
Is Value Investing Really Just an Interest Rate Bet?

Alejandro E. Gaba

Senior Managing Director and
Head of Research Systematic Equity Team

Kanishak Goyal

Senior Quantitative Research Analyst
Systematic Equity Team

Chee K, Ooi

Managing Director and Senior Portfolio Manager
Systematic Equity Team

Tao Wang

Vice President and Senior Quantitative Researcher
Systematic Equity Team

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Introduction

With global policy rates ratcheting higher amid inflationary pressures, market participants are looking closely at the impacts of interest rate movements on various parts of their portfolios, including Value equity. Research shows that the relationship between the Value factor premium¹ and interest rate fluctuations has strengthened significantly since the global financial crisis (Figure 1).²

This rising correlation seems to lend support to a popular view that Value investing is simply an interest rate bet. Many prior literature, on the other hand, find that such correlation does not hold steady over time, and over the past decade, some other Value-related ratios (such as dividend yield) have exhibited a much weaker relationship with rates. However, prior literature fails to provide any fundamental reason for the changing correlations and tends to attribute them to simple statistical randomness.

“ In our view, the recent strong correlation between the Value factor premium and rates is likely driven by changes in sector concentration in Value style indices.”

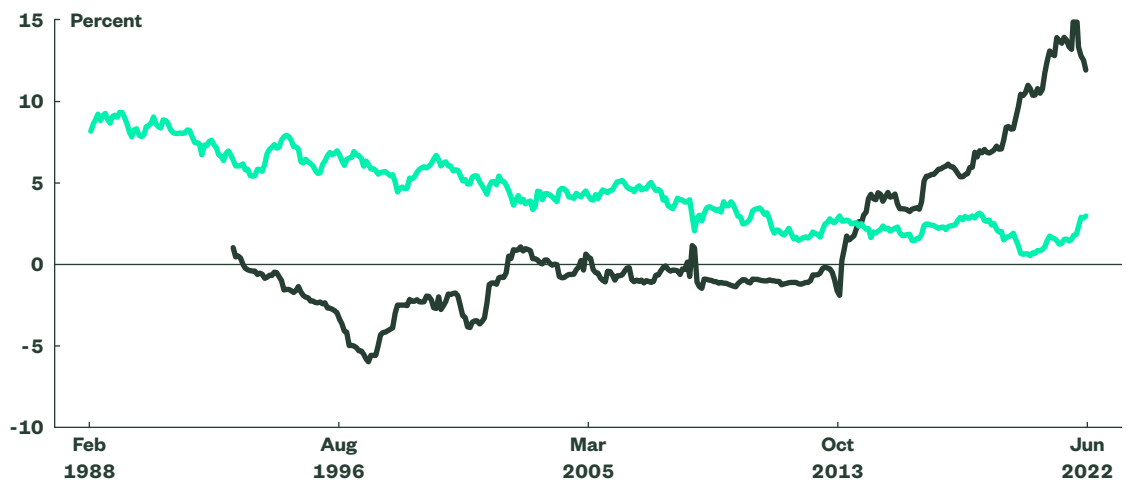
The financial sector has become more concentrated in the top book-to-market quintile (i.e., the deepest Value quintile), and as a result, the interest rate beta³ of the book-to-market factor has risen.

1 The Book-to-Market Factor Premium Has Shown Higher Correlation with Interest Rates in Recent Years

Figure 1 illustrates that post crisis, the sensitivity of the book-to-market factor premium to the 10-year treasury rate changes has increased alongside falling rates. (The book-to-market factor is similar to the high-minus-low or HML factor as in the [Fama-French five-factor model](#)). This seems to support the narrative that the Value factor is primarily an interest rate bet. Some argue that the economic rationale for such a narrative is Value stocks' lower equity duration. Leveraging the duration concept from fixed income securities, the equity duration hypothesis claims that stocks with more cash flow in the distant future (i.e., Growth stocks) have higher duration, and therefore will be devalued more than Value stocks as interest rates rise. On the flip side, the Value factor premium may decrease when rates fall. While this explanation makes intuitive sense, in this piece, data shows that the actual culprit for the increased correlation is driven largely by the change in sector concentration, among many potential drivers.

Figure 1
The Book-to-Market Value Factor Has Exhibited a Strong Relationship with Interest Rates Since 2010

■ Book-to-Market 10-Year Interest Rate Change, Rolling 60-Month
■ US 10-Year Treasury Yield



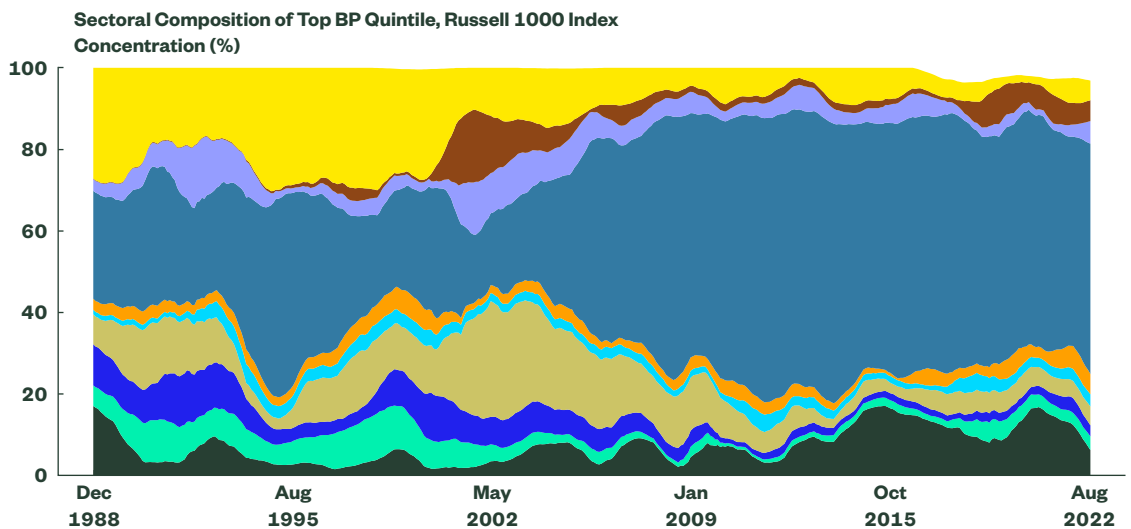
Slope coefficient estimates of value factor monthly returns on ten-year treasury rates from 60-month rolling regressions are shown in dark green line. The market excess (of risk free rate) return is included in the regression as a control variable. Source: State Street Global Advisors, Bloomberg, as of June 30, 2022.

2 Questioning the Tie Between the Value Factor Premium and Interest Rates

Our analysis largely emanates from the changes in sector concentration that have occurred within Value over the past decade. We examined sector changes in the most Value stocks in the Russell 1000 Index, with Value measured by the book-to-market ratio, or BP. The highest quintile stocks by BP are the deepest value. Figures 2 and 3 show the time-series sectoral composition of the top and bottom quintiles.

Figure 2
The Financials Sector Weight Has Risen in the Top Book-to-Market (BP) Quintile

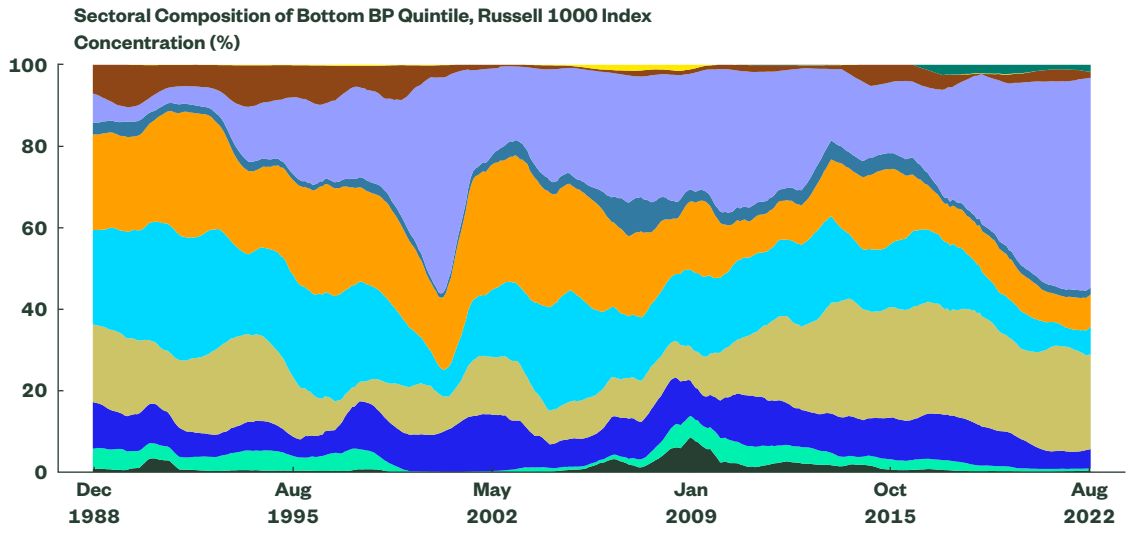
- Energy
- Materials
- Industrials
- Consumer Discretionary
- Consumer Staples
- Health Care
- Financials
- Information Technology
- Communication Services
- Utilities



12-month moving average numbers, M/Cap Weighted.
 Source: Russell Indices, Bloomberg, State Street Global Advisors, as of August 31, 2022.

Figure 3

The Bottom Book-to-Market (BP) Quintile Has Had Fluctuations in Tech Sector Concentration



12-month moving average numbers, M/Cap Weighted.
 Source: Russell Indices, Bloomberg, State Street Global Advisors, as of August 31, 2022.

First, the top BP quintile showed an increasing concentration of financials over the sample period (Figure 2). In general, the top BP quintile has become more concentrated in cyclical industries (Financials, Energy) over the past two decades.

The financial weight started at roughly 25% in the late 1980s, then dropped to about 15% after the peak of the IT bubble, and then rose back to over 50% roughly during the financial crisis, and has remained elevated since then. Meanwhile, the utility sector concentration has fallen from just over 25% in the 1980s to about 5% currently. The performance of the financial sector is sensitive to interest rate change, while the utility sector is more defensive, and less affected by rate movement.

Second, in the bottom quintile (Figure 3), the IT sector concentration started at about 5% in the late 1980s, zoomed up to over 50% at the peak of the TMT bubble, then declined to about 20% after the bubble burst, then rose again to over 50%, and it remains at that level. At the same time, consumer staples and health care — both typically considered defensive sectors less sensitive to interest rate changes and business cycles — both started at about 25% in the late 1980s, and have dropped to 10% today.

Beyond Book to Market

We also examined whether quintiles based on other Value metrics (besides book-to-market) still show varying sector composition that can drive interest rate beta.⁴

We started with two other common metrics for the Value factor: earnings yield and dividend yield. A similar pattern of time-varying sectoral composition emerged for the top and bottom quintiles of earnings yield and dividend yield, but the *magnitude* of the changes in concentration was much smaller for earnings yield, and the smallest for dividend yield.

For example, in the top quintile of earnings yield (deepest value), the financial sector started with about 25% weight; fell to nearly zero around 2010; then rose again to over 50% after around 2020. Meanwhile, in the bottom quintile of earnings yield, the IT sector started from under 5%, increased to over 50% at the peak of the IT bubble, and then dropped to 25% (Figures 4 and 5).

Figure 4
The Top Earnings Yield Quintile Exhibited a Smaller Increase in Financial Sector Concentration

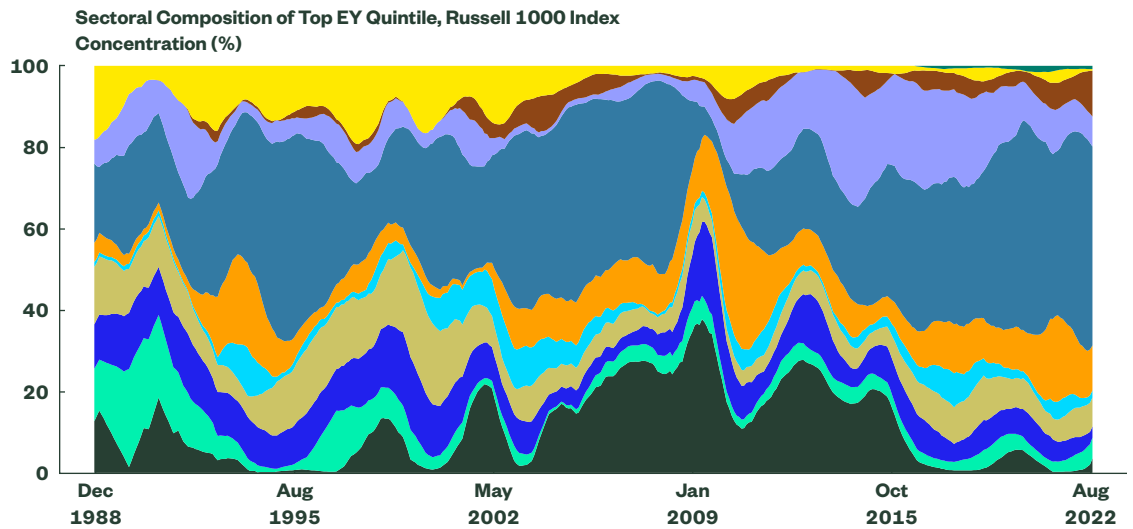
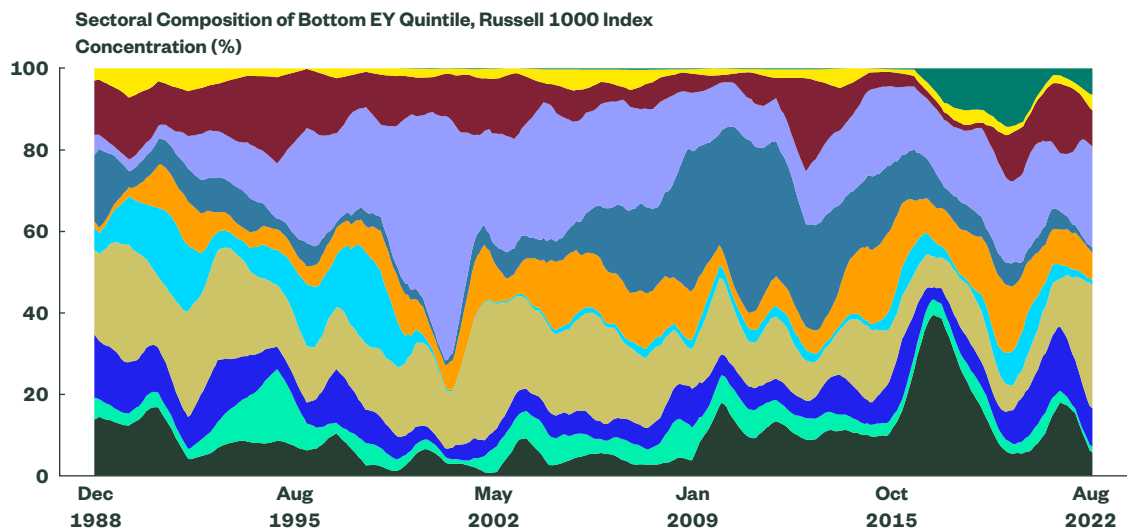


Figure 5
The Tech Sector Concentration Fell Post-IT Bubble with Value Defined by Earnings Yield



- Energy
- Materials
- Industrials
- Consumer Discretionary
- Consumer Staples
- Health Care
- Financials
- Information Technology
- Communication Services
- Utilities
- Real Estate

Source: State Street Global Advisors, FTSE Russell, as of August 31, 2022.

In the top quintile dividend yield quintile, the financial sector started with a roughly 10% weight, and gradually increased to over 25% following the financial crisis. Then the financial sector concentration oscillated, and has now leveled out at approximately 15% (Figure 6).

In the bottom quintile (Figure 7), the IT sector started at about a 20% concentration in the 1980s, soared to over 70% at the peak of the IT bubble, and is now at approximately to 25%. However, a GICS reclassification in 2018 moved many names (such as Alphabet and Meta) from the IT sector to the communication service sector.

Figure 6
The Top Dividend Yield Quintile Exhibited a Lower Level of Increase in Financial Sector Concentration

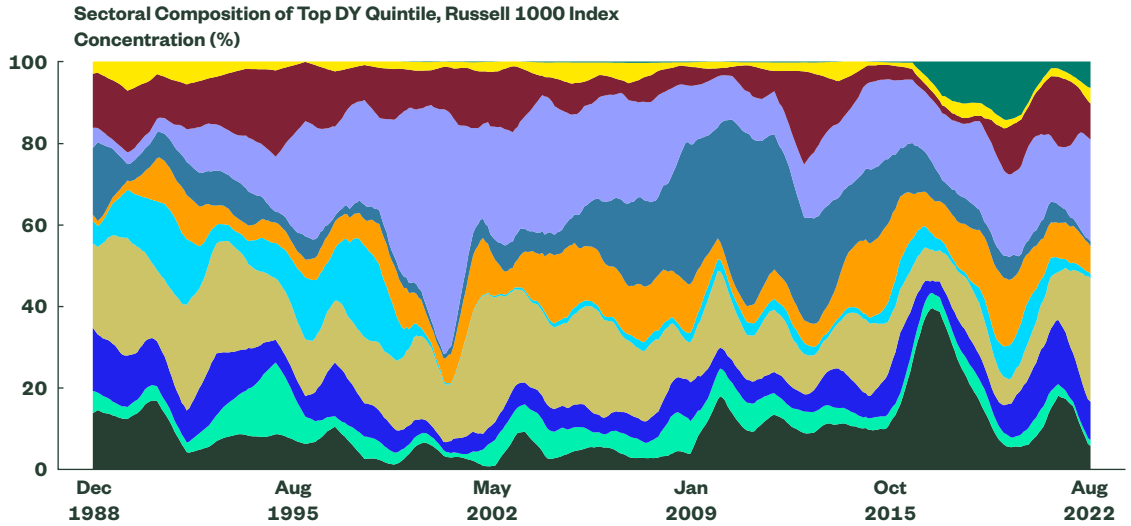
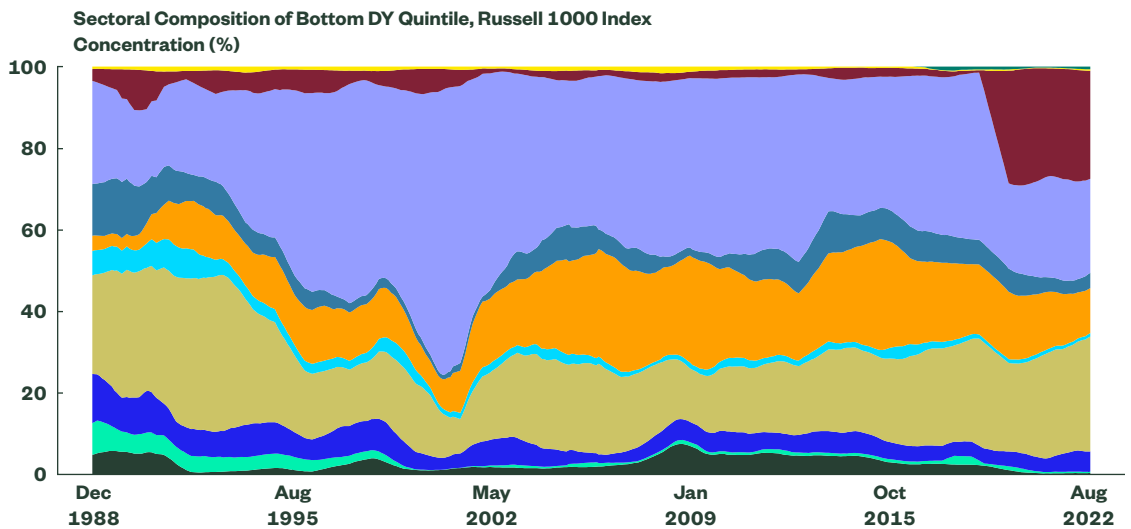


Figure 7
In the Bottom Dividend Yield Quintile, the IT Sector Exhibited Dramatic Swings



- Energy
- Materials
- Industrials
- Consumer Discretionary
- Consumer Staples
- Health Care
- Financials
- Information Technology
- Communication Services
- Utilities
- Real Estate

Source: State Street Global Advisors, FTSE Russell, as of August 31, 2022.

3

More Empirical Evidence Regarding the Financial Sector Concentration and Interest Rate Beta

We also examine this relationship over time, to address the time variance of interest rate beta.⁵

Based on Figures 1–7, we hypothesize that the rise of the Value factor’s interest rate beta over the last decade is likely driven by the sectoral composition shift in the top and bottom quintiles of the Value factors — especially the rise in financial sector concentration in the deepest-Value quintile. We conducted several empirical tests of this idea.

Differences in Interest Rate Beta by Value Factor

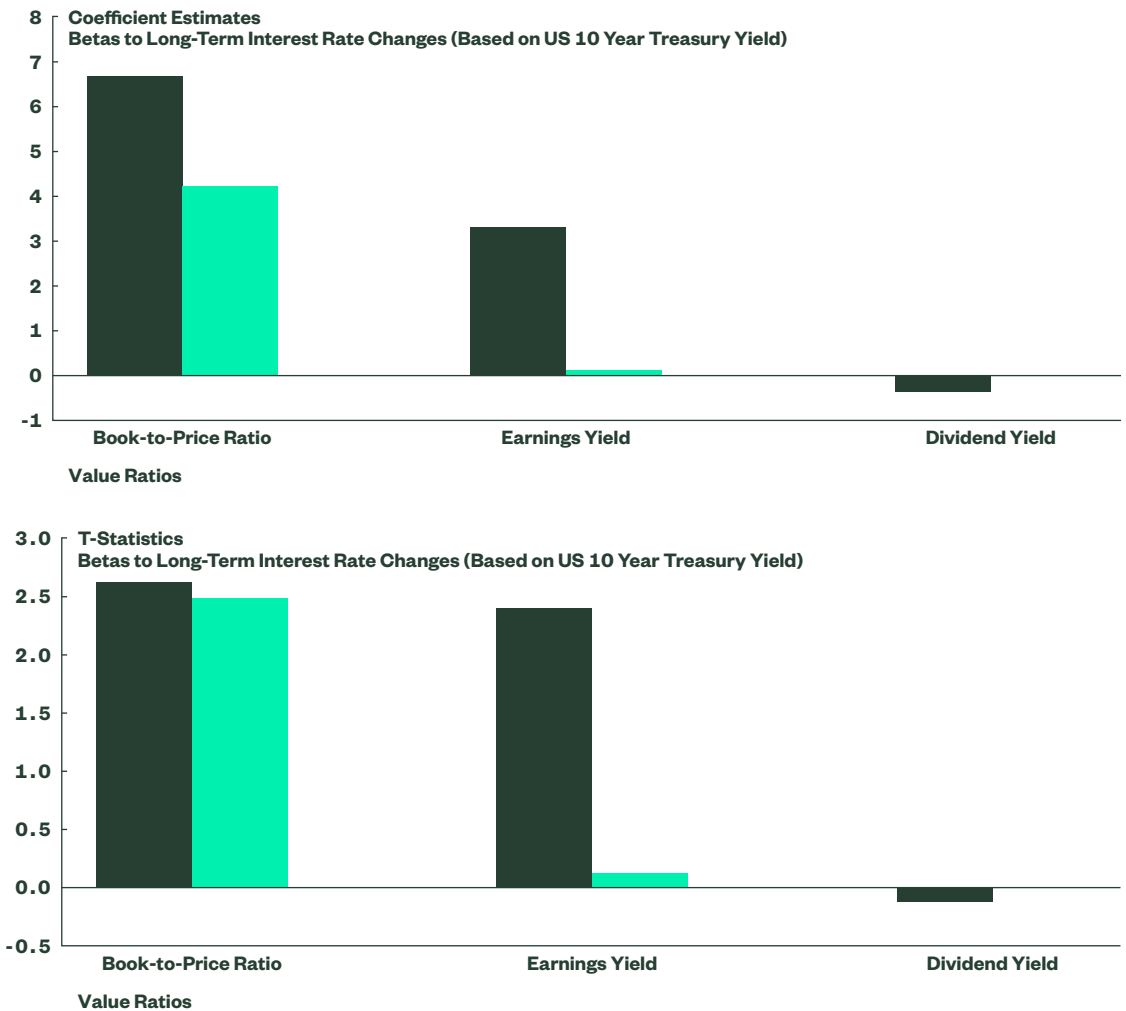
Given that the financial sector concentration increased most based on the book-to-price ratio — and least based on the dividend yield factor post crisis — we would expect that the interest rate beta is largest for the book-to-price factor premium, and smallest for the dividend yield factor premium. We estimated the beta of interest rate changes for all of the three Value metrics in the sample period from the financial crisis to August 2022 (Figures 8 and 9).⁶ We found that indeed, the book-to-market-based Value factor premium had the biggest interest rate beta, and the dividend yield-based premium had the smallest and it was statistically insignificant.

Figure 8 illustrates the coefficient estimates, while Figure 9 shows the t-statistics (significance tests) with Newey-West adjustment⁷ of six lag periods.⁸ The navy bars show the betas to interest rate changes for the Value scores. The book-to-price factor indeed had the largest and most statistically significant beta. The dividend yield-based factor had the smallest beta over the sample period, and the result was insignificant.

Figure 8, 9

Coefficient Estimates and T-statistics for Betas to Interest Rate Changes Since the Great Financial Crisis, Before and After Sector Control

■ Raw
■ Sector Neutralized



Source: State Street Global Advisors, as of August 31, 2022. We run an OLS regression of the Value factor monthly returns based on book-to-price, earnings yield and dividend yield respectively (market cap-weighted quintile spreads between top and bottom quintiles), raw and sector ranked scores, on the contemporaneous change in US 10-year treasury bond yields and the market excess return over risk-free rate in the sample period from Jan 2009 through Aug 2022. The slope coefficient estimates on the interest rate change is plotted on the top chart, while the t-statistics adjusted by Newey-West with 6 lag periods are reported on the bottom chart. Results for raw Value scores are in darker green bars while lighter green bars are for sector ranked Value scores.

Differences in Sector-Ranked Value Ratios

Next, we controlled the effect of changing sector tilt over time by analyzing sector-ranked Value ratios instead of raw Value ratios. We had expected that the magnitude and statistical significance of interest rate betas would fall for sector-ranked Value ratios as the tilt toward financial concentration is largely mitigated, if not completely eliminated.

The results are also shown in Figures 8 and 9. The betas to interest rate changes for sector-ranked Value ratios are the lighter green bars. The charts show a significant drop in the magnitude and the statistical significance of betas to interest rate changes for sector-ranked Value scores. In particular, the interest rate beta for the book-to-price metric drops over 30% from 6.7 to approximately 4.2, and the t-statistics also fall.⁹ In the case of earnings yield, the estimate turns from significant to insignificant. This analysis further confirms that the recent rise in interest rate beta for the Value factor over the last decade was largely driven by a sector tilt toward interest-rate-sensitive sectors, such as financials.

Relative Impacts of the Top and Bottom Quintiles on Interest Rate Beta

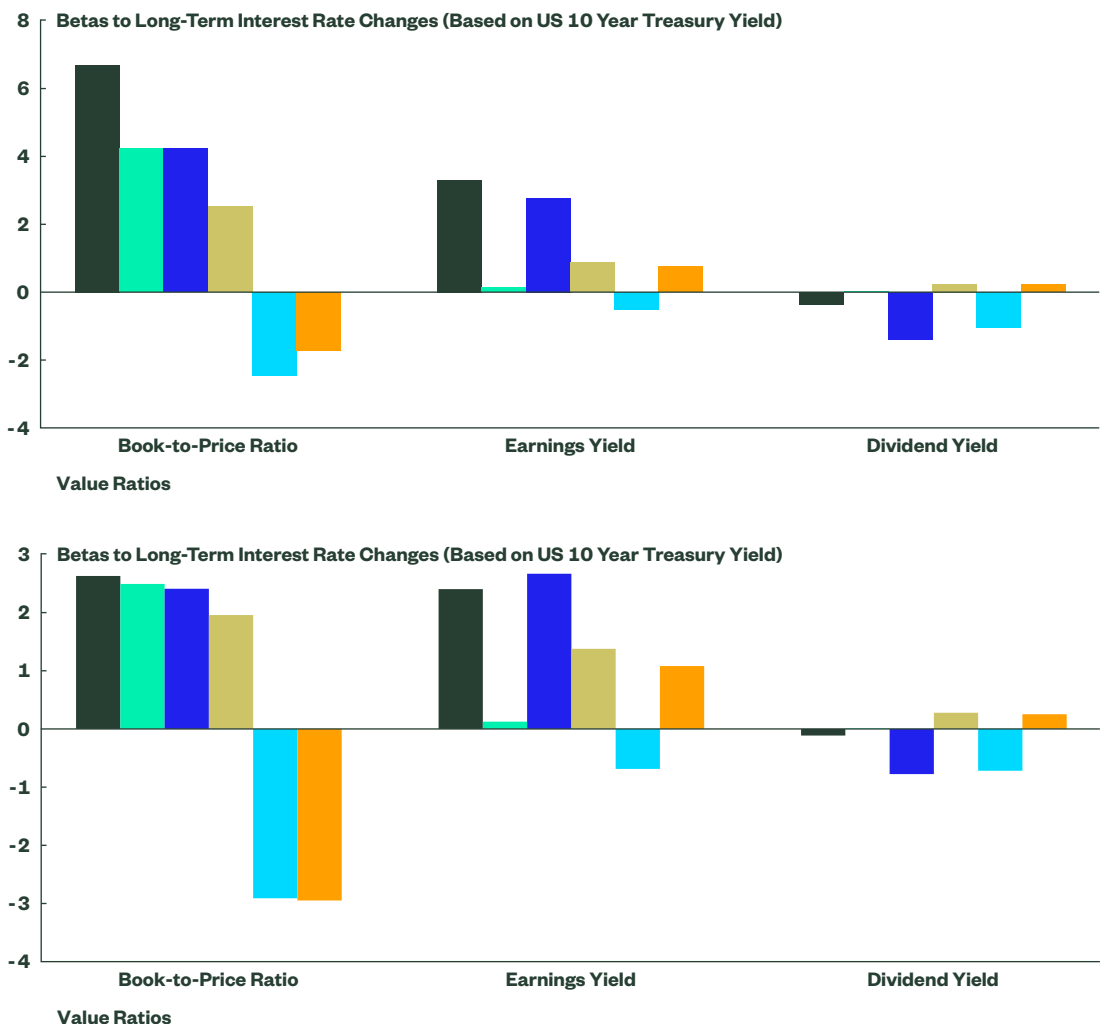
Finally, we considered the relative contributions to interest rate beta of the top and bottom quintiles of each Value factor. We aimed to address whether the change in interest rate beta mainly comes from the top quintile — which has seen an increased weight in financials — or from the bottom quintile, which has seen an increased weight in the IT sector, among others.

The results are shown in Figures 10 and 11. First, the chart shows that the interest rate beta is mainly driven by the top quintile of the Value factors. In cases where the interest rate beta for a factor is statistically significant (raw- and sector-ranked book-to-price, raw earnings yield), the top quintiles' interest rate betas are always statistically significant, and the magnitudes of coefficient estimates are also larger than the bottom quintile.

On the other hand, the bottom quintile only has statistically significant interest rate beta for the book-to-price ratio, raw- and sector-ranked. For the bottom quintiles of earnings yield and dividend yield, the interest rate betas are not statistically significant, despite the hefty weight of the IT sector — especially the dividend yield-based quintile, where the IT sector would have over 50% weight if we reversed the effect of GICS reclassification in 2018.

Figure 10, 11
Coefficient Estimates and T-statistics for Interest Rate Change Beta Since the Great Financial Crisis, before and after Sector Control, Top and Bottom Quintiles

- Market-Cap-Weighted Quintile Spread
- Market-Cap-Weighted Quintile Spread — Sector Neutralized
- Market-Cap-Weighted Quintile Spread — TOP QUINTILE
- Market-Cap-Weighted Quintile Spread — Sector Neutralized — TOP QUINTILE
- Market-Cap-Weighted Quintile Spread — BOTTOM QUINTILE
- Market-Cap-Weighted Quintile Spread — Sector Neutralized — BOTTOM QUINTILE



Source: State Street Global Advisors, as of June 30, 2023. We run an OLS regression of the Value factor monthly returns based on book-to-price, earnings yield and dividend yield respectively (market cap-weighted quintile spreads between top and bottom quintiles) as well as the returns for the top and bottom quintiles, raw and sector ranked scores, on the contemporaneous change in US 10-year treasury bond yields and the market excess return over risk-free rate in the sample period from Jan 2009 through Aug 2022. The slope coefficient estimates on the interest rate change is plotted on the top chart, while the t-statistics adjusted by Newey-West with six lag periods are reported on the bottom chart.

In sum, our analysis shows that the top quintile by book to market has seen a growing concentration in financials, attributable in part to the declining profitability in the sector. In general, the top quintile has become more concentrated in cyclical industries (Financials, Energy) over the past two decades, with Financials alone accounting for over half the weight. We found that this drove an overall increase in interest rate sensitivity for the book-to-market Value factor.

The Value factor portfolio also exhibited greater interest rate sensitivity compared to pre-crisis, when there was more sectoral diversity in the top book-to-market portfolio, and when defensive sectors such as Utilities accounted for about a quarter of the weight.

The regressions in Figures 9–11 are based on market-cap-weighted quintile spreads. We consider the robustness of our analysis by performing the same regressions on portfolios with equal weightings of securities and find our results hold in general.

The Drivers of the Rise in Financial Sector Concentration

It is worth considering why the financial sector concentration rose in the top quintile. We believe the increase is likely related to the changes in financial sector regulation after the GFC, in particular the enactment of the [Dodd-Frank Act](#) in 2010. Dodd-Frank imposed a higher capital requirement for banks and limited the scope of the bank industry's business. For example, by prohibiting proprietary trading (the Volcker Rule), Dodd-Frank made banks' businesses more reliant on interest rate changes than before the crisis. Financial companies affected most by regulatory changes experienced declines in their profitability and their valuations, pushing them toward the top quintile of the Value factor, per data in Figure 12.¹⁰ There was a regime shift in banks' profitability within the Value portfolio before and after the crisis.

The declining profitability of these companies after the crisis helps to explain why the top quintile based on book-to-market showed a greater increase in financial sector weight than the top quintile based on earnings yield or dividend yield. Some firms had high book to market given plummeting valuations, but other fundamentals (earnings and dividends) remained depressed, excluding them from the top quintile based on those Value metrics.

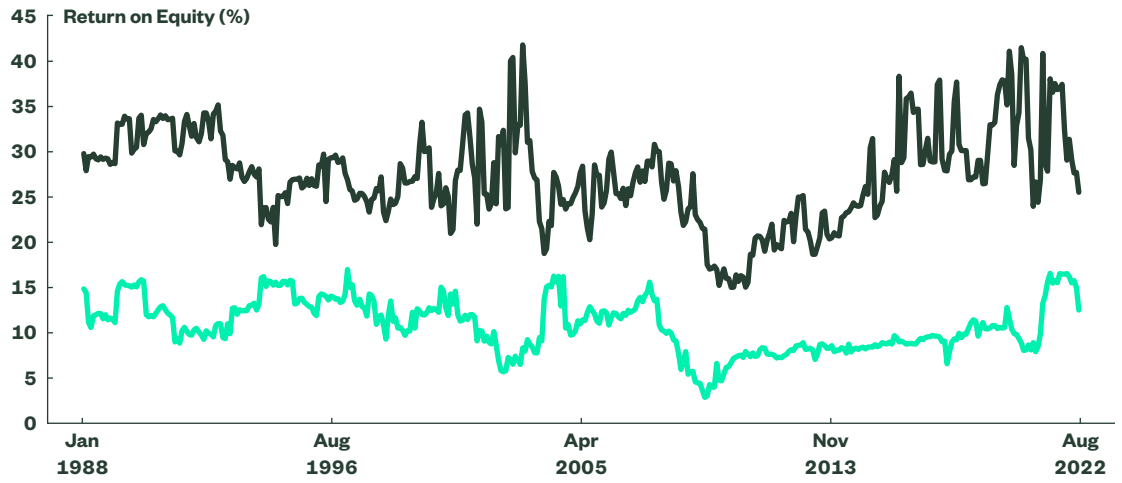
Dodd-Frank Rollback

In May, 2018, the US Congress passed the [Economic Growth, Regulatory Relief, and Consumer Protection Act](#). This change rolled back significant portions of the Dodd-Frank Act; for example, it lowered capital requirements and leverage ratios for certain financial institutions, and exempted lenders with assets less than \$10 billion from requirements of the Volcker Rule.

The chart in Figure 12 shows market cap-weighted averages of return on equity (ROE) in the top and bottom quintiles of the Value factor based on book-to-market.¹¹ In the financial sector, the average ROE for the top quintile, by book to market, hovers above 10% for most of the pre-crisis period. It dropped to nearly zero during the crisis, then stayed below 10% during most of the post-crisis period. It gradually crawled back up, exceeding 10% after around 2018, likely with the help of the regulatory rollback.¹² Then, the ROE jumped higher in 2022, helped by higher interest rates.

Figure 12
**Profitability in Top
and Bottom Quintiles
of Book to Price in
Financial Sectors**

■ BOTTOM QUINTILE
■ TOP QUINTILE



Source: State Street Global Advisors, Russell Indices, WorldScope, as of August 31, 2022.

We also performed analysis to explore the equity duration explanation for the rise in correlation. The idea of equity duration is that the Value factor premium moves with rates because Value stocks have lower duration, or sooner cash flows, versus Growth stocks. As interest rates increase, Growth stocks (with expected cash flows farther in the future) will lose more value than Value stocks, and vice versa.

The regression results of interest rate beta, especially the results based on dividend yield, shed some light on the equity duration hypothesis. One would expect firms with high dividend yield to have more persistent near-term expected cash flows than firms with high earnings yield or high book-to-price, everything else held constant, as dividend payouts tend to be sticky. Moreover, commitments to pay dividends indicate expectations for persistent cash flow in the near future. By contrast, trailing earnings may be cyclical, and book equity reflects little information about companies' expected cash flows.

Therefore, if equity duration drives the correlation, we would expect a higher interest rate beta for the dividend yield factor, versus the book-to-market factor. The regression results revealed the opposite. Interest rate beta was highest for the Value factor based on book to market, and lowest for the factor based on dividend yield. More importantly, we found no significant interest rate beta for the Value factor based on either raw or sector-ranked dividend yield.

Differences Between Equity and Fixed Income Duration

Here, we explain the differences between Equity and Fixed Income to accentuate that we cannot directly apply the duration concept from fixed income to equity, because the cash flow for equity is not "fixed" (unlike fixed-income securities, in which the income/cash flow is fixed).

Equation 1 shows discounted cash flow calculations for equities and bonds. From a theoretical perspective, any security's price is the present value of future cash payments at a discount rate. C is the future cash flow, M is the Value at maturity (or terminal value in equity). N is time to maturity, and i is the discount rate.

Equation (1): Determinants of Fixed income and Equity Prices based on DCF models

$$P = \left(\frac{C}{1+i} + \frac{C}{(1+i)^2} + \dots + \frac{C}{(1+i)^N} \right) + \frac{M}{(1+i)^N}$$
$$= \left(\sum_{n=1}^N \frac{C}{(1+i)^n} \right) + \frac{M}{(1+i)^N}$$

- For fixed income securities, future cash flows are pre-specified and fixed. A rise in interest rates decreases the value of a bond (since the denominator rises and all other values remain constant). The denominator rises more for bonds with a higher duration, which makes sense as they will produce more cash payments far into the future.

By contrast, for equities, changes in interest rates not only affect the discount rate in the denominator, but also spawn changes in expected cash flows in the numerator, as Federal Reserve (Fed) policy changes often respond to anticipated business cycles, per Maloney and Moskowitz (2020). Furthermore, the discount rate for equity has three components: the risk-free rate, expected inflation, and a credit risk premium that reflects the perceived riskiness of the expected cash flows (Equation 2). The changes in these components also depend on the stage of business cycles.

Equation (2): The Discount Rate for Equity Cash Flows Depends on a Wide Range of Inputs

$$i = \text{RiskfreeRate} + E(\text{inflation}) + \text{CreditRiskPremium}$$

- Interest rate hike cycles often begin in anticipation of higher economic growth, which in turn is associated with market expectations for higher expected cash flows — probably more so for Growth stocks, than for Value stocks. Looking at Equation 2, the start of hikes is generally associated with a higher likelihood of inflation but a lower credit risk premium, since economic growth can be expected to reduce expected cash flow risk and increase investors' risk appetite. At the start of rate hikes, the positive impacts on cash flows may dominate the higher discount rate, as companies — especially Growth stocks — usually have positive net-present-value projects in place during expansionary periods.

However, toward the end of interest rate hike cycles, rising rates often come with rising concerns about looming economic recession, which tends to have negative implications for expected cash flows. This scenario also increases each of the three components of discount rates in Equation 2. The effect is more severe and detrimental for Growth stocks, which have more expected cash flow further out in time, and heightened uncertainty around expected economic recessions. Therefore, we would expect the interest rate beta for Growth stocks to be strongly negative during these periods. On the other hand, despite the increased discount rate, we would expect the interest rate beta for Value stocks to be much less negative because of the market's expectations that future cash flows are more evenly distributed, and less uncertain. The interest rate beta for Value stocks may become even positive as a result of investors' flight to safety.

Testing

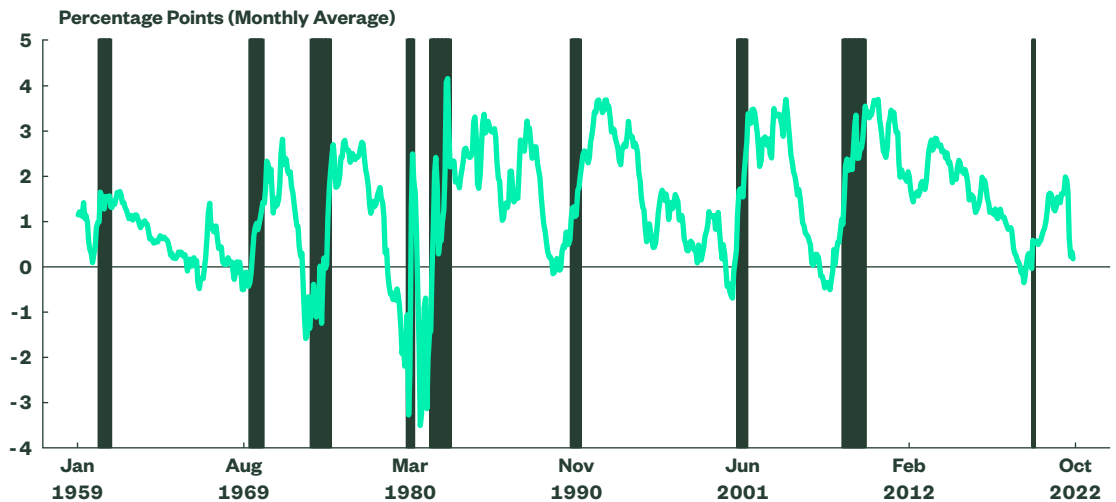
Above, we have made two major points:

- The interest rate beta for the Value factor is not statistically significant, in general
- The interest rate beta for the Value factor becomes significant toward the end of rate hike cycles, with high likelihood of recession

To test the above ideas, we examine interest rate beta for the Value factors, especially based on dividend yield, in the full sample period, with an interaction variable associated with the late stages of interest rate hike cycles, which are accompanied by increasing recession risks. A natural proxy for such a variable is an inverted US Treasury yield curve (i.e., the difference between US 10-year and 3-month Treasury yields is below zero, as shown in Figure 13), which prior literature has found to predict upcoming recessions in the historical sample period via consistent in-sample and out-of-sample evidence (e.g., Ang et al, 2006).¹³

Figure 13
Profitability in Top and Bottom Quintiles of Book to Price in Financial Sectors

■ Recession Bar
■ Spread: US Treasury 10-Year Bond — 3-Month Bill Rate



Source: Federal Reserve Bank of New York, as of October 2022.

We ran a regression of the Value factor's monthly returns on changes in interest rates, controlling market excess returns, in the full sample period from February 1988 through August 2022. We included one dummy variable for inverted yield curve, "IYCDUM," which receives a value of one when the difference between US 10-year and 3-month Treasury yields is below zero, and receives a value of zero elsewhere. We also included an interaction variable that is a product of the dummy variable, "IYCDUM," and the interest rate change, "CHANGE_US_10Y_YIELD". As we can see in the first panel (results for long/short spreads), the slope coefficient on the interaction variable ("CHANGE_US_10Y_YIELD_IYCDUM") is significantly positive across various Value factors, and the slope coefficient on the interest rate change ("CHANGE_US_10Y_YIELD") is generally statistically insignificant except for the book-to-price ratio. Both confirm our hypothesis.

Figure 14

**Regression Results of
Interaction Variable of
Interest Rate Change and
Inverted Yield Curve
Long/Short Spreads**

	BP	EARNINGS YIELD	DIVIDEND YIELD	HML
const	-0.21	0.45*	0.12	0.19
	0.24	0.26	0.31	0.20
IYCDUM	2.30	3.08	2.99**	1.74
	1.42	1.92	1.46	1.20
MKT_MINUS_RF	0.13	-0.37***	-0.48***	-0.10
	0.11	0.09	0.12	0.07
CHANGE_US_10Y_YIELD	2.99***	-0.58	-1.21	1.16
	1.08	0.87	1.00	0.79
CHANGE_US_10Y_YIELD_IYCDUM	7.02*	11.68**	9.59**	6.33*
	3.98	5.33	4.39	3.80
R-squared	0.06	0.14	0.17	0.04
R-squared Adj.	0.05	0.13	0.16	0.03

Standard errors highlighted in orange.

* p<.1, ** p<.05, ***p<.01

Top Quintile (Value Stocks)

	BP	EARNINGS YIELD	DIVIDEND YIELD
const	0.11	0.43***	0.36**
	0.17	0.15	0.16
IYCDUM	1.63	1.90	1.82**
	1.01	1.23	0.90
MKT_MINUS_RF	1.13***	0.96***	0.81***
	0.08	0.05	0.07
CHANGE_US_10Y_YIELD	1.64**	0.19	-1.14**
	0.71	0.57	0.56
CHANGE_US_10Y_YIELD_IYCDUM	4.18	6.07*	5.17*
	3.00	3.36	2.65
R-squared	0.71	0.74	0.64
R-squared Adj.	0.71	0.73	0.64

Standard errors highlighted in orange.

* p<.1, ** p<.05, ***p<.01

Source: State Street Global Advisors, Bloomberg, as of June 30, 2023.

Bottom Quintile
(Growth stocks)

	BP	EARNINGS YIELD	DIVIDEND YIELD
Const	0.32***	-0.02	0.24
	0.10	0.15	0.17
IYCDUM	-0.67	-1.18	-1.17*
	0.44	0.74	0.60
MKT_MINUS_RF	1.00***	1.33***	1.29***
	0.03	0.06	0.05
CHANGE_US_10Y_YIELD	-1.35***	0.78*	0.08
	0.46	0.47	0.56
CHANGE_US_10Y_YIELD_IYCDUM	-2.84**	-5.61**	-4.41**
	1.25	2.21	1.89
R-squared	0.87	0.84	0.82
R-squared Adj.	0.87	0.84	0.81

Standard errors highlighted in orange.

* p<.1, ** p<.05, ***p<.01

Source: State Street Global Advisors, Bloomberg, as of June 30, 2023.

We also break down the Value factor returns into top quintile (the Value portfolio) and bottom quintile (the Growth portfolio), respectively. Consistent with our hypothesis, when perceived risk of economic recession is high, increases in interest rates help the Value portfolio's returns as a result of flight to safety, while hurting the Growth portfolio's returns significantly due to the equity duration hypothesis.

To assess the extent that rising interest rates hurt Growth stocks more severely due to their higher leverage and higher distress risk in anticipation of economic recession related to decreasing expected cash flow and increasing credit risk premium in the discount rate, a more granular empirical test would be required. Specifically, such a test would need to examine the subset of Growth stocks with high leverage and high distress risk with similar regression tests. I will leave that task to future researchers.

Conclusions and Investment Implications

Our empirical evidence supports that sectoral composition change is a significant driving force behind rising interest rate beta of some Value factors since the financial crisis. Regulatory changes in the United States after the crisis had a negative impact on the financial sector's profitability, shifting the sector's weighting in Value portfolios.

Over a longer term, the financial sector will benefit from the net-interest-margin tailwinds in today's high interest rate environment and the relatively less restrictive regulation put into place after 2018. The sector's profitability and relative valuation will likely continue to go up as well, which will move them out of the top quintile of the Value factor gradually and decrease the interest rate beta.¹⁴

So far we have explored many potential drivers for the interest rate beta, mostly from the fundamental side such as sectoral composition change, changing profitability under new regulation, and shifting macroeconomic business cycles. However, there are potentially other non-fundamental drivers in effect as well that impact the interest rate beta of the Value factors such as investors' sentiment driven by excess liquidity, past market returns and retail investors' participation.

Further research could consider how and to what degree market sentiment matters for the Value factor's performance, and how its interaction with Fed policy and business cycles affect the interest rate beta of the Value factor, with testable economic hypotheses. As an example, the Value factor performed very poorly several years before the peak of the IT bubble despite gradually rising interest rates. Several years after the IT bubble burst, despite the fall in policy rates, the Value factor performed very strongly and growth stocks collapsed. The decline in Growth was mainly driven by the reversal of over-stretched relative valuations of Growth stocks relative to Value. Both episodes are associated with negative interest rate beta of the Value factor. These two episodes are probably attributed mostly to change in investor sentiment, as opposed to fundamental factors such as sectoral composition change, changing profitability and shifting macroeconomic business cycles as discussed above.

Future research may also include finding additional evidence outside the US.

Major Reference

Acadian Asset Management, May 2021, Value and Interest Rates: Don't Believe (All) the Hype, available at <https://acadian-asset.com/investment-insights/equities/Value-and-interest-rates-dont-believe-all-the-hype>.

Andrew Ang, Monika Piazzesi, Min Wei, 2006, What Does the Yield Curve Tell Us About GDP Growth? Journal of Econometrics.

Arnott, Robert D. and Harvey, Campbell R. and Kalesnik, Vitali and Linnainmaa, Juhani T., Reports of Value's Death May Be Greatly Exaggerated, Financial Analyst Journal (2021) Available at SSRN: <https://ssrn.com/abstract=3488748> or <http://dx.doi.org/10.2139/ssrn.3488748>.

Engstrom, Eric, and Steve Sharpe (2018). "The Near-Term Forward Yield Spread as a Leading Indicator: A Less Distorted Mirror," Finance and Economics Discussion Series 2018-055. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2018.055>.

Maloney, Thomas and Moskowitz, Tobias J., Value and Interest Rates: Are Rates to Blame for Value's Torments? (May 22, 2020). Available at SSRN: <https://ssrn.com/abstract=3608155> or <http://dx.doi.org/10.2139/ssrn.3608155>.

Israel, Ronen and Laursen, Kristoffer and Richardson, Scott Anthony, Is (Systematic) Value Investing Dead? (March 14, 2020). Journal of Portfolio Management, Forthcoming, Available at SSRN: <https://ssrn.com/abstract=3554267> or <http://dx.doi.org/10.2139/ssrn.3554267>.

Lev, Baruch Itamar and Srivastava, Anup, Explaining the Recent Failure of Value Investing (October 25, 2019). NYU Stern School of Business, Available at SSRN: <https://ssrn.com/abstract=3442539> or <http://dx.doi.org/10.2139/ssrn.3442539>.

Endnotes

- 1 In this case, with Value measured by book-to-market ratio (i.e. BP), which is similar to the high-minus-low or HML factor as in the [Fama-French five-factor model](#).
- 2 Maloney, Thomas and Moskowitz, Tobias J., Value and Interest Rates: Are Rates to Blame for Value's Torments? (May 22, 2020). Available at SSRN: <https://ssrn.com/abstract=3608155> or <http://dx.doi.org/10.2139/ssrn.3608155>.
- 3 *Interest rate* beta is measured as the expected excess return (%) to the factor in response to a 1% move in ten-year US government bond yields.
- 4 This analysis of sector concentration changes is related to our investigation into the non-robustness of the interest rate beta for different Value proxies in the last decade, as found in Maloney and Moskowitz (2020).
- 5 Acadian Asset Management (2021) also examines sectoral composition change of the Value factor based on book-to-price in Russell 3000, and found consistent observations with ours. We further developed an economic hypotheses and conducted backtests that linked sectoral composition change with the Value factor's performance.
- 6 We controlled the contemporaneous market excess return in the regression, following the methodology of Maloney, Thomas and Moskowitz, Tobias J., Value and Interest Rates: Are Rates to Blame for Value's Torments? (May 22, 2020). Available at SSRN: <https://ssrn.com/abstract=3608155> or <http://dx.doi.org/10.2139/ssrn.3608155>.
- 7 A Newey-West estimator is used in statistics and econometrics to provide an estimate of the covariance matrix of the parameters of a regression-type model where the standard assumptions of regression analysis such as independent errors and homogeneity in the standard deviations of errors do not apply.
- 8 The results are robust over varying lag periods.
- 9 Our un-tabulated results confirm that the tilt toward financial concentration is largely mitigated for all three Value ratios (the tilts fall to about 10%) except for the book-to-market ratio, which still remains at about 25% on average. It helps explain why the beta to interest rate changes for the book-to-market ratio, although decreased in magnitude, still remains statistically significant after sector control.
- 10 For example, regarding the impact of Dodd-Frank Act, Visa Inc. commented in their Q2 2013 earnings call transcript that "...Dodd-Frank rules which took effect April 1 of last year. So it was in that quarter that we experienced the single, largest, negative growth rate in terms of Interlink volume. In fact, it was a 54% reduction in payment volume growth in the June ending quarter 2012." Similarly, Western Union also commented in its 2012 annual earnings call that "...the margin was negatively impacted by the higher Business Solutions bank fees and other spending, pricing investments, increased marketing, higher compliance related to the Southwest Border and Dodd-Frank and increased bad debt expenses. EBITDA margin was 25.2% compared to 29.2% a year ago, excluding integration expenses in both periods."
- 11 Note that ROE is not a perfect proxy for profitability, because it is distorted by leverage, share buyback activities, and many other accounting issues such as R&D expense. Future research may use more sophisticated profitability metrics, which takes care of most accounting issues and works well in cross-industry comparisons.
- 12 For example, regarding the impact of the 2018 act, New York Community Bancorp commented the positive performance in their 2018 annual earnings conference call that "The company's performance in 2018 is reflective of 2 major factors. First, it reflects the successful execution of the strategy we put into place in late 2017; and second, it reflects the changed regulatory environment since early 2018, which arose from the passage of the Economic Growth, Regulatory Relief and Consumer Protection Act."

Endnotes

- 13 Recent Fed papers (e.g. Engstrom and Sharpe, 2018) suggest a new proxy, forward spread as difference between the current implied forward rate (on Treasury bills) six quarters from now and the current yield on a three-month Treasury bill, and find that it performs better than inverted yield curve in predicting future recessions. Fed chair Jerome Powell made similar comments in his FOMC meeting statement in March 2022. I will leave it to future research.
- 14 The recent banking crisis highlighted by the failed Silicon Valley Bank suggests that banks with large uninsured leverage (i.e., uninsured debt/assets) may suffer from abrupt increases in interest rates that results in significant unrealized loss of their securities holdings, when the duration risk is not well managed. Nevertheless these individual cases with their own idiosyncrasies do not necessarily invalidate the general observation that higher interest rates usually benefit the bank industry in aggregate and over a long term.

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* Pensions & Investments Research Center, as of December 31, 2022.

[†] This figure is presented as of June 30, 2023 and includes approximately \$63 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated. Please note all AUM is unaudited.

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