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Factors and equity market concentration

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We examine the behavior of global equity factors in the context of increased equity market concentration and show how well-designed equity style factors can effectively diversify a portfolio.

Global equity markets have become visibly more concentrated over the past 25 years. Today, the top 10 MSCI World stocks (by market value) have the highest cumulative index weight since 1997.

Figure 1 shows the Herfindahl-Hirschman index (HHI), a commonly used measure of market concentration, for the MSCI World Index.[1] From 1997 to early 2007, the HHI was on a downward trend before leveling off and remaining roughly constant for ten years and slowly picking up around 2016. HHI for the MSCI World then increased rapidly during and after the Covid crisis. Thus, someone invested in the broad market index over the past 20 years would have effectively been invested in roughly 380 stocks at the peak vs. 125 on average over the past 6 months.

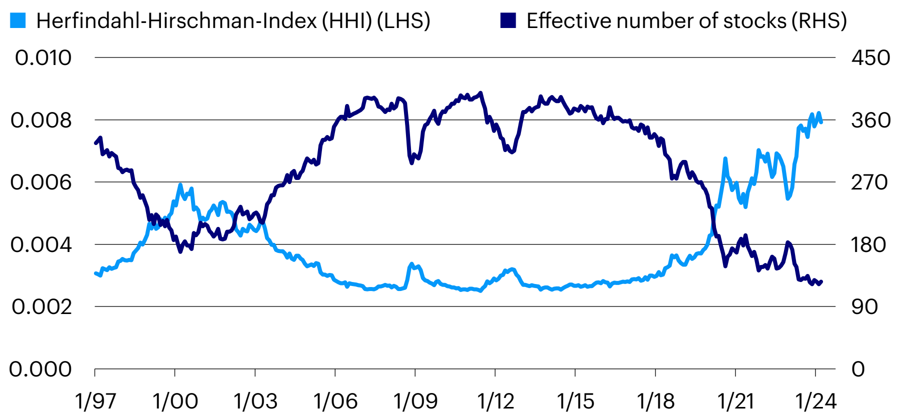
It is true that equity markets have often been dominated by specific sectors. However, while the dominance of a particular sector may not pose significant problems, the dominance of idiosyncratic risks from only a handful of stocks is far more likely to be problematic. Indeed, as figure 2 shows, the contribution of idiosyncratic risk to total risk has risen rapidly since around 2020.

Factor performance

We will now analyze equity factor performance for four different concentration regimes:

(1) low and falling concentration,
(2) low and rising concentration,
(3) high and falling concentration,
(4) high and rising concentration.

Figure 1
Concentration of the MSCI World Index



Source: Invesco calculation based on the MSCI World Index holdings at month end from January 1997 to March 2024.

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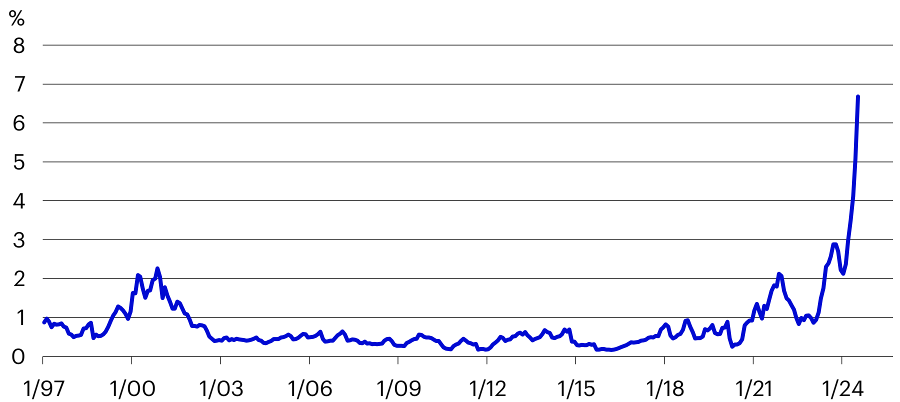
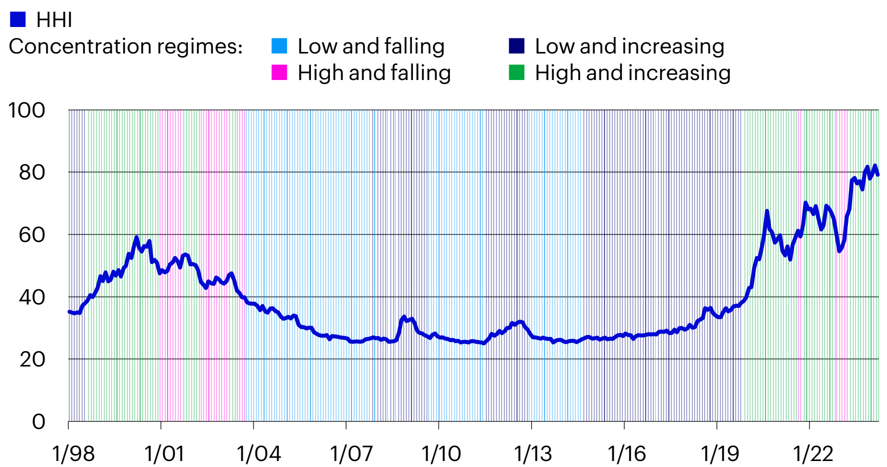
Figure 2
Contribution of idiosyncratic risk to total risk of MSCI World



Source: Invesco calculations based on monthly risk decomposition from January 1997 to July 2024.

Figure 3
Concentration regimes over time



Source: Invesco calculations based on the MSCI World Index holdings at month end from January 1997 to March 2024. The months with HHI value above average HHI for the whole period are considered 'high' and the months with HHI value below average HHI for the whole period are considered 'low'. The months with positive 12-month rolling average month-on-month HHI change are considered 'increasing', while the months with negative 12-month rolling average month-on-month HHI change are considered 'falling'.[2]

The volatilities of all factors increase with higher concentration.

Figure 3 plots these scenarios over time.

Table 1 shows that, most of the time over the past 25 years, market concentration has been low and increasing. Under this regime, the market factor earned a moderate average return of 1.5% p.a., while the Fama-French factors size (small minus big, SMB) and value (high minus low, HML) returned -2.6% and -2.3%, respectively. The Fama-French momentum factor (winners minus losers, WML) was flat.

The market factor saw its best average performance (almost 16% p.a.) in months with low and falling market concentration, i.e., from October 2003 to December 2007, from September 2009 to June 2011 and from December 2012 to August 2014. It was weakest when market concentration was high and falling – precisely when the Fama-French factors exhibited their strongest returns. However, there are only 32 months in which market concentration was high and falling, mainly after the dot-com bubble from 2001 to 2003.

We also observe that the volatilities of all factors increase with higher concentration. Even though the market factor is more volatile than other factors in almost all regimes, the steepest increase in volatility with higher concentration can be seen for the Fama-French value factor (HML). Overall, factors seem to be a source of diversification. However, given the variation in returns and risk, the naively defined factors can be a source of unrewarded risk in certain market environments. As markets are notoriously difficult to time, investors might thus prefer factors that deliver consistent results over different regimes.

Given these considerations, it is important to think thoroughly about factor construction. Enhanced factors are neutralized relative to market risk and do not take industry bets. Well-constructed factors avoid

Table 1
Factor performance under different concentration regimes

Concentration regime		# Months	Market	Size (SMB)	Value (HML)	Momentum (WML)
Return	Low and falling	96	15.9%	2.6%	3.1%	9.9%
	Low and increasing	104	1.5%	-2.6%	-2.3%	1.0%
	High and falling	32	-9.3%	12.1%	17.8%	13.1%
	High and increasing	83	9.0%	-2.7%	2.3%	5.2%
Volatility	Low and falling	96	10.7%	5.0%	4.5%	6.4%
	Low and increasing	104	17.1%	4.9%	6.7%	14.2%
	High and falling	32	16.4%	7.9%	12.6%	19.0%
	High and increasing	83	18.6%	8.7%	14.7%	18.2%
Risk-adjusted return	Low and falling	96	1.49	0.53	0.68	1.55
	Low and increasing	104	0.09	-0.53	-0.34	0.07
	High and falling	32	-0.56	1.54	1.41	0.69
	High and increasing	83	0.48	-0.31	0.15	0.29

Source: Kenneth R. French library. Invesco monthly calculations from January 1998 to March 2024.

Table 2
Performance of enhanced factors under different concentration regimes

Concentration regime		Enhanced Value (VAL)	Enhanced Quality (QAL)	Enhanced Momentum (MOM)	MSCI World
Return	Low and falling	3.3%	2.8%	5.9%	14.7%
	Low and increasing	1.8%	3.4%	3.4%	1.7%
	High and falling	14.8%	5.1%	3.8%	-12.1%
	High and increasing	4.9%	6.4%	4.6%	8.8%
Volatility	Low and falling	3.0%	1.9%	3.7%	10.5%
	Low and increasing	5.1%	2.6%	6.4%	16.9%
	High and falling	5.8%	4.3%	11.6%	16.7%
	High and increasing	8.7%	3.9%	7.3%	18.4%
Risk-adjusted return	Low and falling	1.11	1.43	1.60	1.40
	Low and increasing	0.35	1.29	0.54	0.10
	High and falling	2.52	1.18	0.33	-0.73
	High and increasing	0.57	1.65	0.64	0.48

Source: Invesco monthly calculations from January 1998 to March 2024. Enhanced factors are long/short market and dollar-neutral factor portfolios. MSCI World is in excess of risk-free returns.

overemphasizing high factor signals at the expense of a broader dispersion of risk. This may limit portfolio concentration and minimize idiosyncratic risks.[3]

Table 2 shows the returns and volatilities of enhanced factors, which exhibit much less variation throughout the different market concentration regimes and deliver stronger risk-adjusted performance. Just like the Fama-French value factor, the enhanced value factor seems to offer support, especially in periods of high and falling market concentration, where the average annualized market performance as proxied by the MSCI World Index returns in excess of risk-free returns has struggled most.[4]

Some additional testing

Additional tests will help to see whether the average annualized performance of the MSCI World and the equity factors are significantly different under the various concentration regimes. First, we assess whether volatilities vary significantly across the four regimes. Table 3 reports the results of a Levene's test, which suggest that there is heterogeneity in volatilities for both the market and style factors.

Next, we look at whether average monthly returns for different factors across the four concentration regimes are significantly different. Assuming no equal variance, the results of the Analysis of Variance (ANOVA) test in table 4 indicate that the differences in performance for the market factor, Fama-French size and enhanced value are significant at a 5% significance level.

The results indicate that the market and style factors show some variation in returns and volatilities depending on whether concentration in public equity markets is high or low and whether the trend is increasing or decreasing. Style factors demonstrate the ability to provide diversification to the market factor, with the most notable example of the value factor in times of high and falling market

Table 3
Levene's test

Variable	F-Value	p-Value
Market	6.2	0.000413
SMB	8.7	0.000015
HML	27.8	0.000000
WML	12.4	0.000000
VAL	24.8	0.000000
QAL	15.2	0.000000
MOM	7.9	0.000044
MSCI World	6.7	0.000231

Source: Kenneth R. French library. Invesco monthly calculations from January 1998 to March 2024. Enhanced factors are long/short market and dollar-neutral factor portfolios. MSCI World is in excess of risk-free returns.

Table 4
ANOVA test

Variable	F-Value	p-Value
Market	2.7	0.047441
SMB	3.8	0.012092
HML	2.7	0.051882
WML	1.0	0.380321
VAL	3.6	0.015280
QAL	1.8	0.154582
MOM	0.3	0.806850
MSCI World	2.7	0.048326

Source: Kenneth R. French library. Invesco monthly calculations from January 1998 to March 2024. Enhanced factors are long/short market and dollar-neutral factor portfolios. MSCI World is in excess of risk-free returns.

concentration. Finally, diversifying underlying signals and minimizing idiosyncratic risk when constructing factors makes them more robust and consistent throughout various concentration regimes.

Diversification via size?

Often, an allocation to small caps is suggested to reduce the concentration risk of a portfolio. A rather easy way to achieve this is to invest in an equally weighted index that is largely a combination of a market and a size factor. However, the size factor suffers from the shortcomings addressed above. Investing in an equal-weighted index means naively allocating to size, which can result in unintended biases in the portfolio, including higher market beta, positive value exposure, and negative momentum exposure.

Table 5 shows the risk and return characteristics of the market value-weighted and the equal-weighted S&P 500 Index.[5] The small size tilt of the equal-weighted index provides some support in times of high and falling market concentration (perhaps due to positive value exposure), but has been a source of unrewarded risk when market concentration was low and increasing. Even if designed differently, size fails to satisfy the criteria for a proper factor framework, such as economic theory, robust risk and return evidence, cross-asset and cross-region validation, and implementability.[6]

Fundamentals of the top 10 stocks

In addition to the naive definition of the size factor, the relative quality of small-cap stocks (which reportedly deteriorated over the past few years) might have been a reason for the unsatisfactory results.[7] Therefore, we now look at some anecdotal evidence about the quality characteristics of the top 10 MSCI World stocks (by market capitalization).

Figure 4 compares their average ROE to that of the MSCI World Index; figure 5 compares their average gross profit to assets ratio. As the graphs show, both quality indicators have almost always been higher for the top 10 stocks. Secondly, again for both metrics, the difference between the top 10 average and the overall index was higher in the late 1990s and early 2000s and has been steadily rising again since around 2015.

This suggests that the current concentration might not be due to stretched valuations but is rather a result of certain companies expanding their profitability lead. In fact, it looks like periods of high market concentration coincide with periods of increased divergence between the selected metrics of the top 10 stocks and the overall index. The correlations of HHI with the average gross profit to assets ratio and ROE of the top 10 stocks are 0.8 and 0.6, respectively.

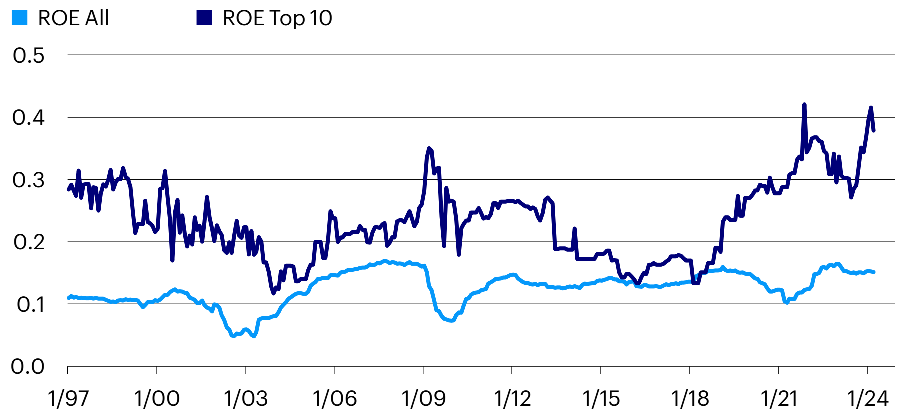
This suggests that the current concentration might not be due to stretched valuations but is rather a result of certain companies expanding their profitability lead.

Table 5
Results for market-weighted and equal-weighted S&P 500 in comparison

Concentration regime	Return		Volatility		Risk-adjusted return	
	Market-weighted	Equal-weighted	Market-weighted	Equal-weighted	Market-weighted	Equal-weighted
Low and falling	14.3%	3.3%	10.0%	3.0%	1.43	1.11
Low and increasing	4.4%	-1.5%	16.0%	5.0%	0.28	-0.29
High and falling	-13.6%	6.4%	17.6%	7.1%	-0.77	0.90
High and increasing	12.2%	0.9%	19.0%	7.6%	0.64	0.12

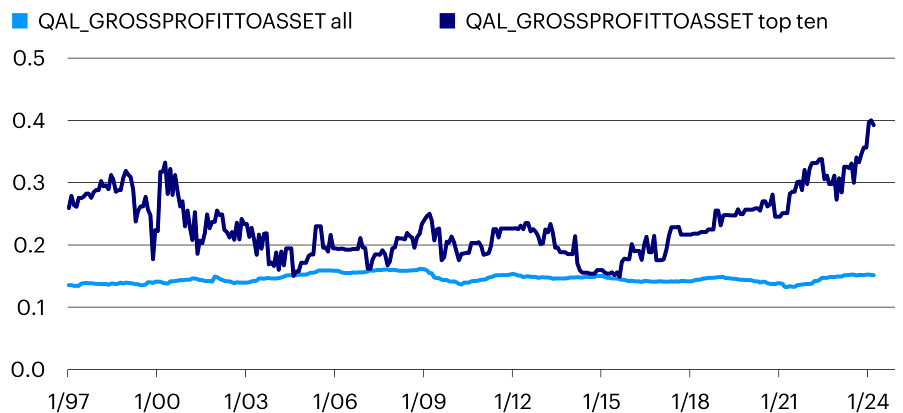
Source: Invesco monthly calculations from January 1998 to March 2024. The concentration regimes are not recalculated based on the S&P Index but remain based on the MSCI World Index.

Figure 4
Average ROE of the MSCI World and its top 10 stocks by market capitalization



Source: Invesco calculations based on the MSCI World Index holdings at month end from January 1997 to March 2024.

Figure 5
Average gross profits to assets ratio of the MSCI World and its top 10 stocks



Source: Invesco calculations based on the MSCI World Index holdings at month end from January 1997 to March 2024.

Conclusion

Today's high market concentrations lead some investors to consider hedging concentration risk. Equity market factors have historically provided diversification under various market concentration regimes, whereas the value factor offered strongest support under the high and falling concentration regime, when the market factor had its worst performance.

Well-balanced style factor construction can achieve consistency of factor returns over different concentration regimes. Naive strategies such as equal-weighted indices, on the other hand, can help increase exposure to equity factors but don't prevent unwanted biases and can introduce unrewarded risks.

Notes

1 Adelman, M.A. (1969). The index is calculated as a sum of squared market shares, using the following formula:

$$HHI = \sum_{i=1}^{N} (MS_i)^2$$

2 While the HHI values are difficult to interpret in absolute terms, it is useful for defining different concentration regimes based on the development of the index over time. For reference, the lowest HHI value for a MSCI World Index assuming number of holdings being 1400 would be 0.005, while the most concentrated portfolio consisting of only one security would have HHI of 10000.

3 Additionally, diversifying the underlying factor signals can help achieve more consistent factor performance. Taking the example of value, with intangibles playing an increasingly important role in companies' valuation, the simple book-to-market ratio to define the value factor is not enough to adequately capture whether a company is undervalued. Moreover, it can make the valuation and performance metrics more volatile (Berkin, Dugar & Pozharny, 2024). Using more signals other than the book-to-market ratio for the value factor helps capture valuation effects that are not reflected in the book-to-market ratio and diversify factor performance, yielding more consistent performance.

4 In the following, MSCI World Index performance in excess of risk-free returns is used as an implementable market beta factor strategy. The definition of the Fama-French market factor is somewhat different but is expected to be consistent with the MSCI World Index performance. Both factors are used in the following calculation to showcase the consistency.

5 The concentration regimes are not recalculated based on the S&P Index but remain based on the MSCI World Index.

6 Gupta et at. (2022).

7 Blitz & Hanauer (2020).

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