out.

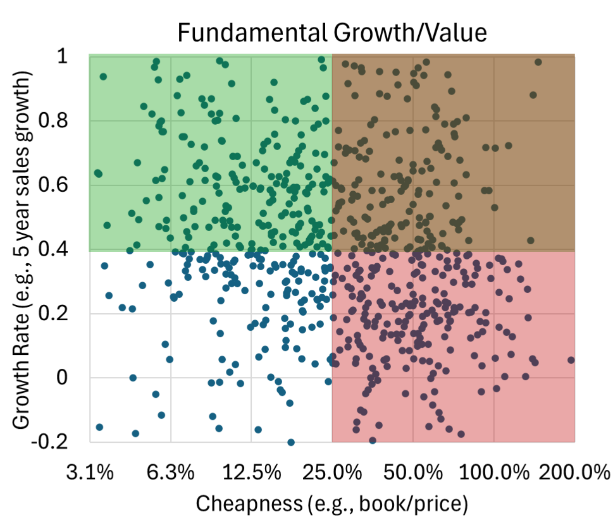




Panel C. "Modern" Growth/Value
Stocks that are some combination of expensive and fast growing are growth (green). Stocks that are some combination of cheap and slow growing are value (red). Some crossover in the middle (brown). Nothing is left out.

Panel D. Our new framework
Stocks that are growing faster than most are growth (green). Stocks that are cheaper than most are value (red). There is a lot of crossover on both lists (brown). Expensive and slow growing stocks are left out.





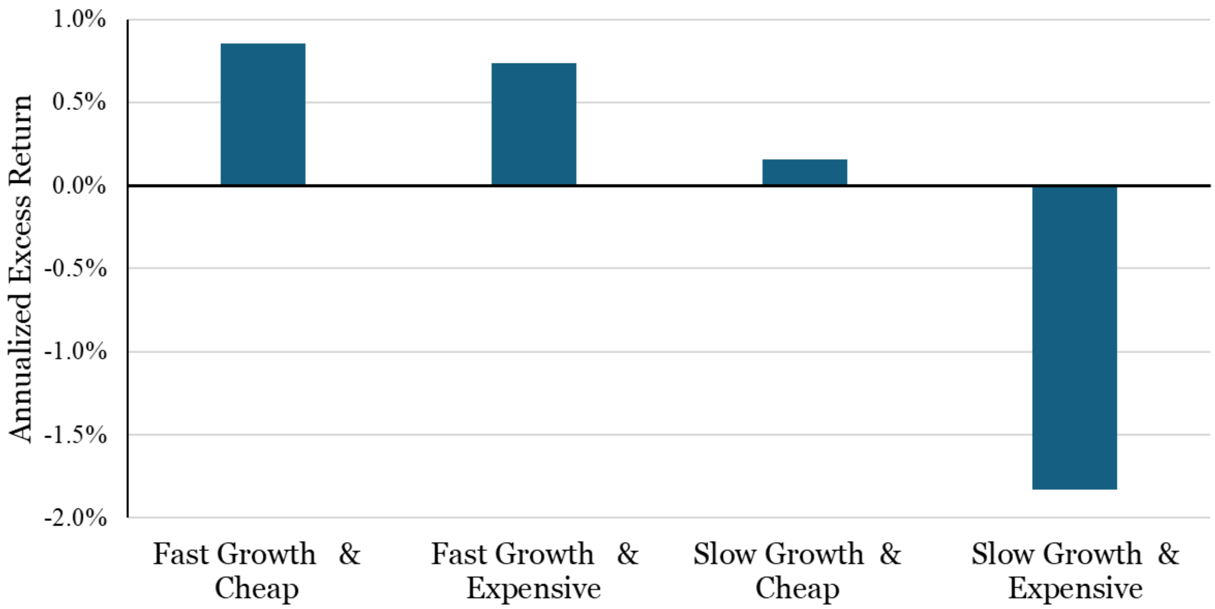
To test the implications of disentangling growth and value as independent characteristics, we test four mutually exclusive portfolios. Each March from 1969 through 2024, we independently sort the top 98% of US equities by market capitalization into quadrants defined by valuation and fundamental growth characteristics. Consistent with Figure 1, we simplify by measuring valuation using book to price (B/P) and growth using the trailing five-year growth in sales per share. We assigned stocks to one of four quadrants (Fast Growth & Cheap, Fast Growth & Expensive, Slow Growth & Cheap, and Slow Growth & Expensive) based on whether they lie above or below the cross-sectional median of each signal.[3] Portfolios are capitalization weighted and rebalanced annually.

Figure 2 presents the average annualized excess returns for these four value/growth quadrant portfolios. Portfolios composed of fast-growing firms outperformed the market over the full period, irrespective of valuation. In contrast, the "Slow Growth & Expensive" portfolio (the segment most vulnerable to misclassification as growth) underperformed by a wide margin (t-statistic = -2.9). These results highlight the pitfalls of traditional growth classifications that rely on valuation multiples and often mislabel slow-growing but expensive stocks as growth opportunities.

This evidence provides empirical support for a two-dimensional framework that disentangles value and growth characteristics. By isolating fundamental growth as an independent dimension, we avoid confusing low-growth expensive stocks for true growth franchises, enabling us to more effectively identify firms with genuine economic momentum while simultaneously avoiding persistent underperformers.

[3] Our later analysis embraces a multidimensional view of growth and value and does not use market capitalization weighting. This simpler form is for illustrative purposes.

Figure 2: Excess Returns of Value/Growth Quadrant Portfolios, (March 1969–December 2024)



Notes: This figure reports average annualized excess returns versus the broad cap-weighted market portfolio from March 1969 through December 2024 for four cap-weighted portfolios formed via independent sorts on book/price and 5-year sales-per-share growth. Stocks are classified into quadrants based on their position relative to the median of each signal. Portfolios are rebalanced annually.
Source: Research Affiliates; data from CRSP/Compustat.

3 Defining Growth Using Fundamentals

Our framework, which we call fundamental growth, attempts to minimize the influence of price-based measures in both identifying *and* weighting growth stocks. Our approach identifies growth opportunities through observable, economically meaningful fundamentals, such as R&D intensity and growth in sales and profits. By anchoring our definition of growth in actual economic measures rather than market sentiment or price-based classifications, we attempt to provide a robust measure aligned with value creation.

3.1 Fundamental Measures of Growth

We focus on three fundamental measures of growth: sales growth, R&D growth, and gross profitability growth. We are not the first paper to analyze measures of growth. **Table 1** summarizes the fundamental measures used in our research and previous studies, organized by typical business lifecycle stages.

Our first economic choice is to focus on variables that represent innovation and business performance. The innovation category focuses on the use of internal funds to stoke future growth. The performance category focuses on turning growing sales into profits. We ignore the value retention category and the distribution category. For example, it is not obvious that growth in book value is linked to fundamental growth. Further, dividend and buyback growth could be measuring the opposite of what we want – companies may be returning money to shareholders because of lack of growth opportunities.

Our second economic choice is the representation of innovation and business performance. For innovation, we chose R&D growth. There are alternatives, such as the growth in capital expenditures (CAPEX growth) studied in Anderson and Garcia-Feijoo (2006). However, R&D growth seems, ex ante, to be a more focused measure of growth because many CAPEX expenditures may be unrelated to growth opportunities. We provide some empirical analysis that contrasts the two measures. For the business performance category, we use sales growth and gross profitability growth. Sales growth is an obvious growth measure that is used in previous research and index construction. Profits are more complicated, because there are so many candidate measures. Our strategy, following the logic of Novy-Marx (2013), is to use the top of the income statement, gross profitability, given that accounting choices may distort measures at the bottom of the income statement, such as net income growth or cash flow growth.

Our third choice is statistical: how do we transform levels into growth rates? Here we largely follow the literature. We scale all measures by the level of sales (denominator at time *t-5*) and use the five-year change in the growth measure in the numerator. Given there are many ways to measure growth, we recognize that this leads to a multiple testing problem (Harvey, Liu and Zhu, 2016). Appendix B investigates the sensitivity of our results to different assumptions on how to calculate growth, and how many years of growth to consider. The results in the appendix suggest that the choice of the growth window does not drive the results.

Finally, we will use our growth fundamentals for two tasks. First, we use the five-year growth measures (percentage rate of growth) to identify candidate growth stocks. Second, once we identify the high growth securities, we form a portfolio and weights for the stocks are derived from the fundamental measures (dollar magnitude of growth). That is, instead of weighting by market capitalization, we weight by the magnitude of growth as a share of total growth in the portfolio.[4]

Table 1. Fundamental Growth Measures by Economic Role

Economic Role	Strategic Focus	Key Fundamentals
Innovation	*Investing in the future*: Using internal funds to innovate and fuel future growth	• **R&D growth** • Capex growth
Business Performance	*Growing the business and improving margins*: Turning growing sales into sustainable profit	• **Sales growth** • **Gross profit growth** • Net income growth • Cash flow growth
Value Retention	*Building the balance sheet*: Preserving financial strength and competitive position	• Book value growth • Asset growth
Distribution	*Returning capital to owners*: Distributing free cash flow to shareholders	• Dividend growth • Dividend with buyback growth

Notes: Key fundamental growth measures are organized by the economic role they play in firm development and long-term value creation. Our choices of fundamental measures are in boldface. Each role corresponds to a distinct strategic focus and includes the corresponding fundamental indicators most relevant to that

[4] For example, Nvidia's sales grew nearly 40% per year between 2019 and 2024, from $12 billion to $61 billion, amply fast enough to earn membership in a fundamental growth portfolio. If all the stocks in the portfolio had combined sales growth of $490 billion, then Nvidia's $49 billion contribution to that macroeconomic growth would earn a 10% weight. Other growth measures, or a blended measure, will lead to different members at different weights.

role. Shaded rows represent categories less aligned with a growth investing style, focusing on capital preservation or distribution rather than innovation or business performance.

3.2 Composite Measure of Growth

To increase robustness and avoid over-reliance on any single indicator, we construct a composite measure of fundamental growth that blends R&D, sales, and gross profit. While the individual fundamentals may each capture important dimensions of business growth, they may also be subject to noise or firm-specific idiosyncrasies. By combining them, we diversify signal risk and improve the reliability of our growth measurement.

We compute the composite rate of growth by first normalizing each firm's per-share growth measure (relative to sales per share) and then averaging the standardized values across the three components.[5] The composite *rate of growth* for any security is:[6]

$$\text{Composite Rate of Growth} = \text{avg}\left(Z\left(\frac{\Delta^5 R\&D_t}{Sales_{t-5}}\right), \quad Z\left(\frac{\Delta^5 Sales_t}{Sales_{t-5}}\right), \quad Z\left(\frac{\Delta^5 GP_t}{Sales_{t-5}}\right)\right),$$

where Δ is difference operator. The weighting of the components is yet another statistical choice. We elected not to attempt to optimize the weighting, choosing instead equal weights.

To construct the composite *magnitude of growth*, we first scale each firm's absolute growth (e.g., five-year dollar changes in R&D, sales, and gross profit), relative to the *total dollar growth* in that measure across the entire investable universe. To avoid negative contributions from firms with declining sales, we count these firms as having zero sales growth, denoted as $(x)^+$. This normalization ensures that all three measures contribute

[5] Each per-share growth measure is standardized using a z-score transformation within each period, defined as mean-centering and scaling by the cross-sectional standard deviation, with values winsorized at ±3 standard deviations. As a robustness check, we normalize growth rates using assets per share instead of sales per share. Results are consistent across both approaches, with only minor differences in portfolio performance across concentration levels (see Figure B3). This suggests the choice of normalization variable does not materially affect the effectiveness of the growth signal.

[6] Firms with missing data for a fundamental are given a zero for both the magnitude and *z*-score of the rate of growth for that fundamental.

comparably, despite differing in scale. The composite is then calculated as the average of these relative growth shares:

$$\text{Composite Magnitude of Growth} = \text{avg}\left(\frac{\Delta^5 R\&D_i^+}{\Sigma_j \Delta^5 R\&D_j^+}, \quad \frac{\Delta^5 Sales_i^+}{\Sigma_j \Delta^5 Sales_j^+}, \quad \frac{\Delta^5 GP_i^+}{\Sigma_j \Delta^5 GP_j^+}\right).$$

This two-dimensional composite approach – selecting by rate of growth and weighting by magnitude of growth – allows us to identify companies that are growing quickly in relative terms, through our selection process, and to then weight the stocks in rough proportion to their contribution to macroeconomic growth. As the empirical results will show, portfolios built using these composite growth signals consistently outperform those based on individual fundamentals alone.

4 Portfolio Construction Using Fundamental Growth

The construction process begins by forming an investible universe of the top 98% of U.S. equities by market capitalization, excluding micro-cap stocks. From this universe, we select the top 1,000 companies based on their rate of growth: the five-year per-share change in a fundamental metric (e.g., sales per share), normalized by the initial sales per share. We will examine individual measures of growth as well as our composite measure of growth. Within this selection, we assign portfolio weights using the absolute magnitude of growth over the same period (e.g., total dollar growth in sales), setting weights to zero for firms with negative growth, if any. Portfolios are rebalanced annually each March.

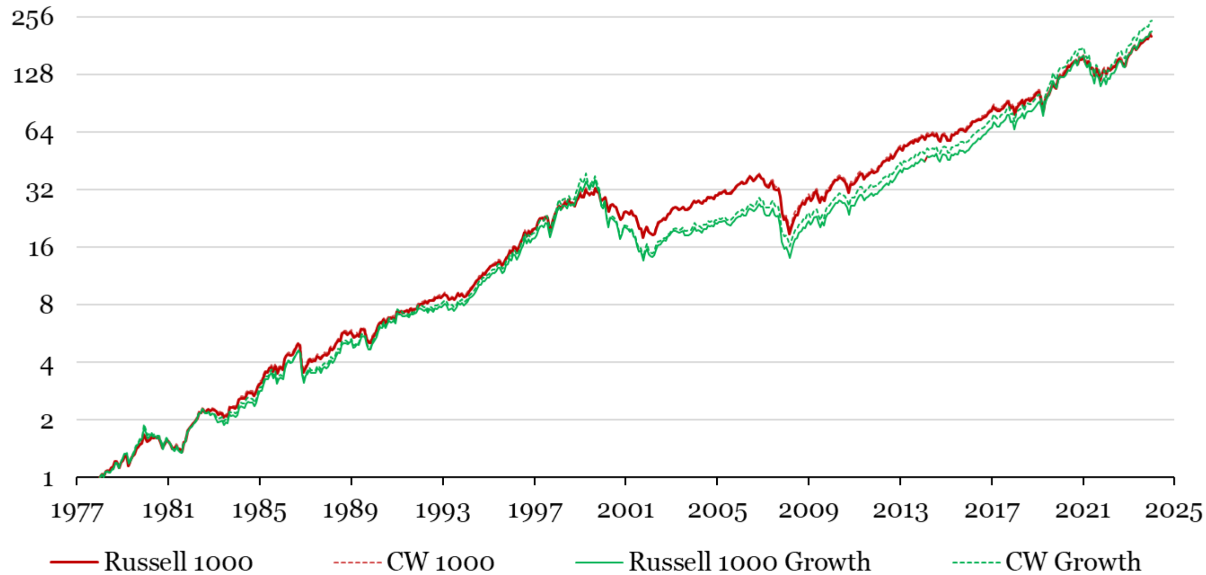
This method decouples portfolio weights from market price, ignoring the common bias of associating high valuation with strong growth. By combining rate-based selection with magnitude-based weighting, we capture companies delivering both rapid and substantial fundamental growth. The analysis that follows applies this methodology to various individual measure, and then to our composite, a blended measure of growth in innovation, sales, and gross profits.

4.1 Benchmark Portfolios

As a first benchmark, we construct a portfolio that selects and weights the top 1,000 US companies by their market capitalization ("CW 1000", as a shorthand), rebalanced annually. This approach creates a neutral benchmark that simply owns the 1,000 largest market-cap stocks, capitalization weighted. As a second benchmark, we simulate a traditional cap-weighted growth-style portfolio ("CW Growth", as a shorthand), using a method of forming value and growth style portfolios similar to the Russell methodology.

In terms of performance, our CW 1000 and CW Growth benchmarks closely track their Russell counterparts since the inception of the latter. From 1978 to 2024, the CW 1000 delivered an annualized return of 12.2%, nearly identical to the 12.3% return of the Russell 1000, with an average monthly absolute return difference of just 0.1%. Our CW Growth portfolio returned 12.7% annually over the same period, compared with 12.4% for the Russell 1000 Growth, with an average monthly absolute return difference of just 0.4%, and an R^2 of 98.5%. **Figure 3** displays the cumulative growth of $1 invested in each of the four indices.

Figure 3. Cumulative Growth of $1 for Simulated Cap-Weighted Indices vs. Russell Indices (December 1978–December 2024)



Notes: This chart displays the simulated growth of $1 from December 1978 to December 2024 for four indices. We compare the Russell 1000 Index (in red) with our simulated Capitalization-Weighted 1000 portfolio (CW 1000, in dashed red), and a like comparison for the Russell 1000 Growth Index and our simulated CW Growth portfolio (in green and dashed green, respectively). The close alignment in cumulative return paths demonstrates that our benchmarks closely mirror the behavior of the established Russell benchmarks.
Source: Research Affiliates; data from CRSP/Compustat and Bloomberg.

In the analysis that follows, comparing the fundamental growth portfolios with our simulated CW Growth benchmark involves an inherent mismatch in portfolio breadth and construction. The fundamental growth portfolios include 1,000 names, while the Russell 1000 Growth index (and by extension our CW Growth benchmark) contains less than 400 stocks. In Section 5.1, we introduce more concentrated versions of the fundamental growth strategy, limited to the top 500 names, for which the CW Growth portfolio provides a more appropriate benchmark in terms of both breadth and composition.

4.2 Individual Fundamental Growth Portfolios

Table 2 presents the empirical analysis of the simulated fundamental growth long-only portfolios. We report both raw returns and risk-adjusted returns using a CAPM as well as multifactor models. The purpose of the analysis is to highlight how our choices of fundamental growth signals compare to other measures that have been featured in the literature. To be clear, Table 2 is not used for selection of fundamental growth signals – the selection was done before the empirical analysis.

The table has multiple messages. First, the performance of R&D growth stands out and dominates CAPEX growth. The weak performance of CAPEX growth is surprising, given that Anderson and Garcia-Feijoo (2006) was a strong predictor of returns. In further investigation, we replicate the Anderson and Garcia-Feijoo result and discover that CAPEX is a strong predictor during their sample period but the predictability vanishes post-publication – an effect documented by McLean and Pontiff (2015). Overall, this analysis is consistent with using a more focused measure of companies investing in growth opportunities, R&D.

In the business performance category, the sales growth and gross profitability measures compare favorably to the alternatives of net income growth and cash flow growth. Looking at the CAPM-adjusted excess returns, the cash flow growth has a t-statistic above 2.0. However, the overall results are consistent with the economic idea of using a measure of profitability before it is transformed by accounting choices. The statistical significance of all these performance measures is weakened when multifactor models are applied.

Finally, we report the two categories that we, ex ante, excluded: value retention and distribution. While the growth in dividends and buybacks appears promising in the unadjusted data, risk adjustment eliminates the alpha. Indeed, in a six-factor model, all of the alphas for individual measures in these two categories are negative.

Table 2. Performance of Individual Fundamental Growth Portfolios (March 1969–December 2024)

A. *Unadjusted returns and risk-adjusted returns (CAPM)*

Mar/1969 - Dec/2024	Return	Volatility	CVaR	Max Drawdown	Sharpe Ratio	CAPM Alpha	t-stat	Turnover
CW 1000	10.6%	15.6%	-9.7%	-49.9%	0.39	0.1%	0.68	4%
CW Growth	10.7%	17.5%	-11.0%	-63.7%	0.35	-0.1%	-0.09	12%
R&D Growth	12.8%	18.3%	-11.0%	-52.8%	0.45	1.9%	2.07	20%
Cap Ex Growth	11.2%	17.1%	-10.8%	-52.6%	0.38	0.7%	0.83	27%
Sales Growth	12.2%	16.5%	-10.2%	-50.0%	0.46	1.5%	2.57	17%
Gross Profit Growth	12.1%	16.3%	-10.2%	-53.2%	0.46	1.4%	3.01	18%
Net Income Growth	11.3%	16.6%	-10.6%	-56.6%	0.40	0.7%	1.11	25%
Cash Flow Growth	11.8%	16.4%	-10.3%	-57.0%	0.44	1.2%	2.00	20%
Book Value Growth	10.6%	16.5%	-10.4%	-56.8%	0.36	0.1%	0.11	17%
Asset Growth	10.1%	18.7%	-11.7%	-74.4%	0.29	-0.5%	-0.44	16%
Dividends Growth	11.0%	15.2%	-9.7%	-59.2%	0.42	1.1%	1.34	20%
Dividend+Buyback Growth	12.1%	15.1%	-9.4%	-52.1%	0.50	2.0%	2.86	18%

B. *Risk-adjusted returns (Fama-French 3-Factor + Carhart)*

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	WML Beta	R^2
CW 1000	0.1%	1.38	1.00	-0.11	0.00	0.00	1.00
CW Growth	1.3%	3.27	1.04	-0.12	-0.35	0.01	0.97
R&D Growth	3.5%	3.89	1.01	0.04	-0.24	-0.06	0.88
Cap Ex Growth	0.5%	0.71	1.02	0.00	0.17	-0.07	0.90
Sales Growth	1.0%	1.99	1.02	0.02	0.20	-0.04	0.95
Gross Profit Growth	1.3%	3.35	1.02	-0.02	0.16	-0.07	0.97
Net Income Growth	0.4%	0.99	1.03	-0.06	0.22	-0.09	0.96
Cash Flow Growth	0.6%	1.30	1.03	-0.06	0.26	-0.06	0.96
Book Value Growth	-0.4%	-1.01	1.03	-0.04	0.26	-0.08	0.97
Asset Growth	-1.6%	-2.02	1.12	-0.06	0.47	-0.11	0.91
Dividends Growth	0.1%	0.25	0.95	-0.16	0.36	-0.07	0.93
Dividend+Buyback Growth	1.1%	2.38	0.96	-0.14	0.31	-0.06	0.96

C. *Risk-adjusted returns (Fama-French 5-Factor + Carhart)*

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	RMW Beta	CMA Beta	WML Beta	R^2
CW 1000	0.0%	-0.59	1.00	-0.10	0.01	0.03	0.00	-0.01	1.00
CW Growth	1.7%	4.57	1.02	-0.13	-0.25	-0.02	-0.19	0.02	0.98
R&D Growth	4.1%	4.52	1.02	-0.02	-0.28	-0.19	0.10	-0.07	0.88
Cap Ex Growth	0.2%	0.28	1.03	0.02	0.13	0.04	0.08	-0.08	0.90
Sales Growth	0.1%	0.27	1.03	0.08	0.15	0.18	0.08	-0.05	0.96
Gross Profit Growth	0.6%	1.75	1.02	0.03	0.13	0.14	0.04	-0.07	0.97
Net Income Growth	0.0%	-0.08	1.03	-0.01	0.24	0.13	-0.04	-0.09	0.97
Cash Flow Growth	0.1%	0.20	1.03	-0.02	0.25	0.12	0.02	-0.06	0.96
Book Value Growth	-0.6%	-1.56	1.03	-0.02	0.25	0.04	0.04	-0.08	0.97
Asset Growth	-1.3%	-1.68	1.11	-0.05	0.53	-0.01	-0.10	-0.11	0.91
Dividends Growth	-1.1%	-1.92	0.97	-0.09	0.31	0.21	0.14	-0.09	0.94
Dividend+Buyback Growth	-0.3%	-0.87	0.99	-0.07	0.22	0.22	0.22	-0.07	0.97

Notes: These tables compare the performance of the fundamental growth portfolios to traditional benchmarks across both unadjusted and risk-adjusted dimensions over the period from March 1969 to December 2024. Each fundamental growth portfolio is formed by selecting the top 1,000 companies based on the rate of growth in the fundamentals and weighting them by the corresponding magnitude of growth. Panel A presents raw performance measures, including annualized return, volatility, CvaR, max drawdown, Sharpe ratio, annualized CAPM alpha with corresponding *t*-statistic, and portfolio turnover. Conditional Value at Risk (CVaR) is calculated as the average realized return in the lower 5% tail of the empirical return distribution (i.e., returns below the 5th percentile). Panel B uses the Fama-French-Carhart four-factor model (including market beta, size, value, and momentum). Panel C extends this analysis by estimating alphas and factor exposures using the Fama–French five-factor model (market, size, value, profitability, and investment) plus momentum. The benchmarks are the CW 1000 portfolio, which selects and weights the top 1,000 firms by market capitalization, and the CW Growth portfolio, which is a traditional cap-weighted growth-style portfolio. Shaded rows reflect portfolios built from retention and distribution growth measures that are less consistent with a growth investing style.
Source: Research Affiliates; data from CRSP/Compustat.

4.3 Composite Fundamental Growth Portfolio

Our composite fundamental growth signal blends measures capturing business growth in sales and profits as well as innovation. We refer to these portfolios as fundamental growth portfolios. For example, a fundamental growth 1000 ("FG 1000"), selects and weights the top 1,000 firms based on their composite growth scores.

As shown in Panel A of **Table 3**, the FG 1000 outperforms the CW 1000 benchmark by 1.8% annually and CW Growth by 1.7%. On a CAPM-adjusted basis, it delivered a 1.6% alpha versus -0.1% for CW Growth. The alpha *t*-statistic is 3.5, and the *t*-statistic of the performance difference at 4.1 is highly significant.

Panel B highlights the fundamental growth strategy's distinctive risk profile. It has a near-neutral loading on the market factor and minimal exposure to size, value, or momentum. In contrast, the CW Growth benchmark exhibits a strong negative loading on the value factor (HML), reflecting its bias toward expensive stocks. In comparison, the fundamental growth portfolio has a small *positive* HML tilt, consistent with its emphasis on fundamental improvement rather than price-based selection. This result stems from use of fundamental weighting, which reduces the tendency to assign larger weights to higher-multiple stocks, as happens with any cap-weighted index. This difference in HML loading is also evident when a five-factor model (plus momentum) is applied in Panel C.

Although not shown in the table, a rolling 3-year analysis reveals that the excess returns for the fundamental growth and cap-weighted growth portfolios are negatively correlated, consistent with their opposing HML exposures, and exhibit a return spread with an annual standard deviation of 6.7%. This observation is consistent with our view that the fundamental growth approach captures a much different and more balanced form of growth.

Table 3. Performance of Fundamental Growth vs. Traditional Benchmarks

A. Unadjusted returns and risk-adjusted returns (CAPM)

Mar/1969 - Dec/2024	Return	Volatility	CVaR	Max Drawdown	Sharpe Ratio	CAPM Alpha	t-stat	Turnover
CW 1000	10.6%	15.6%	-9.7%	-49.9%	0.39	0.1%	0.68	4%
CW Growth	10.7%	17.5%	-11.0%	-63.7%	0.35	-0.1%	-0.09	12%
R&D Growth	12.8%	18.3%	-11.0%	-52.8%	0.45	1.9%	2.07	20%
Sales Growth	12.2%	16.5%	-10.2%	-50.0%	0.46	1.5%	2.57	17%
Gross Profit Growth	12.1%	16.3%	-10.2%	-53.2%	0.46	1.4%	3.01	18%
Fundamental Growth 1000	12.4%	16.5%	-10.1%	-48.5%	0.47	1.6%	3.54	17%

B. Risk-adjusted returns (Fama-French 3-Factor + Carhart)

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	WML Beta	R^2
CW 1000	0.1%	1.38	1.00	-0.11	0.00	0.00	1.00
CW Growth	1.3%	3.27	1.04	-0.12	-0.35	0.01	0.97
R&D Growth	3.5%	3.89	1.01	0.04	-0.24	-0.06	0.88
Sales Growth	1.0%	1.99	1.02	0.02	0.20	-0.04	0.95
Gross Profit Growth	1.3%	3.35	1.02	-0.02	0.16	-0.07	0.97
Fundamental Growth 1000	1.7%	4.01	1.02	0.03	0.08	-0.05	0.97

C. Risk-adjusted returns (Fama-French 5-Factor + Carhart)

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	RMW Beta	CMA Beta	WML Beta	R^2
CW 1000	0.0%	-0.59	1.00	-0.10	0.01	0.03	0.00	-0.01	1.00
CW Growth	1.7%	4.57	1.02	-0.13	-0.25	-0.02	-0.19	0.02	0.98
R&D Growth	4.1%	4.52	1.02	-0.02	-0.28	-0.19	0.10	-0.07	0.88
Sales Growth	0.1%	0.27	1.03	0.08	0.15	0.18	0.08	-0.05	0.96
Gross Profit Growth	0.6%	1.75	1.02	0.03	0.13	0.14	0.04	-0.07	0.97
Fundamental Growth 1000	1.3%	3.04	1.02	0.05	0.04	0.07	0.06	-0.06	0.97

Notes: These tables compare the performance of the FG 1000 portfolio with traditional benchmarks across both unadjusted and risk-adjusted dimensions over the period from March 1969 to December 2024. Panel A presents raw performance measures including annualized return, volatility, CVaR, max drawdown, Sharpe ratio, annualized CAPM alpha with corresponding *t*-stat, and portfolio turnover. Conditional Value at Risk (CVaR) is calculated as the average realized return in the lower 5% tail of the empirical return distribution (i.e., returns below the 5th percentile). Panel B uses the Fama-French-Carhart 4-factor model

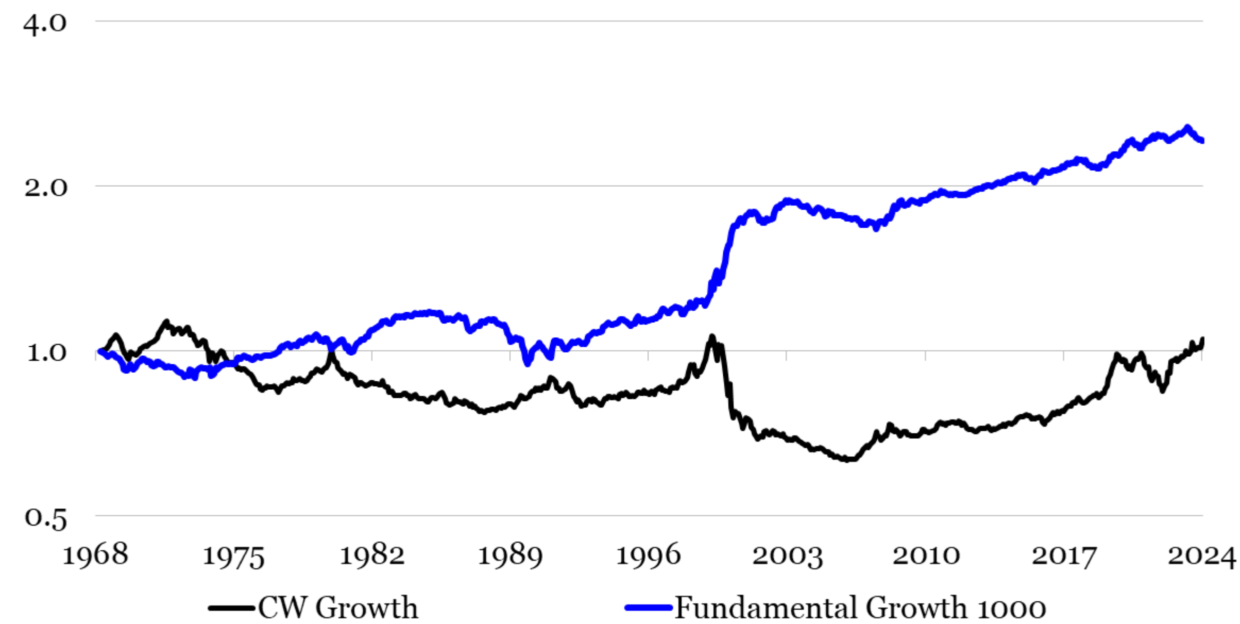
(including size, value, and momentum). Panel C extends this analysis by estimating alphas and factor exposures using the Fama–French five-factor model (market, size, value, profitability, and investment) plus momentum. The benchmarks are the CW 1000 portfolio, which selects and weights the top 1,000 firms by market capitalization, and the CW Growth, which is a traditional cap-weighted growth-style portfolio. The FG 1000 consistently outperforms the traditional growth benchmark, both in absolute returns and on a risk-adjusted basis, with statistically significant alphas and minimal exposure to standard risk factors.
Source: Research Affiliates; data from CRSP/Compustat.

Figure 4 shows the cumulative relative return for both the Fundamental and CW Growth with the CW 1000 from early 1969 through year-end 2024. The results may seem surprising on several levels. To us, the most provocative results surround the dot-com bubble. FG 1000 outperforms the market handily (albeit by considerably less than CW Growth) during the bubble years of the 1997–1999 period, then continues building on those gains even as CW Growth craters from 2000 to 2003. Both growth indices lagged the CW 1000 modestly from 2004 to 2006. It is evident that during the aftermath of the dot-com bubble, fast-growing companies did fine while expensive stocks did not.

During the impressive growth bull market of 2009–2024, FG 1000 adds considerable excess return, without some of the ups and downs of CW Growth. Over the full 55-year span, FG 1000 leaves an investor more than twice as wealthy as CW 1000, while conventionally constructed CW Growth leaves an investor no better off after some surges and tumbles relative to the CW 1000.[7]

[7] See Asness et al. (2000) for evidence that value and growth style performance varies significantly over time, a result consistent with the observed regime shifts in our analysis.

Figure 4. Excess Returns of Fundamental Growth and Cap-Weighted Growth Portfolios



Notes: This chart plots the cumulative relative wealth of the FG 1000 portfolio versus the traditional cap-weighted growth portfolio (CW Growth), both benchmarked to the market capitalization weighted CW 1000 index from 1969 to 2024. The fundamental growth portfolio (constructed using an equally weighted blend of R&D, sales, and gross profit growth signals) delivers significantly higher and more consistent long-term performance. In contrast, the traditional cap-weighted growth portfolio underperforms as a result of its heavy tilt toward expensive stocks selected based on price-driven characteristics.
Source: Research Affiliates; data from CRSP/Compustat.

4.4 The Other Side of the Trade: Who Provides the Alpha?

Any time a statistically significant alpha is estimated with historical data, it is appropriate to ask the economic questions: why does this opportunity exist and who is on the other side of the trade? Further, notice that the performance of fundamental growth during the 1970s and 1980s was flat (Figure 4).

Index funds more or less own the market, so they seemingly cannot be on the other side of our trades. After all, they are passive. However, *flows* into cap-weighted growth indices can easily be on the other side, thus fueling the excess returns for this strategy. By offering low-cost access to diversified equity funds, passive investing has provided considerable benefits to investors. However, the scale of passive flows — nearly $2 trillion_globally[8] into index funds, not counting index-tracking separate accounts, in 2024 alone — has profoundly altered market structure (see Brightman and Harvey, 2025).

We suggest that the efficacy of the fundamental growth strategy is a consequence of at least two interconnected drivers. Market-cap weighted growth indices, even now, heavily rely on the early notion that high valuation multiples equate to growth, and that growth is the antithesis of value.

5 Drivers of Alpha

We now examine the design elements of our fundamental growth strategy, including portfolio concentration and choice of weighting methodology. We also examine the sources of return using a decomposition framework to distinguish between fundamentals-driven growth and returns arising from valuation expansion. Finally, we evaluate the sector exposures of fundamental-growth portfolios, highlighting the structural differences from traditional growth benchmarks.

5.1 The Impact of Concentration and Weighting

We explore portfolio construction using two weighting methods: weighting by the magnitude of fundamental growth (absolute dollar increases in R&D expenditures, sales, and gross profits) versus traditional market-capitalization weighting. We also construct portfolios at different levels of concentration, selecting the top 1,000, 500, 250, and 100 stocks based on their composite rate of growth, which reflects normalized measures of fundamental growth across key economic measures.

Empirical results presented in **Table 4** highlight the performance advantages of weighting portfolios by fundamental growth magnitude rather than market capitalization.

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[8] https://etfgi.com/news/press-releases/2025/01/etfgi-reports-global-etfs-industry-gathered-record-188-trillion-us

As shown in Panel A, fundamental growth-weighted portfolios outperform market cap-weighted growth indices across all concentration levels, displaying higher returns, Sharpe ratios, and information ratios. This outperformance is achieved with moderate increases in turnover.

The results for selection show that the average portfolio return increases from 12.4% for the FG 1000 to 15.3% with the most selective portfolio, the FG 100. The returns increase monotonically as the portfolio becomes more selective (after all, we are focusing on an ever-narrower list of the fastest-growing companies), the volatility and tracking error also increase, and the information ratio erodes modestly with more concentration. Concentration has little impact on the Sharpe ratios.

Panel B and C presents the multifactor risk-adjusted results. Consistent with the total returns in Panel A, the market-capitalization version of the growth portfolio is dominated in every case by the fundamentally weighted portfolio. However, while Panel A shows no gain in Sharpe ratio as portfolios become more concentrated, Panel B shows a boost in the alpha, going from 1.7% for the FG 1000 to 6.4% for FG 100. With compounding, as compared with CW Growth, we wind up with eight times the ending wealth, after just over 55 years. In contrast to the raw returns, this boost does not come at the cost of statistical significance. The *t*-statistic for the FG 1000 is 4.0 and 4.9 for the concentrated FG 100. These results are robust to adding more factors. Panel C shows that t-statistic for FG 1000 is 3.0 and for FG 100, 5.8.

The role of value and size are also evident in the results. Fundamental growth-weighted portfolios exhibit decreasing exposure to traditional value (HML) factors as concentration increases, signifying a more focused investment in true growth-oriented firms, rather than favoring firms that trade at high valuation multiples. The market capitalization portfolio also has a higher loading on size, reflecting the fact that we use price for weighting and selection.[9]

Overall, these findings underscore the advantages of explicitly aligning portfolio selection and weights with fundamental growth: enhancing returns and effectively managing investment risks relative to conventional market cap–weighted approaches.

Table 4. Selection and Weighting

A. Unadjusted returns and risk-adjusted returns (CAPM)

Mar/1969 - Dec/2024	Return	Volatility	CVaR	Max Drawdown	Sharpe Ratio	CAPM Alpha	t-stat	Turnover
CW 1000	10.6%	15.6%	-10%	-49.9%	0.39	0.1%	0.68	4%
CW Growth	10.7%	17.5%	-11%	-63.7%	0.35	-0.1%	-0.09	12%
Fundamental Growth 1000 (FG)	12.4%	16.5%	-10%	-48.5%	0.47	1.6%	3.54	17%
Fundamental Growth 1000 (CW)	11.0%	15.6%	-10%	-48.7%	0.41	0.5%	1.81	5%
Fundamental Growth 500 (FG)	12.7%	17.5%	-11%	-48.3%	0.46	1.7%	2.98	14%
Fundamental Growth 500 (CW)	11.5%	17.0%	-10%	-51.4%	0.41	0.7%	1.38	5%
Fundamental Growth 250 (FG)	13.4%	19.4%	-11%	-54.5%	0.46	2.2%	2.35	15%
Fundamental Growth 250 (CW)	12.2%	19.3%	-11%	-64.0%	0.39	1.1%	1.18	6%
Fundamental Growth 100 (FG)	15.3%	22.8%	-13%	-53.3%	0.47	3.7%	2.47	14%
Fundamental Growth 100 (CW)	13.4%	23.2%	-14%	-71.4%	0.38	2.0%	1.30	7%

[9] It bears mention that the concentrated FG 100 has a small-cap bias relative to CW Growth which is relatively modest and is - perhaps surprisingly - not much more concentrated than Russell 1000 Growth index, when measured by the effective number of stocks in each portfolio (measured by $1/\Sigma w_i^2$).

B. *Risk-adjusted returns (Fama-French 3-Factor + Carhart)*

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	WML Beta	R^2
CW 1000	0.1%	1.38	1.00	-0.11	0.00	0.00	1.00
CW Growth	1.3%	3.27	1.04	-0.12	-0.35	0.01	0.97
Fundamental Growth 1000 (FG)	1.7%	4.01	1.02	0.03	0.08	-0.05	0.97
Fundamental Growth 1000 (CW)	0.5%	2.56	0.99	-0.13	-0.01	-0.01	0.99
Fundamental Growth 500 (FG)	2.4%	4.27	1.04	0.05	-0.09	-0.03	0.95
Fundamental Growth 500 (CW)	1.6%	4.19	1.03	-0.11	-0.22	-0.01	0.97
Fundamental Growth 250 (FG)	3.8%	4.57	1.07	0.10	-0.28	-0.05	0.90
Fundamental Growth 250 (CW)	3.3%	4.33	1.08	-0.08	-0.44	-0.04	0.92
Fundamental Growth 100 (FG)	6.4%	4.85	1.14	0.18	-0.50	-0.07	0.82
Fundamental Growth 100 (CW)	5.4%	4.24	1.16	0.00	-0.69	-0.06	0.84

C. *Risk-adjusted returns (Fama-French 5-Factor + Carhart)*

Mar/1969 - Dec/2024	Alpha	t-stat	Market Beta	SMB Beta	HML Beta	RMW Beta	CMA Beta	WML Beta	R^2
CW 1000	0.0%	-0.59	1.00	-0.10	0.01	0.03	0.00	-0.01	1.00
CW Growth	1.7%	4.57	1.02	-0.13	-0.25	-0.02	-0.19	0.02	0.98
Fundamental Growth 1000 (FG)	1.3%	3.04	1.02	0.05	0.04	0.07	0.06	-0.06	0.97
Fundamental Growth 1000 (CW)	0.0%	-0.01	1.00	-0.09	-0.01	0.11	0.01	-0.01	0.99
Fundamental Growth 500 (FG)	2.3%	4.09	1.04	0.06	-0.11	0.01	0.01	-0.04	0.95
Fundamental Growth 500 (CW)	1.6%	4.00	1.03	-0.09	-0.17	0.07	-0.10	0.00	0.97
Fundamental Growth 250 (FG)	4.4%	5.17	1.06	0.07	-0.25	-0.09	-0.10	-0.05	0.90
Fundamental Growth 250 (CW)	3.9%	5.24	1.06	-0.10	-0.31	-0.04	-0.25	-0.03	0.93
Fundamental Growth 100 (FG)	7.8%	5.80	1.11	0.13	-0.40	-0.17	-0.27	-0.05	0.83
Fundamental Growth 100 (CW)	7.3%	5.88	1.10	-0.07	-0.43	-0.17	-0.55	-0.03	0.86

Notes: This table evaluates the performance of fundamental growth portfolios under different selection and weighting schemes from March 1969 to December 2024. Panel A presents unadjusted return statistics, including annualized return, volatility, CVaR, max drawdown and Sharpe ratio, together with annualized CAPM alpha, *t*-statistic, and turnover for portfolios selecting the top 1,000, 500, 250, and 100 stocks by fundamental growth rate. Conditional Value at Risk (CVaR) is calculated as the average realized return in the lower 5% tail of the empirical return distribution (i.e., returns below the 5th percentile). The portfolios are weighted by either fundamental growth magnitude (FG) or market capitalization (CW). Panel B reports alphas and factor loadings based on the Fama-French three-factor + momentum. Panel C extends this analysis by estimating alphas and factor exposures using the Fama–French five-factor model (market, size, value, profitability, and investment) plus momentum. This specification allows us to assess whether the performance of the fundamental growth portfolios is explained by exposures to profitability or investment factors. The results show that the portfolios continue to earn large and statistically significant alphas under the five-factor model. Across all levels of concentration, fundamental growth-weighted portfolios dominate their market cap-weighted counterparts. Performance improves with greater concentration, particularly for the top 250 and top 100 portfolios.
Source: Research Affiliates; data from CRSP/Compustat.

5.2 Return Decomposition by Source

Next, we follow the return decomposition in Brightman, Clements, and Kalesnik (2017), which breaks portfolio log returns into three key components: income return, earnings per share (EPS) growth, and valuation change (P/E expansion). This framework helps distinguish sustainable, fundamentals-driven returns from those reliant on multiple expansion.

In **Table 5**, we apply this decomposition to excess returns, relative to the CW 1000 benchmark, for fundamental growth portfolios across different levels of concentration and weighting. We measure total return, price (ex-dividend) return, and P/E ratios directly, and compute earnings growth from the implied earnings series constructed using prices and P/E ratios. Valuation effects are captured by changes in the P/E multiple. At each level, from 1,000 to 100 stocks, the growth-weighted portfolios deliver higher excess returns than their cap-weighted counterparts. This performance advantage is consistently driven by stronger EPS growth rather than by dividends or valuation expansion. For instance, the FG 100 portfolio achieves a 4.1% log excess return, primarily fueled by 5.7% EPS growth. Its cap-weighted equivalent delivered a 2.4% log excess return, underperforming FG 100 in all three dimensions: EPS growth, income return, and revaluation, albeit by small margins for the latter two. Excess return contributions from income are uniformly negative, meaning that the growth portfolios delivered lower dividend yields than the overall market. And valuation effects (P/E expansion) are small, but mostly negative. This means that the relative valuation of most of these strategies has become slightly cheaper, particularly relative to CW Growth. These results confirm that the excess performance of the fundamental growth strategy is rooted in real, fundamentals-based growth rather than market-driven re-rating or payout effects.

Table 5. Excess Return Decomposition by Source of Return

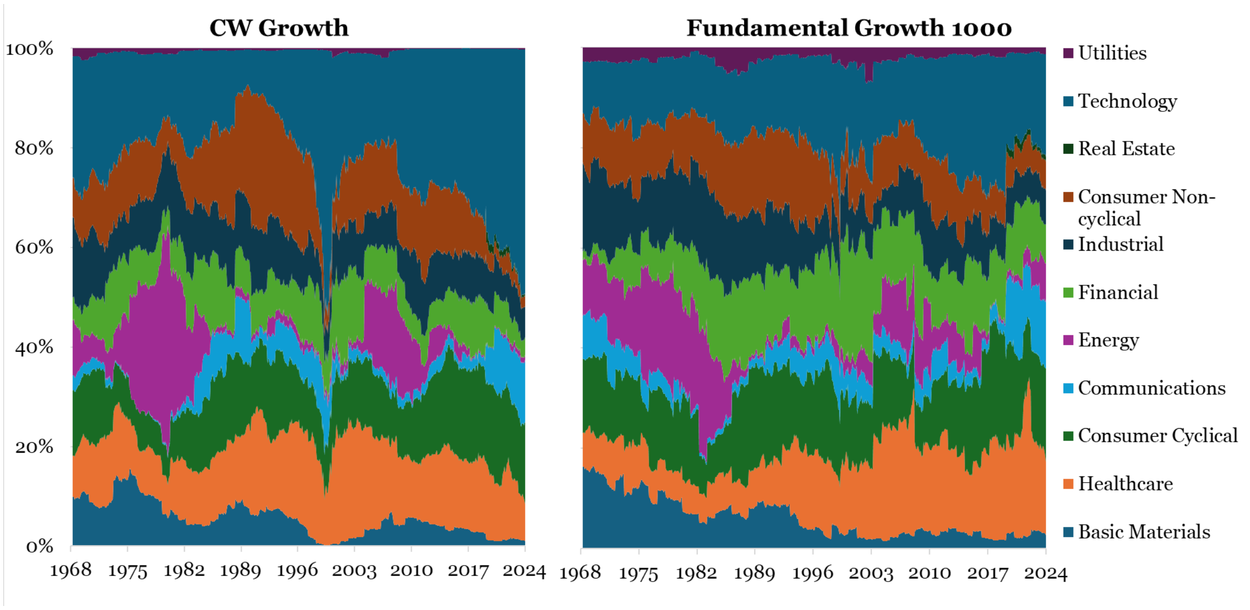
Mar/1969 - Dec/2024	Log Excess Return	=	Income Return	+	EPS Growth	+	Valuation Change
CW Growth	0.1%		-0.8%		0.8%		0.1%
Fundamental Growth 1000 (FG)	1.6%		-0.2%		2.1%		-0.3%
Fundamental Growth 1000 (CW)	0.3%		-0.2%		0.5%		0.0%
Fundamental Growth 500 (FG)	1.9%		-0.6%		2.9%		-0.4%
Fundamental Growth 500 (CW)	0.8%		-0.8%		1.7%		-0.1%
Fundamental Growth 250 (FG)	2.5%		-1.1%		3.9%		-0.3%
Fundamental Growth 250 (CW)	1.4%		-1.3%		2.9%		-0.2%
Fundamental Growth 100 (FG)	4.1%		-1.8%		5.7%		0.2%
Fundamental Growth 100 (CW)	2.4%		-1.9%		4.5%		-0.1%

Notes: This table decomposes the log excess return of each portfolio relative to the CW 1000 benchmark from 1969 to 2024 into three components: income return (dividends), earnings per share (EPS) growth, and valuation change (P/E expansion). Portfolios are shown at multiple levels of concentration (1000, 500, 250, 100 stocks) and for both growth-weighted (FG) and market cap-weighted (CW) implementations. The decomposition highlights that the return advantage of growth-weighted portfolios is primarily driven by stronger EPS growth, with limited contribution from valuation change or income.
Source: Research Affiliates; data from CRSP/Compustat.

5.3 Sector Allocation Consistency

An analysis of sector allocation differences between CW Growth and FG 1000 reveals important differences. As shown in **Figure 5**, the CW Growth benchmark often experiences periods of extreme sector concentration. This is most evident for the technology sector, which exceeds 50% of the portfolio briefly during the early 2000s technology bubble and the more recent surge in technology valuations, and for the energy bubble in 1981, when energy was briefly 40% of the CW Growth index. The FG 1000 portfolio maintains a somewhat more stable and diversified sector exposure across the full sample period. This reduced susceptibility to sector-specific market extremes contributes to consistent performance across varied market cycles.

Figure 5. Sector Allocations: CW Growth vs. FG 1000 (March 1969–December 2024)



Notes: This figure compares the historical sector allocations for the CW Growth benchmark and the FG 1000 portfolio within the US equity market. Data spans from March 1969 to December 2024. The CW Growth benchmark exhibits notable periods of sector concentration, particularly within technology, around major market events (such as the early-2000s technology bubble) and more recently. In contrast, the FG 1000 portfolio demonstrates significantly more balanced and diversified sector allocations throughout the entire analysis period.
Source: Research Affiliates; data from CRSP/Compustat.

6 Robustness across Markets, Conditions, and Specifications

We now assess the robustness and generalizability of fundamental growth indices across global markets, economic regimes, and implementation choices. First, we assess performance outside the United States to test the strategy's generalizability across diverse economic and market structures. We then examine how the strategy performs under elevated market stress and macroeconomic uncertainty, including periods of heightened volatility, financial strain, and recession. Additional robustness checks, such as sensitivity to lookback horizons and alternative normalization methods, are provided in **Appendix**

B. Together, these analyses confirm the reliability of the fundamental growth framework across geographies, risk environments, and methodological choices.

6.1 International Results

While genuinely out-of-sample tests in the real world are hard to find, it is always useful to test a new idea in multiple samples (for example, elsewhere in the world). To test the general efficacy of our fundamental growth strategy outside the US, we apply the identical methodology to non-US developed markets, specifically the UK, Europe ex-UK, and Japan.

As these regional markets have fewer stocks than the US, we include 85% of the market rather than a fixed 1000-stock portfolio. For example, we rank companies in the UK by 5-year *percentage* sales growth.[10] Starting from the top of that list, we include in our portfolio the companies that provide 85% of the aggregate 5-year *nominal* UK sales growth, when weighted by their nominal sales growth. This approach better accommodates differences in market size and data coverage across regions.

For each region, we compute excess return versus a corresponding CW 85% benchmark, which selects and weight the top 85% of companies by cumulative market capitalization for that region, and the corresponding CW Growth portfolio, which follows the traditional cap-weighted growth-style portfolio, closely approximating the Russell methodology.

As shown in **Table 6**, the average return of the Fundamental Growth 85% portfolios consistently exceeds both the CW 85% and CW Growth benchmarks in each of our international regions. In the UK, the fundamental growth portfolio delivers 7.9% annualized return versus 6.8% for both benchmarks (broad market and growth), generating a positive information ratio of 0.17. In Europe ex-UK, the performance gap is wider, with the fundamental growth portfolio producing 2.0% excess return. The strongest relative performance is observed in Japan, where the fundamental growth

[10] As with the US, we first exclude the bottom 2% of the market, by market cap, to exclude stocks that would likely be severely illiquid.

portfolio outperforms the benchmarks by over 3% annually, with an information ratio of 0.70. Of these, although a 1% to 2% improvement in returns is economically meaningful, the UK and Europe ex-UK results fall short of statistical significance. The Japan results are highly significant, with an alpha t-statistic of 4.0 from a regression of the Japan fundamental growth portfolio on the Japan cap-weighted 85% benchmark portfolio.

Appendix B.3 evaluates more concentrated versions of international fundamental growth portfolios. When we form more concentrated international growth portfolios, that include the top 70%, 50%, or 25% of business growth in the economy, the more concentrated portfolios perform slightly better, albeit with more volatility.

Overall, the international results are both statistically and economically weaker than the US results. This could be the result of the smaller sample (from 1991 rather than 1969 for the U.S.). It is also the case that accounting conventions vary from U.S. standards. Despite the international results being statistically weaker, fundamental growth produces higher returns than either a cap-weighted market benchmark or a cap-weighted growth benchmark.

Table 6. International Portfolio Performance across Regions

Mar/1991 - Dec/2024		Return	Volatility	CVaR	Max Drawdown	Sharpe Ratio	Excess Return	Tracking Error	Info Ratio	Turnover
UK	CW 85%	6.8%	15.9%	-10%	-56%	0.26				6%
	CW Growth	6.8%	15.5%	-9%	-55%	0.27	0.0%	4.6%	0.01	17%
	Fundamental Growth 85%	7.9%	18.0%	-11%	-61%	0.29	1.1%	6.4%	0.17	18%
EUxUK	CW 85%	7.9%	17.9%	-12%	-58%	0.30				6%
	CW Growth	7.8%	17.1%	-11%	-59%	0.30	-0.2%	4.1%	-0.04	15%
	Fundamental Growth 85%	9.9%	21.9%	-14%	-61%	0.34	2.0%	8.5%	0.24	18%
JP	CW 85%	2.7%	17.9%	-10%	-60%	0.01				3%
	CW Growth	2.2%	18.9%	-11%	-71%	-0.02	-0.5%	4.6%	-0.11	14%
	Fundamental Growth 85%	5.8%	18.0%	-10%	-48%	0.18	3.1%	4.4%	0.70	17%

Notes: This table presents annualized performance statistics from March 1991 to December 2024 for international portfolios in the UK, Europe ex-UK, and Japan. Each row compares the Fundamental Growth 85% portfolio with two benchmarks: CW 85%, which selects and weights the top 85% of firms by cumulative market capitalization, and CW Growth, which follows the traditional growth methodology that includes price-based growth indicators within that same universe.
Source: Research Affiliates; data from Worldscope/Datastream.

6.2 Sensitivity to Market Stress and Frictions

To examine how market and economic stress affect strategy performance, we segment the sample into high and low periods based on five measures that capture both implementation costs and systemic risk following Harvey, Mazzoleni and Melone (2025). High and low designations are defined relative to the historical median of each measure. Idiosyncratic volatility (Ivol) proxies for stock-level arbitrage constraints, as higher firm-specific risk increases trading costs and impedes price correction (Pontiff 1996, 2006). We follow Garcia, Mantilla-Garza, and Martellini (2014) in computing Ivol as the cross-sectional standard deviation of daily CRSP residuals, aggregated monthly.

We also include three indicators of aggregate market and economic stress: the VIX, which measures implied equity volatility; the Kansas City Financial Stress Index (KCFSI), which reflects funding strain across equity, credit, and interest rate markets; and economic policy uncertainty (EPU), using the index of Baker, Bloom, and Davis (2016). Finally, we segment by NBER-defined recession periods to assess cyclical macroeconomic effects.

To ensure comparability, we examine two strategy differentials matched by portfolio size. The first compares FG 1000 to CW 1000, each comprising 1,000 stocks. The second compares FG 500 to CW Growth, both of which include roughly 500 stocks.

The results in **Table 7** reveal an interesting pattern - the outperformance of fundamental growth strategies is concentrated in periods of elevated market and economic stress or systemic risk. Across multiple measures of stress (idiosyncratic volatility, the VIX, financial stress, and economic policy uncertainty) excess returns are significantly higher during high-friction periods compared with low-friction ones. This pattern holds across both comparisons: FG 1000 versus CW 1000 and FG 500 versus CW Growth, suggesting that the effects are not attributable to differences in portfolio size, scope, or concentration.

One interpretation is that periods of heightened risk amplify market inefficiencies, especially for growth-oriented stocks with long-duration cash flows. In such environments, investors may become more short-term oriented or constrained by risk limits, leading to greater mispricing of firms with strong underlying fundamentals. Fundamental growth strategies - by reweighting portfolios toward companies with robust growth in fundamentals rather than market capitalization - may be better positioned to capture these transient valuation gaps.

Alternatively, these results are consistent with a limits-to-arbitrage interpretation. When volatility and systemic risk are high, arbitrage capital becomes more constrained, and mispricings are more likely to persist. Fundamental growth strategies appear to benefit from this dynamic, outperforming precisely when traditional arbitrage mechanisms are impaired.

Of course, in periods of illiquidity, transactions costs are heightened – potentially diminishing returns. There are, however, reasons to believe that transactions costs (or lack thereof) are not driving our results. First, portfolios are rebalanced once per year in March, so periods of elevated market stress do not mechanically coincide with increased trading activity or implementation costs. Our key results show that the annual turnover of the FG 1000 portfolio is 17% compared to 12% for the CW Growth benchmark, which itself incurs transaction costs, and 4% for the cap-weighted market index (**Table 3)**. The difference is even smaller for the international markets. These are low turnover portfolio strategies. Another exercise is to determine the transactions costs level that would eliminate the strategy's CAPM alpha. We find that transaction costs would need to exceed approximately 9% per dollar traded,[11] a level well above conventional estimates for liquid, large-cap equity strategies and well outside the range under which most low-turnover anomalies survive after costs (Novy-Marx and Velikov, 2016). This analysis is consistent the fundamental growth portfolio providing excess returns even after allowing for transactions costs.

[11] This estimate represents a break-even bound based proportional trading costs applied to observed portfolio turnover rather than a calibrated estimate of realized trading costs. See Appendix B for more details, and Novy-Marx and Velikov (2016) for a comprehensive analysis of trading cost magnitudes across equity anomalies.

The most important insight here is that the alpha generated by fundamental growth strategies is countercyclical: it tends to appear in environments of elevated uncertainty, when investor sentiment is weak and risk-bearing capacity is diminished. In this sense, fundamental growth delivers alpha when investors need it most, offering a potential hedge or stabilizing force during periods of market dislocation -- this is often referred to as "crisis alpha".

Table 7. Annualized Outperformance of Fundamental Growth across High and Low Stress Periods

	FG 1000 minus CW 1000			FG 500 minus CW Growth		
	High/Yes	Low/No	Difference	High/Yes	Low/No	Difference
Ivol	3.13***	0.12	3.01***	3.72***	0.14	3.58**
	(4.00)	*(0.24)*	*(2.97)*	*(3.03)*	*(0.19)*	*(2.30)*
VIX	3.46***	1.66**	1.79	3.79**	0.91	2.88
	(3.05)	*(2.40)*	*(1.36)*	*(1.97)*	*(0.95)*	*(1.34)*
Liquidity	4.09***	1.01*	3.07**	4.09**	0.51	3.57*
	(3.48)	*(1.69)*	*(2.32)*	*(2.11)*	*(0.56)*	*(1.67)*
NBER Recessions	1.61***	2.71	1.10	1.56*	3.34	1.78
	(3.24)	*(1.49)*	*(0.75)*	*(1.93)*	*(1.43)*	*(0.77)*
Econ Uncertainty	2.04***	1.36*	0.67	1.88*	1.66	0.22
	(3.09)	*(1.85)*	*(0.68)*	*(1.78)*	*(1.52)*	*(0.14)*

Notes: This table reports annualized excess returns and corresponding *t*-statistics (in parentheses) for two fundamental growth strategies relative to matched cap-weighted benchmarks. FG 1000 and CW 1000 each consist of the top 1,000 US stocks, while FG 500 and CW Growth each include approximately 500 stocks. Each column compares performance during high and low periods of market frictions, defined as months above and below the historical median of each measure. Friction measures include idiosyncratic volatility (Ivol), the VIX, the Kansas City Financial Stress Index, NBER recession periods, and the economic policy uncertainty index. All performance is evaluated from March 1969 to December 2024, except for the VIX (January 1990–December 2024) and Liquidity (KCFSI, February 1990–December 2024), which begin later due to data availability. Portfolios are rebalanced annually in March; therefore, periods of elevated market or economic stress do not mechanically coincide with increased trading activity or higher transaction costs. Asterisks denote statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

7 Conclusions

Conventional approaches to value and growth indices classify stocks as either value or growth. Indeed, an equal allocation to mainstream value and growth indices delivers the cap-weighted market portfolio. We offer two simple insights. First, why not exclude expensive low-growth stocks from both portfolios? Second, why not weight stocks in a growth portfolio in proportion to the magnitude of growth that they have delivered rather than in proportion to the price or market cap of the stock?

We do not explicitly use price information for either selection or weighting of the growth stocks in a fundamental growth index. Specifically, a stock with a high valuation does not automatically qualify as a growth stock in our classification. To qualify for inclusion, a stock must exhibit growth in fundamentals. Excluding stocks that are both slow growing and expensive from *both* value and growth classifications makes an important difference. Our measure of fundamental growth focuses on innovation (R&D and Capex growth) and business performance (including growth in sales, gross profit, net income, and cash flow). The stocks within our fundamental growth portfolio are then weighted by fundamental information, not market capitalization, consistent with our approach of avoiding price information.

Our empirical results show that our composite growth index significantly outperforms conventional cap-weighted growth. The CAPM alpha for the composite fundamental growth index is 1.6% bps with a *t*-statistic of over 3.5. In contrast, a cap-weighted growth index has essentially zero CAPM alpha. We consider a battery of robustness tests focusing on selectivity (number of stocks in index), and in Appendix B, we evaluate different lookback horizons (three to five years for calculating growth) and an alternate denominator for normalizing growth rates (i.e., total assets vs. sales). We also show that in a handful of international applications (UK, Europe ex-UK, and Japan), a fundamental growth approach exhibits excess, albeit weaker, performance relative to cap-weighted growth.

We also analyze the consistency of outperformance relative to both a traditional cap-weighted growth index and a broad-market cap-weighted index. In short, the fundamental growth index shows a strong general pattern of outperformance across markets, across time, and in various economic environments. Importantly, the largest outperformance is during periods of market stress, which is exactly when investors most need outperformance.

Overall, our message is simple: if an investor wants to invest in growth, then they should focus on the fundamental characteristics of the company. Further, efforts should be made to reduce the dependence on measures linked to stocks prices (or valuation multiple) in both the selection and weighting measures for portfolio formation. In the end, our approach suggests that neither growth nor value portfolios should seek to hold stocks that are both expensive *and* exhibit low fundamental growth rates.

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Appendix A: A Brief History of Cap-Weighted Style Indices

The earliest and best known of the style indices were the Russell Growth and Value indices launched in 1978. Before 1995, Russell indices used only book/price as the signal to divide value versus growth. In 1993, an overlapping region was added, with stocks apportioned partly to growth and partly to value. Previously, there was no overlap; the growth and value portfolios were mutually exclusive. In 1995, Russell added long-term IBES growth forecasts, favoring stocks with faster expected growth for Russell Growth and favoring stocks with low growth expectations for Russell Value, and in 2011, they added five-year historical sales growth and medium-term IBES growth forecasts to further introduce fundamental growth measures into the growth/value distinction.

In 2015, Russell Research introduced the Russell Pure Style Indexes, which form value and growth indices that are concentrated (with no overlap between value and growth) and style-weighted rather than market cap-weighted. These indices still select and weight based on a combined signal value that includes B/P and sales growth. Thus, the Pure Indexes are configured as in Panel C but without the overlapping region.

FTSE Global Style Indexes were introduced in 2018 and apply the current Russell (standard) style methodology (with the same signals) and portfolio to the FTSE Global Equity Index series covering global markets.

MSCI value/growth creates a separate value *z*-score and a growth *z*-score and then normalizes them to sum to 1, effectively creating a composite-blend value and growth. The composite is used to divide the universe into growth and value. Unlike the other index providers, MSCI matches country allocations in their World and ACWI value and growth indices to their World and ACWI indices. In other words, if Poland is cheaper than India, that does not mean that Poland has a higher weight in ACWI Value than in ACWI Growth, nor does it mean that India has a higher weight in ACWI Growth than in ACWI Value. In each rebalance, the country weights are reset to match for the three indices.

S&P also divides the universe into growth and value stocks and has an overlap. Growth signals are three-year sales growth, three-year change in EPS/price ratio, and 12-month momentum. S&P launched its Pure Style indices in 2005. Only growth signals are used for the "pure" growth index, and only value signals are used for "pure" value. But S&P intentionally creates no overlap between pure value and growth indices. Each pure index is weighted by its own style score. And importantly, S&P "pure" growth includes price momentum as a signal.

Russell and S&P also have a newer second generation of "pure" style indices.

For more detail on the history and evolution of growth and value style indices, see the following:

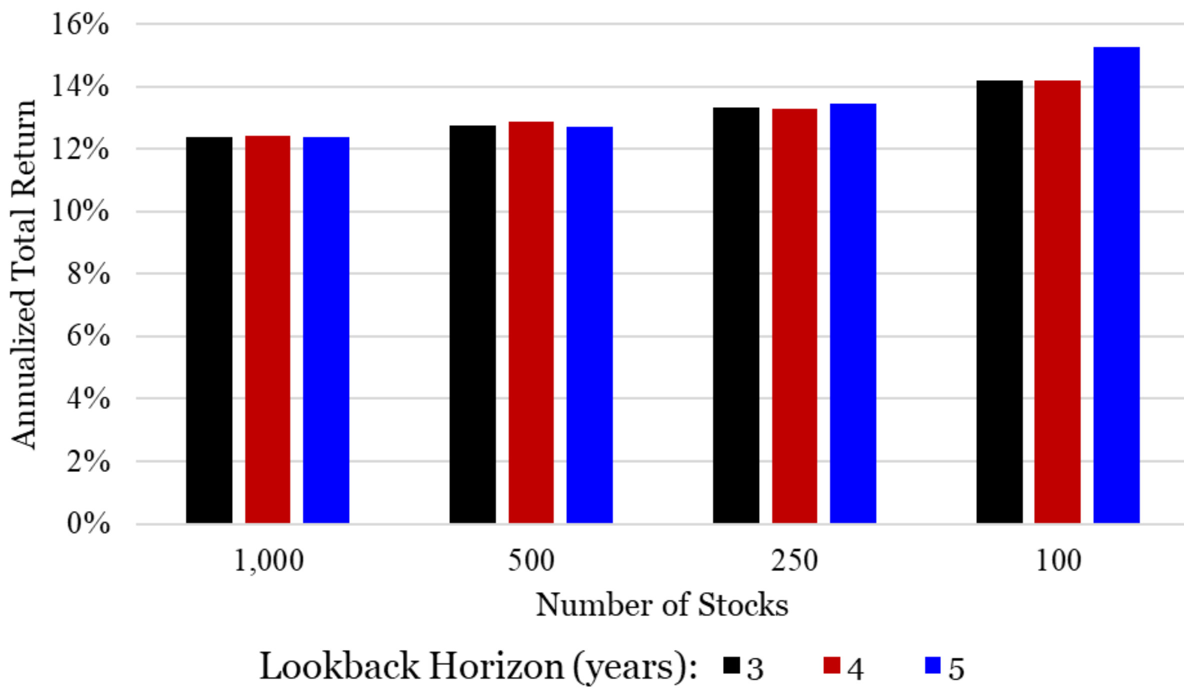
- FTSE Russell, "Russell Growth and Value Indexes: The Enduring Utility of Style" (January 2021) [LINK];
- FTSE Russell, "Russell Pure Style Indexes" (2016) [LINK];
- MSCI, "MSCI Global Investable Market Value and Growth Index Methodology" (September 2017) [LINK];
- S&P Dow Jones Indices, "US Style Indices Methodology" (June 2025) [LINK];
- S&P Dow Jones Indices, "Distinguishing Style from Pure Style" (January 2019) [LINK];
- and FTSE Russell, "Global Style Index Series Methodology," (July 2024) [LINK].

Appendix B: Robustness Checks

B.1 Sensitivity to Lookback Horizon

To assess the robustness of our growth-signal construction, we evaluate the performance of long-only portfolios using alternative trailing horizons for 3-year, 4-year, and 5-year periods to computing both the magnitude and rate of growth. As shown in **Figure B1**, the resulting total returns are highly stable across all lookback periods, regardless of portfolio concentration.

Figure B1. Sensitivity to Growth-Signal Lookback Horizon



Notes: This figure shows the annualized total returns of long-only fundamental growth portfolios formed using different trailing lookback periods—3 years, 4 years, and 5 years—to compute both the magnitude and rate of growth. Returns are shown across portfolios with varying degrees of concentration (1,000, 500, 250, and 100 stocks).
Source: Research Affiliates; data from CRSP/Compustat

While there is a modest improvement in performance with longer lookbacks, particularly in more concentrated portfolios (e.g., FG 100), these differences are small and statistically insignificant. This insensitivity to lookback horizon suggests that our fundamental growth signal is robust and not overly dependent on the specific time window used to measure past fundamental improvement. It reinforces the reliability of the strategy across various historical estimation periods.

B.2 Robustness to Transaction Costs

To evaluate whether trading frictions materially affect the performance of the Fundamental Growth portfolios, we conduct a robustness test following the transaction-cost methodology of (Novy-Marx and Velikov 2016) and (Detzel, Novy-Marx and Velikov 2023). Transaction costs are modeled as a 1-way cost per dollar traded, applied directly to each portfolio's monthly one-sided turnover.

The Fundamental Growth 1000 portfolio exhibits annual one-sided turnover of 17%, implying that only 17 cents of each dollar in the portfolio is traded over the course of a typical year. Under the Novy-Marx–Velikov framework, the return impact of trading frictions is therefore:

$$Cost\ Drag \approx 1 - way\ Cost \times Turnover$$

Using the Novy-Marx and Velikov (2016) empirical estimate of approximately 1% per dollar traded, the implied annual drag on performance is roughly 17 basis points, which is economically small relative to the portfolio's multi-percentage-point annual alpha.

To assess the full range of plausible trading-cost environments, we compute net-of-cost returns, Sharpe ratios, alphas, and t-statistics under assumed 1-way costs ranging from 0% to 10% per dollar traded. Table B.2 reports the results. Using the empirically grounded 1% cost assumption, the Fundamental Growth portfolio's CAPM alpha remains large and statistically significant (t-stat = 3.16). Statistical significance is lost only at assumed trading-cost levels of approximately 4%, and alpha becomes economically negligible only at extreme and implausible cost levels near 9%, well above any estimates for liquid U.S. equities.

This analysis ignores the fact that the mainstream CW Growth portfolios also incur trading costs. If we are comparing Fundamental Growth with conventional CW Growth indices, the impact on relative performance is the difference between two "cost drags." If both indices are equally easy to trade (a plausible assumption), and the difference in turnover is a slender 5%, then the annual drag on performance is a minimal 5 basis points.

Overall, these results demonstrate that transaction costs do not drive the performance of the Fundamental Growth portfolios, and the strategy remains robust under even highly conservative assumptions.

Table B2. Sensitivity to Transaction Costs

Assumed 1-way Cost per Dollar Traded	Return	Sharpe Ratio	CAPM Alpha	t-stat	Note
0%	12.4%	0.47	1.6%	3.54	
1%	**12.2%**	**0.46**	**1.4%**	**3.16**	Emprical Cost (Novy-Marx, Velikov, 2016)
2%	12.0%	0.45	1.2%	2.77	
3%	11.8%	0.44	1.1%	2.37	
4%	**11.6%**	**0.43**	**0.9%**	**1.98**	$p < 0.05$ Threshold
5%	11.4%	0.41	0.7%	1.59	
6%	11.3%	0.40	0.6%	1.20	
7%	11.1%	0.39	0.4%	0.82	
8%	10.9%	0.38	0.2%	0.45	
9%	**10.7%**	**0.37**	**0.0%**	**0.08**	Alpha ≈ 0
10%	10.5%	0.35	-0.1%	-0.27	

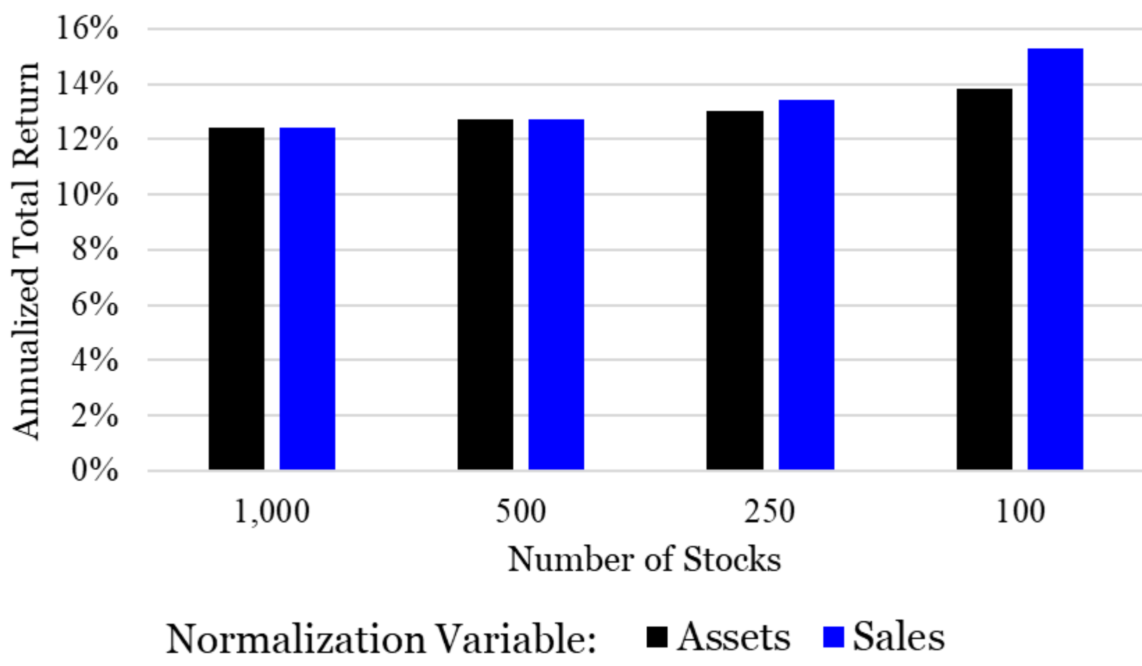
Notes: This table reports net-of-cost annual returns, Sharpe ratios, and CAPM alphas for the Fundamental Growth 1000 portfolio from Marh 1969 through December 2024, under alternative assumed 1-way trading costs, expressed as the cost per dollar of one-sided turnover. Following Novy-Marx and Velikov (2016, 2023), trading costs are applied directly to the portfolio's realized one-sided turnover (17% per year). For example, a 1% cost corresponds to paying one cent per dollar traded, yielding an implied annual performance drag of approximately 17 basis points. Bold rows highlight (i) the empirical cost estimate of

1%, (ii) the cost level at which alpha loses statistical significance (≈4%), and (iii) the point at which alpha becomes economically negligible (≈9%). Costs are not annualized; they scale linearly with turnover.

B.3 Normalizing Growth Rates by Assets

To evaluate the robustness of our growth rate construction, we compare portfolio performance using two alternative normalization variables: sales per share (our baseline) and assets per share. As shown in **Figure B3**, the results are remarkably consistent across both methods, with only minor differences in total return across all portfolio sizes. While normalization by sales generally delivers slightly higher returns, particularly in more concentrated portfolios, the differences are neither economically nor statistically significant. This consistency reinforces that our results are not sensitive to the specific scale variable used and that either normalization approach provides a reliable signal of relative fundamental growth*, as long as we are not normalizing by market cap or share price.*

Figure B3. Sensitivity to Growth-Rate Normalization Method



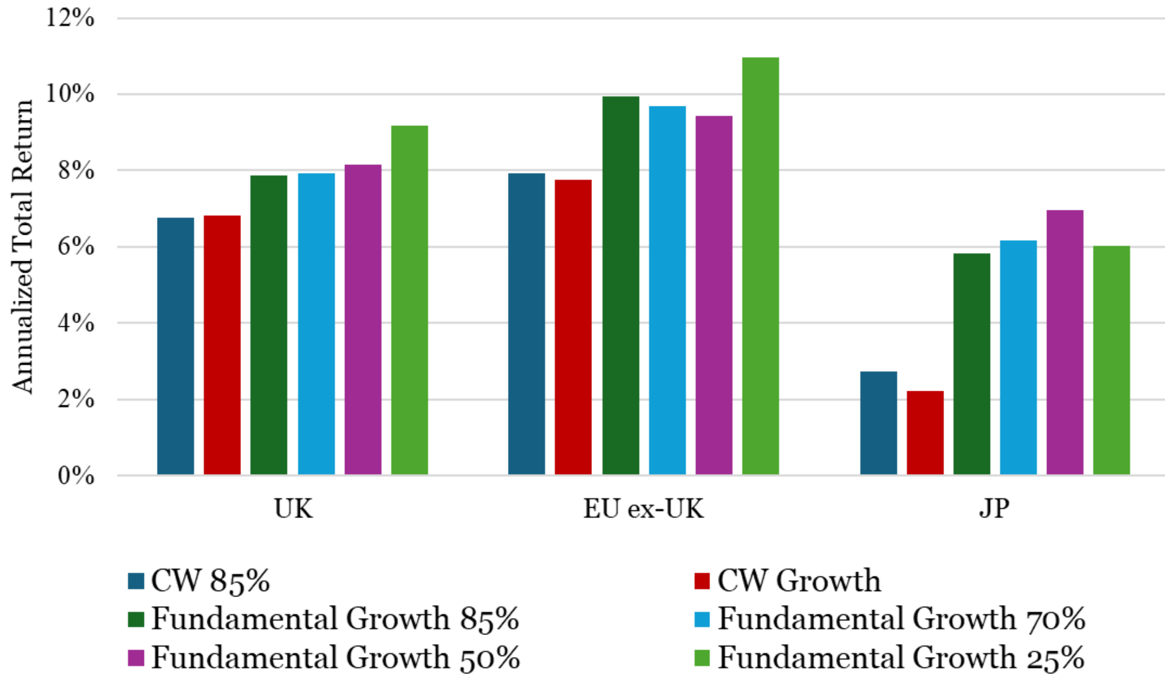
Notes: This figure compares the annualized total returns of fundamental growth portfolios constructed using two different normalization variables for calculating growth rates: *assets* (black) and *sales* (blue). Results are shown across portfolio sizes (1000 to 100 stocks).
Source: Research Affiliates; data from CRSP/Compustat.

B.4 International Performance by Concentration Levels

As shown in **Figure B4**, this method delivers consistent excess returns across all three regions—UK, Europe ex-UK, and Japan—with the highest excess returns generally observed in more concentrated portfolios. Japan shows particularly strong results, where the Top 50 and Top 70 portfolios deliver 4%–5% annualized excess returns relative to the CW 85% and CW Growth benchmarks. These findings support both the adaptability and effectiveness of the fundamental growth strategy in international markets.

The results in Japan also show a general pattern of improvement as portfolio concentration increases, despite a lower baseline for market returns. Overall, these findings support the robustness and portability of the fundamental growth framework across diverse regional markets.

Figure B4. International Portfolio Performance across Regions and Concentration Levels



Notes: This figure presents the annualized total returns of long-only fundamental growth portfolios in three non-US regions: UK, Europe ex-UK, and Japan. Portfolios are constructed using the same growth-based selection and weighting methodology applied in the US, with various concentration levels (top 85%, 70%, 50%, and 25% of the investable universe) compared with CW 85% and CW Growth benchmarks.
Source: Worldscope/Datastream; results span March 1991 to December 2024.