Value vs. Growth: What Drives the Value Premium?

Linda H. Chen, CFA, Wei Huang, and George J. Jiang[☆]

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[☆] Linda H. Chen, CFA, is Associate Professor of Accounting at the University of Idaho, College of Business and Economics, Moscow, Idaho. Wei Huang is Assistant Professor of Finance at the University of Minnesota Duluth, Labovitz School of Business and Economics, Duluth, Minnesota. George J. Jiang is the Gary P. Brinson Chair of Investment Management and Professor of Finance at the Washington State University, Carson College of Business, Pullman, Washington. Send correspondence to George J. Jiang at george.jiang@wsu.edu

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Abstract

Each year, a significant number of stocks transition from non-value stocks to value stocks and likewise from non-growth stocks to growth stocks. As a result, about half of value stocks and half of growth stocks are new. We find that the value premium based on new value and growth stocks is statistically higher than that based on old value and growth stocks, mostly driven by the underperformance of new growth stocks. In addition, we find that the large value premium for new value and growth stocks is more pronounced during contraction, Fed monetary tightening cycle, subperiods with high long-term yields, and high economic uncertainty. Moreover, we show that the large value premium for new value and growth stocks is mainly the across-industry effect. Finally, international evidence further confirms the findings.

Keywords: Value premium; New value stocks; New growth stocks; Time-varying performance

JEL Classification: G11; G12; G14

I. Introduction

The literature documents a well-known value premium: value stocks (firms with high book-to-market ratio) on average significantly outperform growth stocks (firms with low book-to-market ratio) (see, e.g., Stattman, 1980; and Fama and French, 1992). Fama and French (1993) formalize this premium as a key component of their three-factor model.

What drives the value premium? Despite the consensus on the existence of the value premium, the potential explanations remain the center of debate in the literature. Two main explanations are risk-based theories and behavioral theories. Fama and French (1992, 1993, 1995, 1996) argue that the book-to-market ratio captures risk of financial distress, which is not accounted for by the CAPM. In contrast, Lakonishok, Shleifer, and Vishny (1994) find no evidence that value stocks are inherently riskier. Instead, they attribute the premium to investor mispricing. For a review of related literature, please refer to Section III. A.

This paper examines what subsamples of stocks contribute more to the value premium and under what market conditions the value premium is more pronounced. Our study is motivated by the observation that each year, a substantial number of stocks transition into the value or growth category. On average, about half of value and growth stocks are new in a given year as they are not categorized as value or growth over the previous two years. We find that new value stocks deliver slightly higher returns than incumbent value stocks, whereas new growth stocks substantially underperform incumbent growth stocks. As a result, over the period from 1970 to 2024, the value premium based on new value and growth stocks (0.326% in monthly returns) is significantly higher than that based on incumbent value and growth stocks (0.147% in monthly returns). The spread in monthly alpha between new value and growth stocks (0.133%) is higher than that between old value and growth stocks (-0.272%). The difference in alpha spread has a large magnitude of 0.405% and is statistically significant. Moreover, the Sharpe ratio of the value premium based on new value and growth stocks (0.076) is higher than the Sharpe ratio of that based on incumbent value and growth stocks (0.038). In addition, the skewness of the value premium based on new value and growth stocks (0.341) is higher than that based on incumbent value and growth stocks (0.052), whereas the excess kurtosis of the value premium based on new value and growth stocks is also substantially higher (4.488) than that based on incumbent value and growth stocks (0.704). That is, the value premium based on new value and growth stocks has a much more favorable distribution to investors, with higher average return, higher alpha, higher Sharpe ratio, positive skewness, and fat right tail.

To understand the differences between new and old value and growth stocks, we compare their firm characteristics. The comparison shows that new value stocks tend to be younger and exhibit significantly higher sales growth and stronger profitability than old value stocks. New growth stocks tend to be younger and smaller, with higher sales growth and investment. However, they display weaker fundamentals, higher financial leverage, and lower profitability compared to their incumbent counterparts, despite being priced at relatively high valuations. One key driver behind the change in value and growth classification appears to be past stock performance or changes in market capitalization. Specifically, over the past two years, new value stocks have significantly lower returns than incumbent value stocks, whereas new growth stocks have significantly higher returns than incumbent growth stocks.

We perform several robustness checks of our main findings. First, we replicate our analysis using classifications of old and new value and growth stocks based on year t-1 or year t-2 only. The results show that the classification based on year t-1 or year t-2 both contributes to our findings. Second, our study is closely related to Baba-Yara, Boons, and Tamoni (2024) who examine how the persistent and transitory components of firm characteristics shape return predictability. Specifically, they sort stocks into decile portfolios based on the most recent book-to-market ratio ("new" sorts) and book-to-market ratio observed 36 months earlier ("old" sorts). They show that the value premium based on "old" sorts is significantly higher than that based on "new" sorts. In our main analysis, we follow the conventional Fama-French approach and classify stocks into value and growth each June using NYSE 30th and 70th percentile breakpoints. In addition, when classifying "old" value and growth stocks, we focus on consistent ranking over three consecutive years (years t-2, t-1, and t). Our main finding is that the value premium based on "new" stocks is significantly higher than that based on "old" stocks. To reconcile the differences, we first replicate the analysis in Baba-Yara, Boons, and Tamoni (2024) and confirm their findings. We then replicate our analysis using year t-3 to classify "old" or "new" value and growth stocks. The value premium based on "new" stocks is indeed lower than that based on "old" stocks. However, the difference is insignificant, suggesting that the significant difference in Baba-Yara, Boons, and Tamoni (2024) is mainly driven by stocks in the extreme deciles. Third, we follow Asness and Frazzini (2013) and update the market value in book-to-market ratio using more timely data. The results are consistent with our main findings. Fourth, we follow Fama and French (2007) and classify value (or growth) stocks that have the same classification in the holding period as the "same" and those that do not have the same classification as "other". We find consistent patterns as in Fama and French (2007).

In addition, we perform regressions of the "new" value premium (based on new value and growth stocks) on the Fama and French five factors plus the momentum factor. The results show that existing factors explain less than 60% of the variation in the "new" value premium, and the "new" value premium is not subsumed by existing factors. Similarly, we show that the “new” value premium is not subsumed by the “old” value premium (based on old value and growth stocks). Furthermore, we find that, compared to old growth stocks, new growth stocks exhibit significant and stronger long-term reversal. This suggests that the underperformance of new growth stocks is likely associated with the reversal effect in stock returns.

Consistent with the literature (Fama and French, 2017; 2021; Israel, Laursen, and Richardson, 2021), we observe a substantial variation in value premium over time. Interestingly, we observe that the relative outperformance of the value premium based on new value and growth stocks is more pronounced during periods when the overall value premium is also strong. Gonçalves and Leonard (2023) document a decline in the value premium toward the end of their sample period in 2018. Extending the sample to 2024, we observe a renewed uptick in the value premium in more recent years. More importantly, we find strong and consistent outperformance of the value premium based on new value and growth stocks during the recent period.

The literature shows that the performance of value stocks relative to growth stocks is associated with economic conditions. Several studies document that value stocks are riskier than growth stocks during economic downturn due to high price of risk (Liew and Vassalou, 2000; Lettau and Ludvigson, 2001; Chan and Lakonishok, 2004; Petkova and Zhang, 2005; Zhang, 2005). The valuation of growth stocks, often characterized as long-duration assets, tends to be more sensitive to interest rate or discount rate changes (Jensen, Johnson, and Mercer, 1997; Campbell and Vuolteenaho, 2004; Lettau and Wachter, 2007). In addition, asset pricing is influenced by economic uncertainty (Bansal, Kiku, Shaliastovich, and Yaron, 2013; Brogaard and Detzel, 2015; Bali and Zhou, 2016). Finally, several studies argue that sentiment and behavioral biases also contribute to the value premium (Lakonishok, Shleifer, and Vishny, 1994;

La Porta, Lakonishok, Shleifer, and Vishny, 1997; Barberis and Shleifer, 2003; Chan and Lakonishok, 2004; Baker and Wurgler, 2006; Stambaugh, Yu, and Yuan, 2012).

In light of these insights, we expand our main analyses over various subperiods. Specifically, we divide our sample period into contraction and expansion, monetary tightening and easing cycles, high and low 10-year U.S. Treasury yield subperiods, high and low uncertainty subperiods, and high and low sentiment subperiods. We find that the value premium based on new value and growth stocks is substantially higher than that based on old value and growth stocks during the contraction period, monetary tightening cycle, high 10-year Treasury yield subperiod, and high uncertainty subperiod. In all these subperiods, the "new" value premium is significantly higher than the "old" value premium. The differences are also of high magnitude and economic significance. For instance, during economic contraction, the difference in monthly alpha between the "new" and "old" value premium is 0.707%. During the monetary tightening cycle, the difference in monthly alpha between the "new" and "old" value premium is 0.794%. The results also show that the "new" value premium is significantly higher than the "old" value premium during low sentiment period rather than high sentiment period.

We also examine to what extent our main findings are driven by the within-industry effect or the across-industry effect. The literature shows that cross-sectional variation in stock returns can be driven by industry effects (Moskowitz and Grinblatt, 1999; Banko, Conover, and Jensen, 2006). Following Gonçalves and Leonard (2023), we calculate the median book-to-market (B/M) ratio for each industry and the median-adjusted B/M ratio for firms within each industry. The results show that the high value premium based on new value and growth stocks is mostly attributed to the across-industry effect rather than the within-industry effect. Specifically, using industry median-adjusted B/M ratios, we find that the value premium based on new value and growth stocks is 0.149%, which is significantly higher than the value premium based on old value and growth stocks (-0.109%). This difference is also mainly driven by the underperformance of the new growth stocks relative to old growth stocks.

Finally, we examine the value premium in the international markets. We follow the procedures outlined in Jensen, Kelly, and Pedersen (2023) to process the international data. The results are largely consistent with those based on the U.S. data. Both value-weighted and equal-weighted results show that the value premium based on the new value and growth stocks is substantially higher than the value premium based on old value and growth stocks.

Our study provides new insights on the driver of value premium. We show that a significant portion of the value premium comes from stocks that are newly classified as value or growth. The value premium based on new value and growth stocks is stronger, both statistically and economically, than that based on incumbent stocks. This effect is most pronounced during periods of economic contraction, monetary tightening cycle, subperiods with high long-term yields and high economic uncertainty. The results of our study have direct implications for active investment strategies. For practitioners, distinguishing newly classified value and growth stocks from their incumbent counterparts can materially enhance the performance of style-investing. By recognizing style migration, investors can adopt a more dynamic approach to style-investing by refining portfolio allocation between value and growth and adjusting exposures more effectively over different market conditions.

II. Data and Methodology

We restrict our sample to common stocks (SHRCD = 10 or 11) traded on NYSE, AMEX, or NASDAQ (EXCHED = 1, 2, or 3) with monthly stock return data from the CRSP stock database and accounting data from Compustat. Following Fama and French (1993), we exclude utility firms (SIC in 4900s) and financial firms (SIC in 6000s). To be included in the sample, a firm must have stock return observations from December of year t-1 and June of t and book equity for year t-1. In addition, a firm must have at least two years' data in the Compustat database. The sample period is from January 1970 to December 2024.

We follow Fama and French (1993) and calculate the book-to-market ratio (B/M) at the end of each June using the book value of equity for the fiscal year ending in calendar year t-1 divided by the market value of equity at the end of December of year t-1. The book equity (BE) is calculated using Compustat annual data as the sum of stockholders' equity and deferred taxes and investment tax credit minus preferred stock. Only stocks with positive BE are included. The market equity is calculated as the price per share multiplied by the number of shares outstanding. Both variables are from the CRSP monthly file.

In June of each year t, we follow Fama and French (1993) and divide stocks in our sample into three B/M groups: top 30% (High), middle 40% (Medium), and bottom 30% (Low), based on the NYSE breakpoints of B/M ratio. Stocks in the top 30^{th} percentile are classified as value stocks (V), and stocks in the bottom 30^{th} percentile are classified as growth stocks (G). Each year t, we count the number of firms in the High (H(V)), Medium (M), and Low (L(G)) B/M group. Within each group, we calculate the percentage of firms that stay in the same B/M group or migrate to other groups in year t+1 and year t+2. Table 1 reports the average transition probabilities from year t to year t+1 and year t+2, respectively. From year t to year t+1, about 25.59% of value stocks and 22.94% of growth stocks migrate to other groups. From year t to year t+2, about 34.85% of value stocks and 30.38% of growth stocks migrate to other groups.

Next, we further divide value and growth stocks into old and new value and growth stocks. Old value stocks (OldV) are those that are classified as value stocks in year t that are also classified as value stocks in both year t-1 and year t-2. The remaining value stocks are classified as new value stocks (NewV). Old growth stocks (OldG) are those that are classified as growth stocks in year t that are also classified as growth stocks in both year t-1 and year t-2. The remaining growth stocks are classified as new growth stocks (NewG). Figure 1 plots the percentage of new value stocks out of the total number of value stocks and the percentage of new growth stocks out of the total number of growth stocks over our sample period. On average, about 51% of value stocks are newcomers, and 52% of the growth stocks are newcomers. Overall, the percentages are steady over time. This suggests a balance in sample size between the new and old value and growth stocks, which helps to ensure that the differences in subsequent performance are unlikely driven by a small number of stocks.

How do these new value and growth stocks differ from old value and growth stocks? We examine the differences in firm characteristics between new and old value and growth stocks. Each year, we calculate average size and age and value-weighted average of all other variables for new and old value and growth stocks as well as their differences. The detailed construction of firm characteristics is provided in the Appendix. Table 2 reports the time series average of the cross-sectional mean of all variables and the Newey-West t-statistics of the differences. The results show that relative to old value stocks, new value stocks are younger, have lower sales, and significantly higher sales growth rate. New value stocks have significantly lower investment and lower financial leverage. As measured by operating profitability, ROE and ROA, new value stocks exhibit more robust profitability. Based on CF/P and S/P, the valuation of new value stocks is higher relative to old value stocks. New value stocks, on average, have significantly lower returns over the past two years than old value stocks. Poor past stock performance or decrease in market capitalization seems to be an important factor that causes these non-value stocks to migrate to the value category.

The results in Table 2 also show that relative to old growth stocks, new growth stocks are smaller and younger firms. Relative to old growth stocks, new growth stocks have significantly weaker fundamentals in terms of sales, earnings, cash flows (CF), and free cash flows (FCF). On average, new growth stocks also have higher sales growth, higher investment, and higher financial leverage relative to old growth stocks. However, new growth stocks have significantly lower earnings growth rate, and weaker profitability, based on operating profitability, ROE, and ROA. As measured by E/P, new growth stocks have significantly higher valuation than old growth stocks. New growth stocks, on average, have significantly higher returns over the past two years than old growth stocks. High stock performance or increase in market capitalization seems to be one of the reasons that drive the migration of these non-growth stocks to the growth category.

III. What Drives the Value Premium?

A. Literature Review

There are two main categories of explanations for the value premium: risk-based theories and behavioral theories. Although the two approaches differ in interpretation, both highlight mechanisms directly connected to the firm-level fundamentals and state-dependent return patterns examined in this paper. The following discussion summarizes these explanations and highlights the empirical implications that motivate the analysis of our study.

Risk-based theories argue that value firms earn higher expected returns because they are exposed more to adverse economic conditions. Early studies show that book-to-market ratio captures risks not accounted for in standard models and that value firms load are more subject to state-dependent macroeconomic shocks.[1] Subsequent research expands this view by linking the premium to variation in consumption and cash-flow risk, production-side frictions, and differences in operating and financial leverage, mechanisms that relate directly to the firm-level fundamentals examined in this paper. A prominent theoretical explanation is provided by Berk, Green, and Naik (1999), who develop a real-options model in which firms' investment opportunities endogenously generate a value premium through time-varying systematic risk. Anderson and Garcia-Feijóo (2006) provide consistent empirical evidence that firms with higher investment growth subsequently earn lower expected returns, supporting the model's prediction that the value premium is closely tied to corporate investment dynamics. These studies collectively suggest that the value premium reflects compensation for underlying economic risks rather than persistent mispricing.[2] One important implication of the existing literature is that value premia vary systematically across economic states as the underlying economic risk evolve over time. This observation motivates the empirical strategy of our study. Specifically, we

[1] Fama and French (1992, 1993) identify book-to-market as a risk factor omitted from the CAPM, and Fama and French (1995, 1996) relate the value premium to financial distress risk.

[2] Lettau and Ludvigson (2001) show that value firms have higher conditional consumption beta, while Campbell and Vuolteenaho (2004) attribute the premium to cash-flow beta associated with news about future market cash flows. Petkova and Zhang (2005) document time-varying risk exposures. Production-based studies highlight costly reversibility and countercyclical risk prices (Zhang 2005) and the role of economic risk in cash flows (Bansal, Dittmar, and Lundblad 2005). A large literature links the premium to operating and financial leverage, including Carlson, Fisher, and Giammarino (2004), García-Feijóo and Jorgensen (2010), Novy-Marx (2011), Ozdagli (2012), Choi (2013), Elgammal and McMillan (2014), and Cao (2015). More recent work incorporates intangible capital and uncertainty shocks (Ahn 2019) and labor-induced operating leverage (Donangelo 2021), both of which account for substantial portions of the observed premium.

examine whether the value premium based on new value and growth stocks is associated with changes in economic and market conditions.

On the other hand, behavioral explanations attribute the value premium to systematic mispricing rather than compensation for risk. This strand of research argues that investors form biased expectations, leading them to overvalue growth firms and undervalue firms with weak past performance. Expectation errors on fundamentals, slow incorporation of earnings information, and limits to arbitrage all contribute to persistent return differentials.[3] One common implication of the behavioral explanations is that investor subjective view of the economy or sentiment plays a role in the misvaluation of value and growth stocks. In our empirical analysis, we examine how the value premium based on new value and growth stocks is associated with changes in investor sentiment.

B. Value Premium: New vs. Old Value and Growth Stocks

In Section II, we show that a significant number of stocks transition from non-value to value category and likewise from non-growth to growth category. We further show that there are significant differences in firm characteristics between new and old value stocks and between new and old growth stocks. In this section, we are interested in how these new value and growth

[3] Lakonishok, Shleifer, and Vishny (1994) argue that value stocks are not fundamentally riskier and attribute their outperformance to investor bias and extrapolation. Daniel and Titman (1997) find no evidence that risk-factor loadings explain the value premium, proposing characteristic-based mispricing instead. La Porta et al. (1997) show that market underreaction to earnings announcements contributes to the premium. Bauman and Miller (1997) introduce an adaptive-expectations explanation, while Asness, Friedman, Krail, and Liew (2000) emphasize mispricing between value and growth portfolios. Skinner and Sloan (2002) highlight expectational errors around negative earnings surprises. Bourguignon and de Jong (2003, 2006) attribute the premium to temporary valuation errors. Phalippou (2008) documents pricing errors and limited arbitrage. Asness, Frazzini, Israel, and Moskowitz (2015) argue that both mispricing and risk-based channels are relevant, and Jaffe, Jindra, Pedersen, and Voetmann (2019) present additional evidence that mispricing-related factors explain the value premium.

stocks affect the value premium. Following the literature (Fama and French, 1993), we divide the stock sample into value stocks (H(V)) and growth stocks (L(G)). Within value stocks, we further divide into old value stocks (OldV) and new value stocks (NewV). Similarly, within growth stocks, we further divide into old growth stocks (OldG) and new growth stocks (NewG). The details can be found in Section II.

Table 3 reports the average monthly returns of value and growth portfolios as well as the spreads between value and growth portfolios. The results are also reported for subsamples of old and new value and growth stocks. Panel A reports the value-weighted results, where the spreads between value and growth portfolios are essentially the value premium commonly defined in the literature.

In Panel A of Table 3, for the whole sample, the average monthly return of the value portfolio (1.162%) is higher than the average monthly return of the growth portfolio (0.978%). This leads to a value premium of 0.184%. The results also show that the value premium based on the new value and growth stocks (0.326%) is higher than the value premium based on old value and growth stocks (0.147%). The average difference is 0.179% and statistically significant. This difference is mainly driven by the underperformance of new growth stocks. The average monthly return of new growth stocks (0.885%) is lower than the average monthly return of old growth stocks (1.016%).

We also report the alpha based on Fama-French five-factor model excluding the value factor and plus the momentum factor, namely market (MKT), size (SMB), profitability (RMW), investment (CMA), and momentum (UMD). The average monthly alpha of new growth stocks (-0.084%) is also lower than the average monthly alpha of old growth stocks (0.127%). The spread in monthly alpha between the new value and growth stocks (0.133%) is higher than that between the old value and growth stocks (-0.272%). The difference is 0.405% with a higher magnitude than returns and statistically significant.

Furthermore, the Sharpe ratio of the value premium based on new value and growth stocks (0.076) is higher than the Sharpe ratio of the value premium based on incumbent value and growth stocks (0.038). The skewness of the value premium based on new value and growth stocks (0.341) is higher than the skewness of the value premium based on incumbents (0.052). The excess kurtosis of the value premium based on new value and growth stocks (4.488) is also higher than the excess kurtosis of the value premium based on incumbent value and growth stocks (0.704). This suggests that relative to the value premium based on old value and growth stocks, the value premium based on new value and growth stocks not only has a higher mean and higher Sharpe ratio but also a fatter right tail. In other words, the value premium based on new value and growth stocks offers investors a more favorable distribution.

The equal-weighted results in Panel B show a similar pattern as those in Panel A. That is, the value premium based on the new value and growth stocks (0.770%) is higher than the value premium based on old value and growth stocks (0.640%). The difference is 0.131% and is statistically significant. This difference is mainly driven by the lower return of new growth stocks (0.675%) relative to old growth stocks (0.942%). The spread in monthly alpha between the new value and growth stocks (0.484%) is also higher than the spread between the old value and growth stocks (0.342%). Furthermore, the Sharpe ratio of the value premium based on new value and growth stocks (0.229) is higher than the Sharpe ratio of the value premium based on incumbent value and growth stocks (0.181). Nevertheless, the skewness and excess kurtosis are of similar magnitude for both the value premium based on new value and growth stocks and the value premium based on old value and growth stocks. We note that the value-weighted results have strong implications on the economic significance of value investing.

We perform several robustness checks of our main findings. First, in our classification of old value and growth stocks, we require stocks to be classified in the same category in both year t-1 and year t-2. The classification leads to balanced sample sizes for old and new value and growth stocks. To understand which year contributes to our main findings, we replicate our analysis by classifying old value and growth stocks based on year t-1 only or year t-2 only. Table 4 Panels A1 and A2 report the results. The results show that when the classification is based on either year t-1 or year t-2, the difference in monthly alpha between the value premium of new value and growth stocks and that of old value and growth stocks are all positive. Based on year t-1 classification, the average value-weighted monthly alpha of the value premium of new value and growth stocks is higher than that of old value and growth stocks by 0.301%. Based on year t-2 classification, the average value-weighted monthly alpha of the value premium of new value and growth stocks is higher than that of old value and growth stocks by 0.269%. The results show that the classification based on year t-1 and year t-2 both contributes to the overall results.

Second, our study is closely related to Baba-Yara, Boons, and Tamoni (2024). The main focus of Baba-Yara, Boons, and Tamoni (2024) is the persistent and transitory components of firm characteristics and their implications on asset pricing. In the main analysis, they form high and low B/M decile portfolios based on the most recent value ("new sort") and lagged value 36 months earlier or year t-3 ("old sort"). In comparison, our method follows the conventional approach in Fama and French (1993) by sorting stocks based on NYSE breakpoints at the 30th and 70th percentiles each June to classify top 30% of stocks as value stocks and bottom 30% of stocks as growth stocks. In addition, when we classify "old" value and growth stocks, we focus on consistent ranking over three consecutive years, namely years t-2, t-1, and t.

To compare our findings with those of Baba-Yara, Boons, and Tamoni (2024), we first replicate their analysis directly and then replicate our analysis following their approach. Following Baba-Yara, Boons, and Tamoni (2024), we first sort stocks into deciles based on the current B/M ratio. Within the top and bottom deciles, stocks are further split into two subsamples based on the median of B/M ratio 36 months prior. The results are consistent with Baba-Yara, Boons, and Tamoni (2024). That is, the average return of the value premium based on the old value and growth stocks (0.737%) is significantly higher than that based on the new value and growth stocks (0.194%). To replicate our analysis following Baba-Yara, Boons, and Tamoni (2024), we classify a stock as "old" value or growth stock if it is in the value or growth category in year t and also in year t-3. The results show that the value premium based on old value and growth stocks (0.216%) is slightly higher than that based on new value and growth stocks (0.158%). However, the difference is statistically insignificant. This suggests that the significant differences in Baba-Yara, Boons, and Tamoni (2024) are driven by stocks in extreme decile portfolios. The results are not tabulated for brevity but available upon request.

Third, Asness and Frazzini (2013) argue that the conventional Fama-French method of constructing book-to-market (B/M) ratios uses stale prices, which fails to capture important information from recent price movements. Following Asness and Frazzini (2013), we use the following methods to calculate the book-to-market ratio:

- Current annual method: using the book value of equity from the most recent fiscal year-end and the current market value of equity as of the end of June on the portfolio formation date.

- Current month method: using the book value of equity from the most recent fiscal year-end and the current market value of equity as of the end of the prior month.

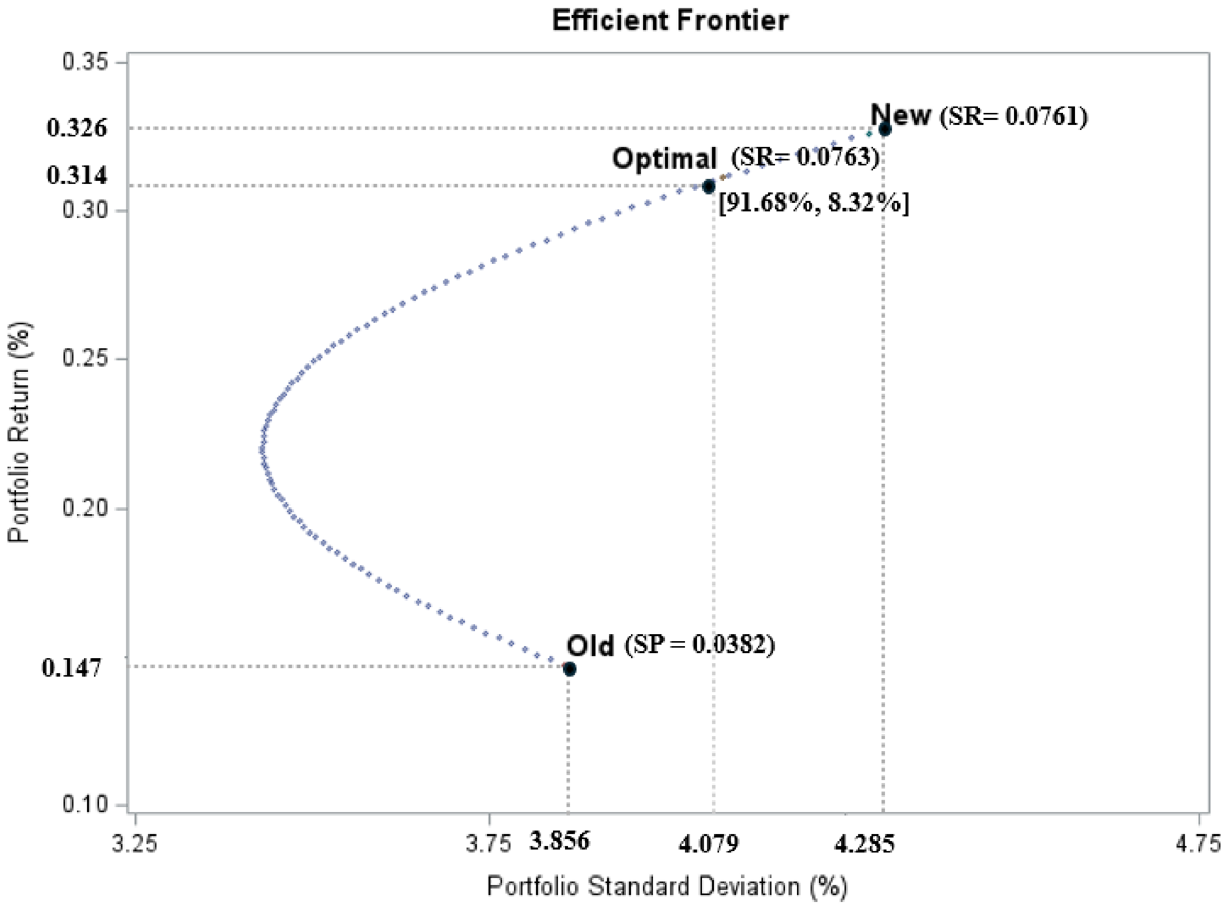
Table 4 Panels A3 and A4 report the results based on both methods. The results are consistent with our main findings in Table 3. Based on both methods, the value-weighted and equal-weighted monthly alphas of the value premium based on the new value and growth are significantly higher than those based on the old value and growth. The difference is mainly driven by the underperformance of new growth stocks relative to old growth stocks.

Fourth, Fama and French (2007) also explore how the migration of a stock between value and growth contributes to the value premium. We follow Fama and French (2007) and divide value and growth stocks into the “same” (those remain to be value or growth in the holding period year t+1) and “other” (those are no longer value or growth). Table 4 Panel B reports the returns of stocks in the “same” category and “other” category for both value and growth stocks. The results are consistent with those in Fama and French (2007). That is, the monthly alpha of value premium based on stocks in “other” category is significantly higher than that based on stocks in the “same” category, for both value-weighted and equal-weighted portfolios.

Similar to Baba-Yara, Boons, and Tamoni (2024), we also combine new and old value-factor portfolios to construct the optimal portfolio. The plot below shows that the optimal portfolio has a 91.68% weight on the new value-factor portfolio and 8.32% weight on the old value-factor portfolio. The Sharpe ratio of the optimal portfolio is 0.0763, slightly higher than that of the new value-factor portfolio (0.0761) and much higher than that of the old value-factor portfolio (0.0382).

Exhibit I. Efficient Frontier of Old and New Value Factors

The plot depicts the efficient frontier based on new and old value-factor portfolio. It also shows the weights and Sharpe ratio of the optimal portfolio.



To understand how the "new" value factor is related to existing factors, we perform regressions of the value premium based on new value and growth stocks on existing factors, namely the Fama and French five factors plus the momentum factor:

$$\underset{}{New(V-G)_{i,t}} = \underset{(2.34)}{0.261} - \underset{(-1.56)}{0.041} * MktRf_{i,t} - \underset{(-3.27)}{0.138} * SMB_{i,t} + \underset{(20.96)}{0.905} * HML_{i,t}$$

$$-\underset{(-5.39)}{0.139} * UMD_{i,t} + \underset{(0.70)}{0.035} * RMW_{i,t} + \underset{(0.46)}{0.033} * CMA_{i,t} + \epsilon_{i,t} \qquad (1)$$

Adj. R^2 = 59.96%

The results in regression (1) show that the "new" value factor has a significantly negative relation with size factor (SMB) and momentum factor (UMD), and a significantly positive relation with value factor (HML). The highly significant and large positive coefficient on HML suggests that the "new" value factor has a positive association with the value factor. This is consistent with the observation in Figure 2 that the "new" value premium tends to be high when the overall value premium is high. The adjusted R^2 is 59.96%, indicating that existing factors explain less than 60% of the variation of the "new" value premium. Most importantly, the intercept in the above regression is significantly positive, suggesting that the "new" value premium is not subsumed by the existing Fama-French five factors plus the momentum factor.

We also regress the "new" value premium on the "old" value premium and returns of new growth stocks:

$$New(V-G)_{i,t} = \underset{(3.31)}{0.471} + \underset{(13.02)}{0.475} * Old(V-G)_{i,t} - \underset{(-9.70)}{0.243} * NewG_{i,t} + \epsilon_{i,t} \qquad (2)$$

Adj. R^2 = 29.08%

The results in regression (2) show that the "new" value premium has a significantly positive relation with the "old" value premium (Old(V-G)) and a significantly negative relation with new growth (NewG). The adjusted R^2 is 29.08%. Again, the intercept is significantly positive, suggesting that the "new" value premium is not subsumed by the "old" value premium.

As shown in Table 2, past stock performance is one important driver of stocks migrating into value or growth categories. We also examine whether the performance of new value and growth stocks is related to the reversal effect in stock returns. For brevity, we present the empirical findings in Online Supplemental Material.

To illustrate the variation of value premium over time, we plot the cumulative value premium over our sample period from 1970 to 2024. The results are reported in Figure 2. Panel A of Figure 2 plots the cumulative value premium for all stocks, denoted as HML; old value and growth stocks, denoted as Old(V-G); and new value and growth stocks, denoted as New(V-G). The plot shows that consistent with existing studies (Fama and French, 2017; 2021; Israel, Laursen, and Richardson, 2021), except in the 1990s and second half of 2010s, the value premium appears strong and robust. Similarly, based on the sample period from 1973 to 2018, Gonçalves and Leonard (2023) document that the value premium has declined toward the end of their sample period. Extending the sample period to 2024, we observe a clear uptick again in the value premium in most recent years toward the end of our sample period. The plots in Panel A of Figure 2 show similar patterns for Old(V-G) and New(V-G). It appears that the value premium based on new value and growth stocks (New(V-G)) is particularly strong and robust during periods when there is a strong overall value premium (HML). For instance, the value premium based on new value and growth stocks (New(V-G)) was strongest during the early 2000s and the most recent period toward the end of our sample period after 2019.

Panel B of Figure 2 also plots the differences in cumulative value premium between new value and growth stocks and old value and growth stocks (New(V-G) – Old(V-G)) as well as differences between new value and growth stocks and the full sample of stocks (New(V-G) – HML). The plots illustrate similar patterns. On average, the value premium based on new value and growth stocks (New(V-G)) is higher, and the differences are more pronounced during periods when value stocks outperform growth stocks.

C. Results based on Subperiods

The literature shows that the performance of value stocks relative to growth stocks is associated with economic conditions. A large body of work argues that value stocks are riskier than growth stocks during economic downturns because the price of risk rises in bad times.[4] The valuation of value versus growth stocks is directly related to interest rates and discount rates.

[4] Liew and Vassalou (2000) find that the performance of value premiums is directly related to the business cycle. Lettau and Ludvigson (2001), Petkova and Zhang (2005) and Zhang (2005) argue that value stocks tend to outperform growth stocks in "good" times but underperform in "bad" times. In contrast, Chan and Lakonishok (2004) find that the value premium does not disappear in recessions or economic downturns.

Growth stocks are considered long-duration assets, implying that their valuations respond more strongly to shifts in discount rates.[5] A third strand of literature emphasizes uncertainty as a key driver of asset-pricing dynamics, highlighting that variation in macroeconomic or policy uncertainty has different impact on value and growth stock valuation.[6] Finally, a broad behavioral literature suggests that variation in investor sentiment can influence the relative pricing of value and growth stocks.[7]

In light of the literature, we conduct the following subperiod analysis. First, we divide the full sample period into contraction and expansion. Second, we divide the full sample period into monetary tightening and easing cycles, and high and low 10-year U.S. Treasury yield subperiods. Third, we divide the full sample period into high and low uncertainty subperiods. Finally, we divide the full sample period into high and low sentiment subperiods.

Contraction and expansion are identified based on the business cycle dates from the National Bureau of Economic Research (NBER).[8] Out of the 660 months from January 1970 to

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[5] Jensen, Johnson, and Mercer (1997) show that value premium depends heavily on Fed policy cycles. The value effect is strong and statistically significant only during easing monetary policy periods. In tightening monetary periods, the value premium shrinks dramatically and often disappear. Campbell and Vuolteenaho (2004) propose a two-beta ICAPM model that decomposes the beta of a stock with the market portfolio into cash-flow beta and discount-rate beta. They find that the market betas of growth stocks are mainly driven by discount-rate betas. Lettau and Wachter's (2007) model implies that returns of growth stocks, as long-duration assets, covary more with discount rate risk compared to value stocks.

[6] Bansal, Kiku, Shaliastovich, and Yaron (2013) find that growth stocks are more exposed to uncertainty shocks and therefore require higher compensation in volatile times. Brogaard and Detzel (2015) show that economic policy uncertainty is an important equity risk factor and the effect is mainly driven by changes in the discount rate. Bali and Zhou (2016) show that stocks with more exposure to economic uncertainty earn significantly higher returns and the impact of uncertainty on equity returns tends to vary over time.

[7] Barberis and Shleifer (2003) and Baker and Wurgler (2006) argue that investor sentiment significantly influences stock valuation. Lakonishok, Shleifer, and Vishny (1994), La Porta, Lakonishok, Shleifer, and Vishny (1997), and Chan and Lakonishok (2004) show that investors systematically overvalue "glamour" stocks by extrapolating recent growth trends and overestimating future performance. These mispriced growth stocks tend to underperform, particularly when the economy deteriorates and optimistic expectations are revised downward. However, Stambaugh, Yu, and Yuan (2012) do not find the return spreads between value and growth stocks differ significantly between high- and low-sentiment periods.

[8] https://www.nber.org/research/business-cycle-dating

December 2024, 85 months are classified as contraction months, and 575 months are classified as expansion months. Following Adrian and Estrella (2008) and Lucca and Moench (2015), we define the monetary tightening cycles as the intervals from local troughs to peaks in the federal funds rate, while easing cycles are defined as the intervals from local peaks to troughs in the target rate.[9] Out of the 660 months from January 1970 to December 2024, 297 months are classified as tightening cycle months, and 363 are classified as easing cycle months. The data on 10-year U.S. Treasury yield is obtained from the Board of Governors of the Federal Reserve System. High (low) Treasury yield spread periods are months with the 10-year Treasury yield above (below) the sample median. We use the 1-year ahead macroeconomic uncertainty index by Jurado, Ludvigson, and Ng (2015) to measure uncertainty.[10] The index captures broad-based unpredictability and displays substantial independent variation from popular proxies, such as VIX, reducing measurement error and endogeneity concerns. High (low) uncertainty periods are months with the uncertainty index above (below) the sample median. Sentiment is based on University of Michigan consumer sentiment index.[11] High (low) sentiment periods are months with the UMich consumer sentiment above (below) the sample median.

Table 5 reports the average value-weighted monthly returns of value and growth stocks as well as the spreads between value and growth stocks in various subperiods. The results show that there is no significant difference between the value premium based on new value and growth stocks and that based on old value and growth stocks during the expansion period, monetary easing cycle, low 10-Year Treasury yield subperiod, and low uncertainty subperiod. The Sharpe ratios are also similar.

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[9] Effective fed funds rates are obtained from: https://fred.stlouisfed.org/series/FEDFUNDS
[10] https://www.sydneyludvigson.com/macro-and-financial-uncertainty-indexes
[11] https://www.sca.isr.umich.edu/

In contrast, the table shows significant differences between the value premium based on new value and growth stocks and that based on old value and growth stocks during the contraction period, monetary tightening cycle, high 10-Year Treasury yield subperiod, and high uncertainty subperiod. In all these subperiods, the value premium based on new value and growth stocks is statistically higher than that based on old value and growth stocks, as measured by both stock returns and alphas. The differences are also of high magnitude and economic significance. For instance, during economic contraction, the spread in monthly alpha between the new value and growth stocks (-0.466%) is significantly higher than that between the old value and growth stocks (-1.173%). The difference is 0.707% and statistically significant. During the monetary tightening cycle, the spread in monthly alpha between the new value and growth stocks (0.403%) is significantly higher than that between the old value and growth stocks (-0.391%). The difference is 0.794% and statistically significant. Overall, the underperformance of new growth stocks is the main driver of the differences. These results confirm that new growth stocks underperform particularly during economic downturns, monetary tightening cycle, and subperiods with high long-term interest rates and high uncertainty.

The results in Table 5 also show that during the high sentiment subperiod, the value premium based on new value and growth stocks and that based on old value and growth stocks are statistically indifferent. During the low sentiment subperiod, the spread in monthly alpha between the new value and growth stocks (0.125%) is significantly higher than that between the old value and growth stocks (-0.318%). This suggests that new growth stocks tend to underperform when sentiment is low and investors have less optimistic views.

We perform further analysis to explore how the characteristics of the new versus incumbent firms differ during different market conditions. For brevity, we focus on comparison of expansion versus contraction periods. Table S1 in Online Supplemental Material reports the time series average of firm characteristics for new value and new growth stocks during the contraction and expansion periods as well as the differences. New growth stocks experience significantly lower returns during the contraction period relative to the expansion period. Their business fundamentals also deteriorate significantly during contraction, so is their valuation. In comparison, new value stocks, although also underperform during contraction, experience less deterioration in business fundamentals and valuation.

D. Within-industry vs Across-industry Effects

The literature shows that cross-sectional variation in stock returns can be driven by industry effects. For instance, Moskowitz and Grinblatt (1999) find that much of the individual stock momentum anomaly can be explained by industry momentum. Banko, Conover, and Jensen (2006) demonstrate that both inter- and intra-industry variations in the book-to-market ratio (B/M) play an important role in explaining stock returns. In this section, we investigate to what extent our main findings are driven by within-industry effect or across-industry effect. Following Gonçalves and Leonard (2023), we compute the median book-to-market ratio for each industry, denoted by BM_{ind}, and define the industry-adjusted book-to-market ratio for each firm as $BM_{firm} - BM_{ind}$. We use Fama and French (1997) 48 industry classification in our empirical analysis.

Table 6 reports the average monthly returns of value and growth portfolios as well as the spreads between value and growth portfolios based on industry-adjusted B/M ratio and industry median B/M ratio. Panel A of Table 6 reports the results based on the industry-adjusted B/M ratio. The value-weighted results show that the value premium based on new growth and value stocks (0.067%) is lower than the value premium based on old growth and value stocks (0.156%). Based on the equal-weighted results, the value premium based on new growth and value stocks (0.712%) is slightly higher than the value premium based on old growth and value stocks (0.644%). None of those differences are statistically significant. This result indicates that the higher value premium based on new value and growth stocks documented in the main analysis is not driven by the within-industry effect.

Panel B of Table 6 reports the results based on the median B/M ratio of each industry. The value-weighted results show that the value premium based on the new value and growth stocks (0.149%) is significantly higher than that based on the old value and growth stocks (-0.109%). The difference is mostly driven by the lower return of new growth stocks (0.800%) compared to old growth stocks (1.069%). The equal-weighted results show consistent and even stronger patterns. The value premium based on the new value and growth stocks (0.185%) is also significantly higher than the value premium based on old value and growth stocks (-0.014%). Again, the difference is mainly driven by the low return of new growth stocks (0.797%) relative to old growth stocks (1.161%). Overall, the results indicate that our main findings, the underperformance of new growth stocks and high value premium based on new value and growth stocks, are primarily attributed to cross-industry differences rather than within-industry differences.

One main finding in the literature is that the value premium arises mainly from return differentials among firms within the same industry (e.g., Daniel and Titman, 1997; Asness, Porter, and Stevens, 2000; Campbell, Giglio, and Polk, 2025). For instance, Daniel and Titman (1997) find that the value premium is mainly an intra-industry phenomenon, arising from firm-level characteristics shared within industries, rather than from systematic inter-industry differences. Campbell, Giglio, and Polk (2025) find that the value premium comes mainly from intra-industry effects, while inter-industry effects earn a negative premium and add volatility.

Our full sample results confirm this pattern. However, we find considerable variations in the value premium between new and incumbent value and growth stocks, especially during certain market conditions. Moreover, we find that the high value premium based on new value and growth stocks is primarily attributed to cross-industry differences rather than within-industry differences. The finding is consistent with Menzly and Ozbas (2010) who provide empirical evidence that inter-industry relationships represent a systematic and exploitable source of return predictability, supporting their relevance for factor investing. In this regard, our finding has direct implications for practitioners. When quantitative managers emphasize intra-industry value measures, they may underweight the cross-industry shifts that drive the return spread of new value versus new growth stocks. In contrast, smart beta strategies that blend intra-industry and inter-industry exposures may be able to capture the time-varying industry tilt that contributes to higher factor returns.

E. International Evidence

As a further robustness check, we examine whether our main results hold based on international data. The literature has examined the value premium in international markets. Capaul, Rowley, and Sharpe (1993) find that there are significant value premiums in six countries during the 1981 to 1992 period. Fama and French (2012) find value premiums in all of the four regions (North America, Europe, Japan, and Asia Pacific) from November 1990 to March 2011.

We follow the procedures outlined in Jensen, Kelly, and Pedersen (2023) to process the international data. Specifically, stock prices are obtained from Compustat Global, converted to US dollars, which are used to calculate the stock return and the market value of equity (ME). Since the delisting returns are not available in the international data, all performance-based delisting returns are adjusted to -30%. ME and the book value of equity (BE) are constructed the same as the U.S. sample. Following Fama and French (1993), the book-to-market ratio (B/M) based on international data is calculated at the end of each June using the BE for the fiscal year ending in calendar year t-1 divided by the ME at the end of December of the year t-1. The sample period is from July 1991 to December 2022.

Table 7 reports the average monthly returns of value and growth portfolios as well as the spreads between value and growth portfolios based on international data. The value-weighted results suggest a rather weak value premium in international markets, whereas the equal-weighted results show a sizeable value premium. In both cases, the patterns are consistent with the results based on the U.S. data in Table 3. Specifically, the value-weighted results show that the value premium based on the new value and growth stocks (0.172%) is substantially higher than the value premium based on old value and growth stocks (-0.016%). This difference is attributed to both the underperformance of new growth stocks and the outperformance of new value stocks. The average monthly return of new value stocks (0.887%) is higher than the monthly return of old value stocks (0.734%), whereas the average monthly return of new growth stocks (0.716%) is lower than the average monthly return of old growth stocks (0.750%).

The equal-weighted results show consistent and stronger patterns. The value premium based on the new value and growth stocks (0.702%) is higher than the value premium based on the old value and growth stocks (0.227%). In this case, the difference is mostly driven by the underperformance of new growth stocks. While the average monthly return of new value stocks (1.076%) is slightly higher than the monthly return of old value stocks (0.928%), the average monthly return of new growth stocks (0.374%) is substantially lower than the average monthly return of old growth stocks (0.701%). Overall, the variation of value premium across subsamples of stocks is consistent with the findings based on the U.S. data.

IV. Conclusion

In this paper, we show that each year a considerable number of stocks transition from non-value to the value category and likewise from non-growth to the growth category. We find that, on average, the value premium based on new value and growth stocks is significantly higher than the value premium based on incumbent value and growth stocks.

Dividing the full sample period into expansion and contraction, Fed monetary policy cycles, subperiods based on 10-year Treasury yield, uncertainty, and sentiment, we find that the "new" value premium is substantially higher during contraction, monetary tightening cycle, and subperiods with high 10-year Treasury yield, high uncertainty, and low sentiment. The differences in monthly alphas between the "new" value premium and "old" premium are not only statistically significant but also economically significant with high magnitude.

In addition, we show that the "new" value premium is largely driven by the across-industry effect rather than the within-industry effect. Finally, evidence based on international data shows consistent patterns. The findings of our study reveal substantial variation in the value premium across stock subsamples and also over time. These findings shed important insights on value investing and have direct and practical implications for active investment strategies.

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Table 1: Transition Matrix

Following Fama and French (1993), we calculate the book-to-market ratio (B/M) in June of each year using the book value of equity for the fiscal year ending in calendar year t-1 divided by the market value of equity at the end of December of the year t-1. We then divide stocks in our sample into three B/M groups based on the NYSE breakpoints of B/M: top 30% (High), middle 40% (Medium), and bottom 30% (Low). Stocks in the top 30th percentile are classified as value stocks (V), and stocks in the bottom 30th percentile are classified as growth stocks (G). The sample includes all common stocks (SHRCD = 10 or 11) traded on NYSE, AMEX, or NASDAQ (EXCHED = 1, 2, or 3) in the CRSP stock database with a positive book value of equity and at least two-year historical data in COMPUSTAT. Each year t, we identify stocks in a group that transition to other groups in year t+1 and year t+2. The table reports the average transition probabilities from year t to year t+1 and t+2, respectively. The sample period is from January 1970 to December 2024.

	Year t+1			Year t+2		
Year t	H (V)	M	L (G)	H (V)	M	L (G)
H (V)	74.41%	21.96%	3.63%	65.15%	26.91%	7.94%
M	16.22%	61.01%	22.77%	19.00%	52.78%	28.22%
L (G)	3.10%	19.84%	77.06%	5.93%	24.45%	69.62%

Table 2: Firm Characteristics of Old and New Value and Growth Stocks

Following Fama and French (1993), we divide stocks in our sample into three B/M groups based on the NYSE breakpoints of B/M: top 30% (High), middle 40% (Medium), and bottom 30% (Low). Old value stocks (OldV) are those that are classified as value stocks in year t that are also classified as value stocks in both year t-1 and year t-2. The remaining value stocks are classified as new value stocks (NewV). Old growth stocks (OldG) are those that are classified as growth stocks in in year t that are also classified as growth stocks in both year t-1 and year t-2. The remaining growth stocks are classified as new growth stocks (NewG). We compute average firm characteristics for stocks in each group, including market capitalization (SIZE), firm age (Age), past one-year returns ($LRET_{1Y}$), past two-year returns ($LRET_{2Y}$), sales, earnings, cash flow (CF), free cash flow (FCF), sales growth rate, investment, leverage (LEV), earnings growth rate, operating profitability (OP), return on equity (ROE), return on assets (ROA), earnings to price ratio (E/P), cash flows to price ratio (CF/P), free cash flows to price ratio (FCF/P), and sales to price (S/P). All variables are defined in the Appendix. The table reports the time series average of all variables for new and old value and growth stocks as well as differences between new and old value and growth stocks. The Newy-West t-statistics of the differences are also reported. ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from January 1970 to December 2024.

	OldV	NewV	New-Old	OldG	NewG	New-Old
SIZE (in $Billion)	0.889	0.937	0.048 (0.62)	9.352	2.246	-7.106** (-2.68)
Age	19.406	13.355	-6.050** (-11.09)	16.598	10.010	-6.587** (-13.31)
$LRET_{1Y}$	0.186	0.056	-0.130** (-8.61)	0.221	0.404	0.183** (6.03)
$LRET_{2Y}$	0.293	0.044	-0.249** (-10.43)	0.541	0.938	0.397** (5.68)
Sales (in $Million)	1,496.18	1,283.20	-212.98* (-2.01)	2,819.56	1,153.27	-1,666.29** (-2.83)
Earnings (in $Million)	32.72	41.48	8.761 (1.03)	280.60	51.53	-229.076** (-3.21)
CF (in $Million)	133.80	120.29	-13.512 (-0.99)	393.43	102.36	-291.070** (-3.26)
FCF (in $Million)	87.28	170.09	82.812 (1.89)	524.80	346.84	-177.966** (-2.71)
Sales Growth	0.071	0.151	0.079** (4.01)	0.172	0.196	0.024** (2.69)
Investment	-0.040	-0.062	-0.021 (-1.69)	0.015	0.050	0.036* (2.45)
LEV	0.506	0.490	-0.016** (-3.20)	0.489	0.525	0.035** (3.36)
Earnings Growth	-0.325	-0.270	0.055 (0.58)	0.214	0.022	-0.192** (-4.05)
OP	0.185	0.205	0.020** (3.84)	0.447	0.355	-0.092** (-4.99)
ROE	0.048	0.062	0.014** (3.88)	0.224	0.097	-0.127** (-5.43)
ROA	0.026	0.033	0.007** (3.31)	0.108	0.052	-0.056** (-8.44)
E/P	0.058	0.064	0.005 (1.72)	0.046	0.037	-0.009* (-2.02)
CF/P	0.203	0.176	-0.027** (-4.27)	0.068	0.077	0.009 (1.34)
FCF/P	0.577	2.105	1.528 (1.40)	0.493	2.435	1.942 (1.66)
S/P	3.161	2.426	-0.735** (-3.22)	0.577	0.971	0.394** (3.90)

Table 3: Value Premium: New vs. Old Value and Growth Stocks

Following Fama and French (1993), we divide stocks in our sample into three B/M groups in June of each year based on the NYSE breakpoints of B/M: top 30% as value stocks (H(V)), middle 40%, and bottom 30% as growth stocks (L(G)). B/M and the stock sample are defined the same as in Table 1. Old value stocks (OldV) are those that are classified as value stocks in year t that are also classified as value stocks in both year t-1 and year t-2. The remaining value stocks are classified as new value stocks (NewV). Old growth stocks (OldG) are those that are classified as growth stocks in in year t that are also classified as growth stocks in both year t-1 and year t-2. The remaining growth stocks are classified as new growth stocks (NewG). The table reports the mean, alpha, standard deviation (Std Dev), Sharpe ratio, skewness, kurtosis, and Sortino ratio of value-weighted and equal-weighted monthly returns of new and old value and growth portfolios as well as the spreads between value and growth portfolios. "New-Old" denotes the difference between the value premium based on new value and growth stocks (New(V-G)) and the value premium based on old value and growth stocks (Old(V-G)). Alpha is based on Fama-French five-factor model excluding the value factor and plus the momentum factor, namely market (MKT), size (SMB), profitability (RMW), investment (CMA), and momentum (UMD). The Newy-West t-statistics of the differences are also reported for the value premium based on old value and growth stocks (Old(V-G)), the value premium based on new value and growth stocks (New(V-G)), as well as their differences (New-Old). ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from January 1970 to December 2024.

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New-Old
Panel A: Value-Weighted Monthly Return										
Mean (%)	1.162	0.978	0.184	1.163	1.016	0.147 (0.98)	1.211	0.885	0.326** (3.55)	0.179** (2.63)
Alpha (%)	-0.059	0.083	-0.141	-0.145	0.127	-0.272* (-2.31)	0.049	-0.084	0.133 (0.92)	0.405* (2.32)
Std Dev (%)	5.366	4.900	3.558	5.365	4.877	3.856	5.816	5.608	4.285	0.429
Sharpe Ratio	0.217	0.200	0.052	0.217	0.208	0.038	0.208	0.158	0.076	0.038
Skewness	-0.429	-0.347	0.179	-0.434	-0.287	0.052	-0.306	-0.549	0.341	0.290
Kurtosis	2.919	1.450	1.980	2.208	1.354	0.704	4.003	1.789	4.488	3.784
Sortino Ratio	0.202	0.170	0.075	0.203	0.183	0.054	0.199	0.123	0.113	0.059
Panel B: Equal-Weighted Monthly Return										
Mean (%)	1.516	0.794	0.722	1.581	0.942	0.640** (4.66)	1.446	0.675	0.770** (5.88)	0.131* (2.47)
Alpha (%)	0.474	0.058	0.415	0.442	0.100	0.342** (3.06)	0.484	0.001	0.484** (4.54)	0.142 (1.46)
Std Dev (%)	6.555	6.913	3.186	6.257	6.318	3.529	6.947	7.537	3.363	-0.165
Sharpe Ratio	0.231	0.115	0.227	0.253	0.149	0.181	0.208	0.090	0.229	0.048
Skewness	0.179	-0.097	0.350	0.137	-0.209	0.409	0.266	-0.005	0.306	-0.103
Kurtosis	3.797	2.227	2.757	4.436	1.830	3.797	3.268	2.548	3.365	-0.432
Sortino Ratio	0.253	0.087	0.334	0.279	0.126	0.264	0.226	0.058	0.336	0.072

Table 4: Robustness Checks

Following Fama and French (1993), we divide stocks in our sample into three B/M groups in June of each year based on the NYSE breakpoints of B/M: top 30% as value stocks (H(V)), middle 40%, and bottom 30% as growth stocks (L(G)). B/M and the stock sample are defined the same as in Table 1. In Panel A1, we identify old value stocks (OldV) as those that are classified as value stocks in year t that are also classified as value stocks in year t-1. The remaining value stocks are classified as new value stocks (NewV). Old growth stocks (OldG) as those that are classified as growth stocks in year t that are also classified as growth stocks in year t-1. The remaining growth stocks are classified as new growth stocks (NewG). In Panel A2, we identify old value stocks (OldV) as those that are classified as value stocks in year t that are also classified as value stocks in year t-2. The remaining value stocks are classified as new value stocks (NewV). Old growth stocks (OldG) as those that are classified as growth stocks in year t that are also classified as growth stocks in year t-2. The remaining growth stocks are classified as new growth stocks (NewG). In Panel A3, we follow Asness and Frazzini (2013) and calculate the book-to-market ratio using book value of equity from the most recent fiscal year-end and the current market value of equity as of the end of June each year. In Panel A4, we follow Asness and Frazzini (2013) and calculate the book-to-market ratio using book value of equity from the most recent fiscal year-end and the current market value of equity as of the end of previous month. In Panel B, we follow Fama and French (2007) and classify those value stocks in year t that remain to be value stocks in year t+1 as the “same” (SameV). The remaining value stocks are classified as “other” (OtherV). Similarly, we classify those growth stocks in year t that remain to be growth stocks in year t+1 as the “same” (SameG). The remaining growth stocks are classified as “other” (OtherG). The table reports the average alpha of value-weighted and equal-weighted value and growth portfolios as well as the spreads between value and growth portfolios. Alpha is based on Fama-French five-factor model excluding the value factor and plus the momentum factor, namely market (MKT), size (SMB), profitability (RMW), investment (CMA), and momentum (UMD). In Panel A, “New-Old” denotes the difference between the value premium based on new value and growth stocks (New(V-G)) and the value premium based on old value and growth stocks (Old(V-G)). In Panel B, “Other-Same” denotes the difference between the value premium based on “other” value and growth stocks (Other(V-G)) and the value premium based on the “same” value and growth stocks (Same(V-G)). In Panel A, the Newy-West t-statistics of the differences are reported for the value premium based on old value and growth stocks (Old(V-G)), the value premium based on new value and growth stocks (New(V-G)), as well as their differences (New-Old). In Panel B, the Newy-West t-statistics of the differences are reported for the value premium based on “other” value and growth stocks (Other(V-G)), the value premium based on the “same” value and growth stocks (Same(V-G)), as well as their differences (Other-Same)). ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from January 1970 to December 2024.

Panel A: Alternative Classifications and Market Cap Calculation

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New-Old
A1: Classification based on Year t-1										
VW Alpha (%)	-0.059	0.083	-0.141	-0.091	0.108	-0.199 (-1.83)	-0.022	-0.124	0.102 (0.60)	0.301 (1.69)
EW Alpha (%)	0.474	0.058	0.415	0.439	0.070	0.369** (3.58)	0.511	0.012	0.499** (4.05)	0.130 (1.06)
A2: Classification based on Year t-2										
VW Alpha (%)	-0.059	0.083	-0.141	-0.100	0.114	-0.214 (-1.83)	0.005	-0.050	0.055 (0.36)	0.269 (1.49)
EW Alpha (%)	0.474	0.058	0.415	0.438	0.118	0.320** (2.96)	0.501	-0.029	0.530** (4.80)	0.210 (1.85)
A3: Market Cap based on Current Annual Data (Asness and Frazzini, 2013)										
VW Alpha (%)	0.054	-0.015	0.069	-0.027	0.035	-0.062 (-0.63)	0.080	-0.137	0.217* (2.00)	0.279* (2.29)
EW Alpha (%)	0.608	-0.055	0.662	0.531	0.051	0.481** (4.40)	0.650	-0.159	0.809** (7.57)	0.328** (2.98)
A4: Market Cap based on Current Month Data (Asness and Frazzini, 2013)										
VW Alpha (%)	0.040	0.014	0.026	-0.035	0.048	-0.083 (-0.87)	0.095	-0.074	0.168 (1.69)	0.251* (2.24)
EW Alpha (%)	0.582	-0.020	0.601	0.512	0.035	0.478** (4.61)	0.627	-0.091	0.718** (7.35)	0.240* (2.52)

Panel B: Contemporaneous Classification based on Year t+1 (Fama and French, 2007)

	H(V)	L(G)	HML	SameV	SameG	Same(V-G)	OtherV	OtherG	Other(V-G)	Other-Same
VW Alpha (%)	-0.059	0.083	-0.141	-0.420	0.177	-0.597** (-5.04)	0.748	-0.559	1.307** (7.76)	1.904** (9.80)
EW Alpha (%)	0.474	0.058	0.415	0.081	0.545	-0.463** (-3.39)	1.293	-0.937	2.230** (13.59)	2.693** (11.41)

Table 5: Subperiod Results

We divide the full sample period into contraction and expansion subperiods (A1 and A2), monetary tightening and easing cycles (B1 and B2), high and low 10-year Treasury yield subperiods (C1 and C2), high and low uncertainty subperiods (D1 and D2), and high and low sentiment subperiods (E1 and E2). Contraction and expansion are based on the business cycle from the National Bureau of Economic Research (NBER). Monetary tightening and easing cycles are defined following Adrian and Estrella (2008) and Lucca and Moench (2015). Please refer to details in Section III. C. Data on US 10-year Treasury yield is obtained from the Board of Governors of the Federal Reserve System. A month is classified as high (low) 10-year Treasury yield period if the yield is above (below) the median monthly yield. Uncertainty is measured by the 12-month uncertainty index constructed by Jurado, Ludvigson, and Ng (2015). A month is classified as high (low) uncertainty period if the uncertainty index is above (below) the median monthly uncertainty index. Sentiment is measured by the University of Michigan consumer sentiment index. A month is classified as high (low) sentiment period if the sentiment is above (below) the median monthly sentiment. The value and growth portfolios are defined the same as in Table 3. The table reports the mean, alpha, standard deviation (Std Dev), and Sharpe ratio of value-weighted monthly returns of new and old value and growth portfolios as well as the spreads between value and growth portfolios in all subperiods. "New-Old" denotes the difference between the value premium based on new value and growth stocks (New(V-G)) and the value premium based on old value and growth stocks (Old(V-G)). Alpha is based on Fama-French five-factor model excluding the value factor and plus the momentum factor, namely market (MKT), size (SMB), profitability (RMW), investment (CMA), and momentum (UMD). The Newy-West t-statistics of the differences are also reported for the value premium based on old value and growth stocks (Old(V-G)), the value premium based on new value and growth stocks (New(V-G)), as well as their differences (New-Old). ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from January 1970 to December 2024.

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New-Old
A1: Contraction Periods										
Mean (%)	0.062	0.045	0.016	-0.125	0.188	-0.312 (-0.65)	0.308	-0.419	0.726* (2.13)	1.038** (3.15)
Alpha (%)	-0.483	0.475	-0.958	-0.585	0.589	-1.173** (-3.21)	-0.271	0.195	-0.466 (-0.80)	0.707* (2.17)
Std Dev (%)	8.129	7.043	4.653	7.650	7.051	4.411	9.459	7.629	6.379	1.968
Sharpe Ratio	0.008	0.006	0.004	-0.016	0.027	-0.071	0.033	-0.055	0.114	0.185
A2: Expansion Periods										
Mean (%)	1.325	1.116	0.208	1.354	1.138	0.215 (1.37)	1.344	1.077	0.267 (1.65)	0.052 (0.30)
Alpha (%)	0.018	0.029	-0.011	-0.061	0.060	-0.121 (-0.98)	0.101	-0.107	0.208 (1.49)	0.329 (1.86)
Std Dev (%)	4.815	4.490	3.371	4.919	4.463	3.767	5.061	5.225	3.885	0.118
Sharpe Ratio	0.275	0.249	0.062	0.275	0.255	0.057	0.266	0.206	0.069	0.012
B1: Monetary Tightening Cycles										
Mean (%)	1.064	0.968	0.096	0.940	1.015	-0.074 (-0.33)	1.202	0.807	0.395** (3.14)	0.469* (2.22)
Alpha (%)	-0.002	0.104	-0.106	-0.221	0.170	-0.391* (-2.36)	0.226	-0.177	0.403* (2.08)	0.794** (3.10)
Std Dev (%)	4.862	4.593	3.509	5.260	4.563	3.892	4.941	5.436	4.125	0.233
Sharpe Ratio	0.219	0.211	0.027	0.179	0.222	-0.019	0.243	0.148	0.096	0.115
B2: Monetary Easing Cycles										
Mean (%)	1.242	0.987	0.255	1.346	1.017	0.329 (1.64)	1.219	0.949	0.270 (1.17)	-0.059 (-0.26)
Alpha (%)	-0.103	0.062	-0.165	-0.044	0.082	-0.126 (-0.78)	-0.133	0.020	-0.153 (-0.75)	-0.027 (-0.12)
Std Dev (%)	5.751	5.144	3.601	5.450	5.126	3.822	6.451	5.752	4.416	0.594
Sharpe Ratio	0.216	0.192	0.071	0.247	0.198	0.086	0.189	0.165	0.061	-0.025

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New-Old
C1: High 10-Year Treasury Yield (Top 50%) Subperiods										
Mean (%)	1.271	0.817	0.455	1.273	0.860	0.413* (2.16)	1.341	0.777	0.563** (2.73)	0.150* (2.12)
Alpha (%)	0.065	0.041	0.024	-0.120	0.090	-0.210 (-1.33)	0.270	-0.107	0.376* (1.98)	0.586* (2.49)
Std Dev (%)	4.932	5.127	3.330	5.022	5.078	3.784	5.331	6.006	4.090	0.305
Sharpe Ratio	0.258	0.159	0.137	0.254	0.169	0.109	0.251	0.129	0.138	0.029
C2: Low 10-Year Treasury Yield (Bottom 50%) Subperiods										
Mean (%)	1.002	1.215	-0.213	1.002	1.244	-0.241 (-1.00)	1.021	1.041	-0.020 (-0.07)	0.221 (0.85)
Alpha (%)	-0.182	0.175	-0.357	-0.194	0.200	-0.393* (-2.23)	-0.186	0.038	-0.225 (-1.01)	0.169 (0.65)
Std Dev (%)	5.950	4.547	3.840	5.836	4.567	3.934	6.466	4.974	4.541	0.607
Sharpe Ratio	0.168	0.267	-0.055	0.172	0.272	-0.061	0.158	0.209	-0.004	0.057
D1: High Uncertainty (12 Month) (Top 50%) Subperiods										
Mean (%)	1.085	0.731	0.353	0.977	0.801	0.175 (0.76)	1.212	0.489	0.723* (2.51)	0.547* (2.07)
Alpha (%)	-0.099	0.135	-0.234	-0.250	0.196	-0.446* (-2.52)	0.056	-0.110	0.166 (0.72)	0.612* (2.26)
Std Dev (%)	6.258	5.734	4.123	6.144	5.701	4.191	6.897	6.514	5.238	1.047
Sharpe Ratio	0.173	0.128	0.086	0.159	0.141	0.042	0.176	0.075	0.138	0.096
D2: Low Uncertainty (12 Month) (Bottom 50%) Subperiods										
Mean (%)	1.240	1.226	0.014	1.350	1.231	0.119 (0.62)	1.210	1.280	-0.070 (-0.42)	-0.189 (-0.91)
Alpha (%)	0.022	0.019	0.003	-0.016	0.040	-0.056 (-0.36)	0.054	-0.088	0.143 (0.85)	0.199 (0.93)
Std Dev (%)	4.300	3.885	2.882	4.454	3.880	3.496	4.494	4.500	3.004	-0.491
Sharpe Ratio	0.288	0.316	0.005	0.303	0.317	0.034	0.269	0.284	-0.023	-0.057

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New-Old
E1: High Sentiment Subperiods										
Mean (%)	0.966	0.933	0.033	1.070	0.986	0.085 (0.42)	0.956	0.865	0.091 (0.45)	0.006 (0.03)
Alpha (%)	-0.046	0.030	-0.076	-0.072	0.082	-0.154 (-0.99)	0.019	-0.047	0.066 (0.35)	0.220 (1.03)
Std Dev (%)	4.627	4.540	3.262	4.614	4.457	3.685	4.968	5.245	3.689	0.004
Sharpe Ratio	0.209	0.205	0.010	0.232	0.221	0.023	0.192	0.165	0.025	0.002
E2: Low Sentiment Subperiods										
Mean (%)	1.360	1.025	0.335	1.257	1.047	0.210 (0.95)	1.468	0.905	0.563* (2.13)	0.353* (2.25)
Alpha (%)	-0.054	0.136	-0.189	-0.151	0.167	-0.318 (-1.88)	0.045	-0.079	0.125 (0.58)	0.443 (1.69)
Std Dev (%)	6.019	5.244	3.833	6.033	5.273	4.026	6.558	5.959	4.804	0.779
Sharpe Ratio	0.226	0.195	0.087	0.208	0.198	0.052	0.224	0.152	0.117	0.065

Table 6: Within-industry vs Across-industry Effects

We examine the within-industry and across-industry book-to-market (B/M) effects based on industry-adjusted B/M ratio and industry median B/M ratio, respectively. Following Gonçalves and Leonard (2023), the industry-adjusted book-to-market ratio is defined as $BM_{within} = BM_{firm} - BM_{ind}$ and industry median book-to-market ratio is defined as $BM_{across} = BM_{ind}$, where BM_{ind} is the median book-to-market ratio of the industry. The industries are defined based on the Fama and French (1997) 48 industry classification. The portfolios are formed based on BM_{within} or BM_{across} using the same method as in Table 3. This table reports the mean, alpha, standard deviation (Std Dev), and Sharpe ratio of value-weighted monthly returns of value and growth portfolios as well as the spreads between value and growth portfolios. Panel A reports the results of the within-industry effect. Panel B reports the results of the across-industry effect. Alpha is based on Fama-French five-factor model excluding the value factor and plus the momentum factor, namely market (MKT), size (SMB), profitability (RMW), investment (CMA), and momentum (UMD). The Newy-West t-statistics of the differences are also reported. ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from January 1970 to December 2024.

Panel A: Within-Industry Effect

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New - Old
Value-Weighted Monthly Return										
Mean (%)	1.111	1.021	0.090	1.222	1.066	0.156 (1.21)	1.058	0.991	0.067 (0.54)	-0.089 (-0.66)
Alpha (%)	-0.015	0.007	-0.022	-0.038	0.044	-0.082 (-0.68)	0.000	-0.082	0.082 (0.70)	0.164 (1.17)
Std Dev (%)	5.228	4.865	2.857	5.285	4.812	3.312	5.586	5.313	3.198	-0.114
Sharpe Ratio	0.213	0.210	0.032	0.231	0.221	0.047	0.189	0.186	0.021	-0.026
Equal-Weighted Monthly Return										
Mean (%)	1.549	0.842	0.708	1.624	0.979	0.644** (6.26)	1.454	0.742	0.712** (7.19)	0.068 (0.78)
Alpha (%)	0.538	-0.103	0.640	0.532	-0.063	0.596** (6.49)	0.515	-0.151	0.666** (7.42)	0.071 (0.77)
Std Dev (%)	6.624	6.382	2.345	6.273	5.836	2.646	7.045	6.918	2.543	-0.104
Sharpe Ratio	0.234	0.132	0.302	0.259	0.168	0.243	0.206	0.107	0.280	0.036

Panel B: Across-Industry Effect

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New - Old
Value-Weighted Monthly Return										
Mean (%)	0.929	0.984	-0.055	0.961	1.069	-0.109 (-0.73)	0.949	0.800	0.149** (2.62)	0.257* (2.36)
Alpha (%)	-0.287	0.139	-0.426	-0.273	0.249	-0.522** (-4.23)	-0.238	-0.148	-0.090 (-0.60)	0.432* (2.36)
Std Dev (%)	4.883	5.010	3.359	5.010	5.116	3.804	5.161	5.540	4.016	0.212
Sharpe Ratio	0.190	0.196	-0.016	0.192	0.209	-0.029	0.184	0.144	0.037	0.066
Equal-Weighted Monthly Return										
Mean (%)	1.051	1.019	0.032	1.147	1.161	-0.014 (-0.10)	0.983	0.797	0.185* (2.58)	0.199** (2.73)
Alpha (%)	-0.084	0.241	-0.325	-0.070	0.356	-0.426** (-3.79)	-0.056	0.054	-0.110 (-0.91)	0.316* (2.54)
Std Dev (%)	6.322	6.939	3.287	6.265	6.758	3.604	6.592	7.306	3.638	0.034
Sharpe Ratio	0.166	0.147	0.010	0.183	0.172	-0.004	0.149	0.109	0.051	0.055

Table 7: Results based on International Data

We replicate the analysis in Table 2 using international data. Following Jensen, Kelly, and Pedersen (2023), we obtain accounting and stock price information from Compustat Global to calculate the book-to-market ratio (B/M) and the monthly stock returns. B/M is defined the same as in Table 1. In June of each year, we divide all international stocks in our sample into three groups: top 30% as value stocks (H(V)), middle 40%, and bottom 30% as growth stocks (L(G)). OldV, OldG, NewV, and NewG portfolios are defined the same as in Table 3. This table reports the mean, standard deviation (Std Dev), and Sharpe ratio of value-weighted and equal-weighted monthly returns of value and growth portfolio as well as the spreads between value and growth portfolios. The Newy-West t-statistics of the differences are also reported. ** and * indicate significance at the 1% and 5% level, respectively. The sample period is from July 1991 to December 2022.

	H(V)	L(G)	HML	OldV	OldG	Old(V-G)	NewV	NewG	New(V-G)	New - Old
Global Value-Weighted Monthly Return										
Mean (%)	0.715	0.711	0.004	0.734	0.750	-0.016 (-0.08)	0.887	0.716	0.172 (1.20)	0.188 (1.91)
Std Dev (%)	4.998	4.765	3.931	4.977	4.754	3.870	5.720	5.581	5.338	1.468
Sharpe Ratio	0.143	0.149	0.001	0.147	0.158	-0.004	0.155	0.128	0.032	0.036
Global Equal-Weighted Monthly Return										
Mean (%)	0.959	0.547	0.412	0.928	0.701	0.227 (0.93)	1.076	0.374	0.702** (3.00)	0.475** (3.33)
Std Dev (%)	5.634	5.238	4.459	5.638	5.209	4.764	5.923	5.586	4.554	-0.209
Sharpe Ratio	0.170	0.104	0.092	0.165	0.135	0.048	0.182	0.067	0.154	0.106

Figure 1: Percentage of New Growth and New Value Stocks

This figure plots the percentage of new value stocks (NewV) out of all value stocks and the percentage of new growth stocks (NewG) out of all growth stocks each year. In June of each year, we follow Fama and French (1993) and divide stocks in our sample into three B/M groups: top 30% as value stocks, middle 40%, and bottom 30% as growth stocks, based on the NYSE breakpoints of B/M. New value (growth) stocks are those that are not classified as value (growth) stocks in year t-1 or year t-2 or both. We plot the percentage of new value (growth) stocks out of the total number of value (growth) stocks each year. The sample period is from January 1970 to December 2024.

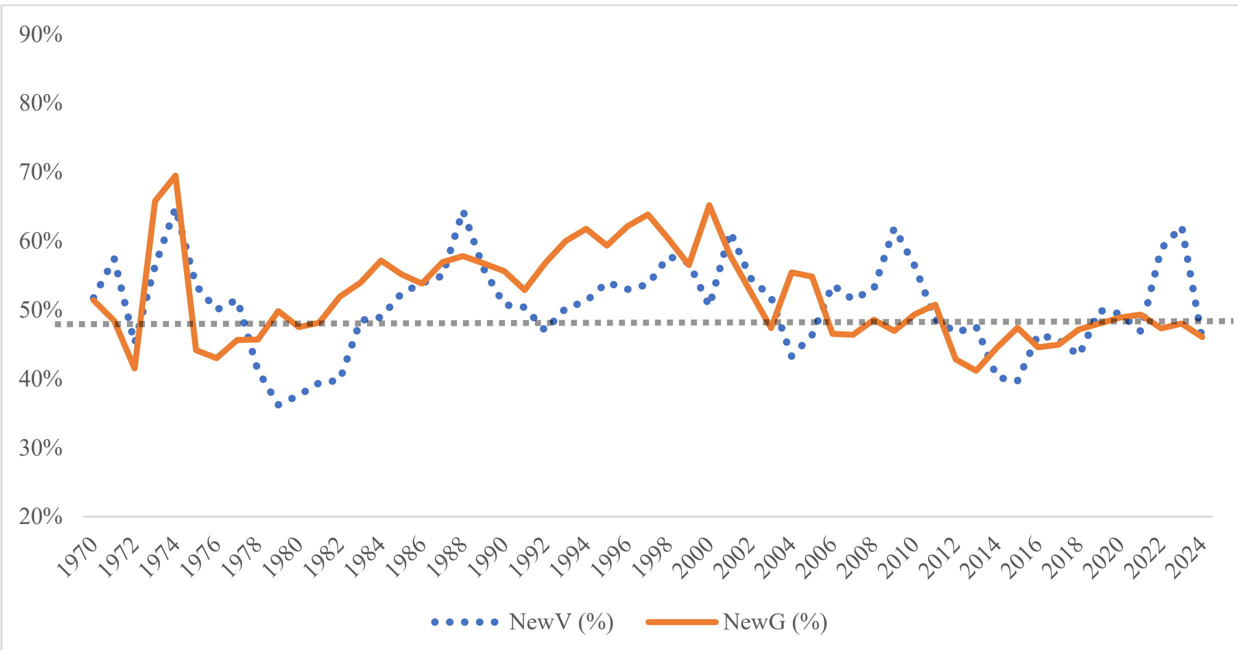
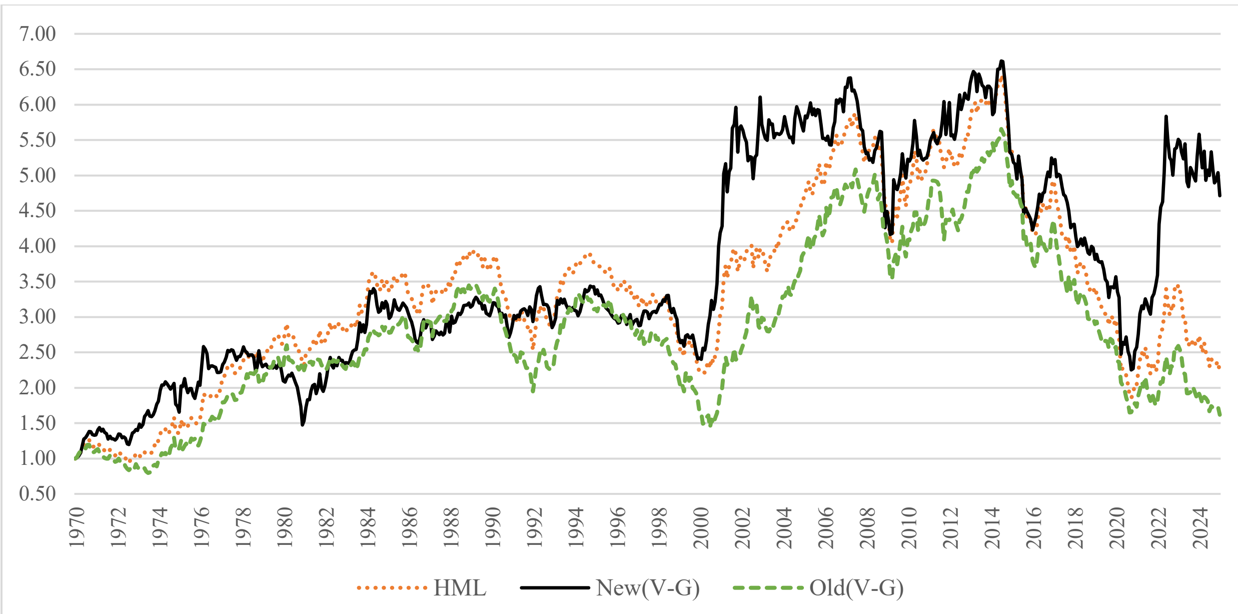


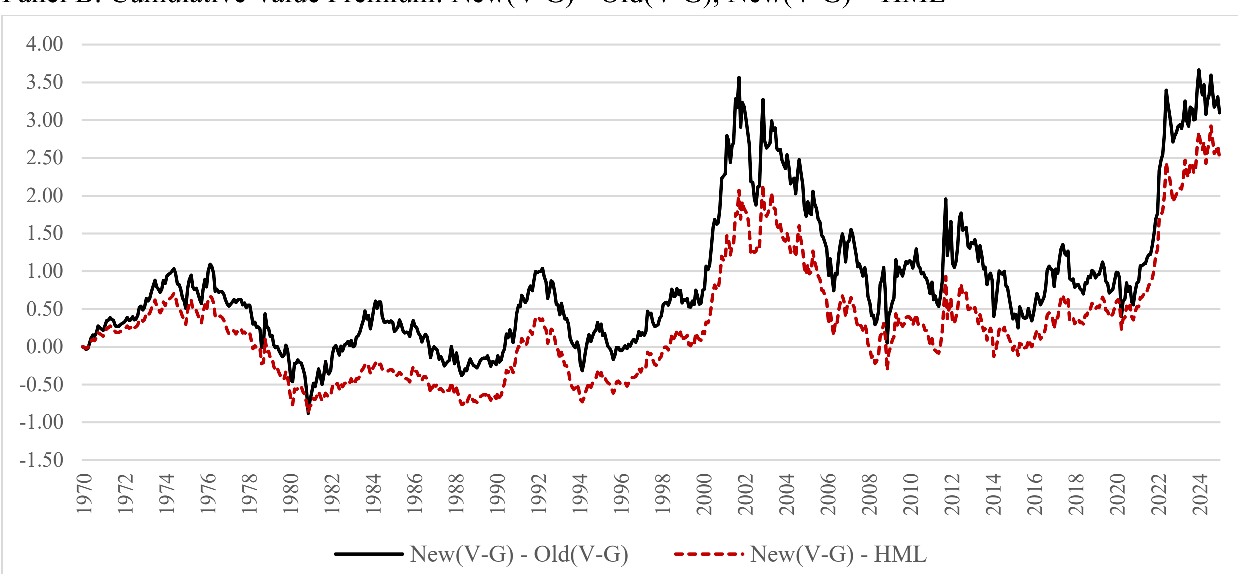
Figure 2: Cumulative Value Premium

In June of each year, we divide stocks into three book-to-market ratio (B/M) groups based on the NYSE breakpoints of B/M: top 30% as value stocks (H(V)), middle 40%, and bottom 30% as growth stocks (L(G)). B/M and the stock sample are defined the same as in Table 1. New value stocks (NewV), old value stocks (OldV), new growth stocks (NewG), and old growth stocks (OldG) are defined the same as in Table 2. Panel A plots the cumulative value premium based on the full stock sample (HML), as well as the old and new value and growth stocks (Old(V-G) and New(V-G)). Panel B plots the differences between the cumulative value premiums. The sample period is from January 1970 to December 2024.

Panel A: Cumulative Value Premium: HML, Old(V-G), and New(V-G)



Panel B: Cumulative Value Premium: New(V-G) - Old(V-G), New(V-G) – HML



Appendix

List of variables

Market capitalization (SIZE): stock price times the number of shares outstanding at the end of each June (Fama and French, 1993).

Firm age (Age): the number of years that a firm is in the CRSP database.

Past one-year return ($LRET_{1Y}$): cumulative return in the past year

Past two-year return ($LRET_{2Y}$): cumulative return in the past two years.

Sales: annual sales averaged over the past three years. If net sales unavailable, we use the total revenue.

Earnings: annual net income averaged over the past three years. If Income Before Extraordinary Items unavailable, we use Net Income minus Extraordinary Items and Discontinued Operations. If this is unavailable, we use Pretax Income minus Total Income Taxes minus Noncontrolling Interest (MII). Missing MII will be replaced by 0 (Jensen, Kelly, and Pedersen, 2023).

Cash Flow (CF): net income plus depreciation and amortization (Fama and French, 1996) averaged over the past three years.

Free Cash Flow (FCF): operating cash flow minus capital expenditures, where operating cash flow is the Operating Activities – Net Cash Flow. If this is unavailable, we use net income (defined above) minus Operating Accruals. If this is unavailable, we use net income (defined above) plus depreciation and amortization minus Total Working Capital Change (WCAPCH). Missing WACPCH will be replaced by 0. Operating Accruals is the annual change in current operating working capital plus the annual change in Net Non-Current Operating Assets (Jensen, Kelly, and Pedersen, 2023). Free cash flow averaged over the past three years.

Sales growth rate: the annual change in sales, averaged over the past three years (Jensen, Kelly, and Pedersen, 2023). If net sales unavailable, we use the total revenue.

Earnings growth rate: the annual change in earnings, as defined above, averaged over the past three years.

Investment: capital expenditures divided by sales relative to its average over the past three years (Titman, Wei, and Xie, 2004).

Leverage (LEV): book debt to total assets (AT), averaged over the past three years, where book debt is total assets minus book equity, and book equity is calculated using Compustat annual data as the sum of stockholders' equity and deferred taxes and investment tax credit minus preferred stock. Preferred stock is measured as either preferred stock redemption value, liquidating value, or par value, in this order. Missing deferred taxes and investment tax credits or preferred stock will be replaced by 0 (Fama and French, 1993).

Operating profitability (OP): revenue minus cost of goods sold, minus selling, general, and administrative expenses, minus interest expenses all divided by book equity (Fama and French, 2015). OP is averaged over the past three years.

Return on equity (ROE): the net income divided by the book value of equity, as defined above, averaged over the past three years.

Return on asset (ROA): the net income divided by total assets, as defined above, averaged over the past three years.

Sale to price ratio (S/P): sales divided by market value of equity, as defined above, averaged over the past three years.

Cash flow to price ratio (CF/P): cash flow, as defined above, divided by market value of equity, averaged over the past three years.

Free cash flow to price (FCF/P): free cash flow, as defined above, divided by market value of equity, averaged over the past three years.

Earnings to price ratio (E/P): net income divided by market value of equity, as defined above, averaged over the past three years.

Amihud illiquidity ratio (ILLIQ): the ratio of absolute daily return to dollar trading volume and averaged over the quarter, pre-multiplied by 10^6. Since the trading volume on NASDAQ was double-counted before 2004, we follow Boehmer (2005) and adjust the trading volume of NASDAQ stocks by a factor of 0.7. After 2004, we do not adjust the trading volume of NASDAQ stocks since there are no longer significant differences in the reporting of NYSE and NASDAQ trading volume (Gao and Ritter, 2010).

Idiosyncratic volatility (IVOL): the standard error of residuals of the Fama-French 3-factor model estimated from daily returns over a quarter.