

Factor Asset Allocation: What are the Benefits for Investors?

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Introduction

Factor investing is currently very popular among investors. This investment approach was developed following the publication of a report by Ang, Goetzmann and Schaefer (2009), who were asked to evaluate the performance of active management for Norway's sovereign fund. According to the authors, risk factors are like nutrients, or building blocks, that explain the returns of various assets, which combine these building blocks. Those who believe in factor investing think that it is wiser to build a portfolio that bases its allocation on factors rather than on asset classes. In fact, asset classes are naturally correlated due to their underlying exposure to these common risk factors. For example, equity and high-yield corporate bonds are two asset classes with different degrees of exposure to equity risk, and are therefore highly correlated. Furthermore, this correlation between asset classes is amplified during crises, when market risk (or equity risk) starts to prevail over all other risks (Brière et al., 2012). This has led a large number of investors to question the conventional strategies for determining allocation based on asset classes and to focus more on methods that seek to diversify the sources of fundamental risk, or risk factors.

But what does «risk factor» mean? In theory, it is a «pure» exposure to an underlying risk that is supposed to produce a risk premium. In practice, there are a number of coexisting notions of factors: macroeconomic factors, statistical factors that result from principal component analysis (PCA) or other forms of analysis, «style» factors (size, value, momentum, etc.) that result from dynamic, systematic selection of individual securities (equity, or more recently corporate bonds), depending on their characteristics. As an example, the literature has identified more than 300 style factors for equity alone (Harvey et al., 2014).

In this article, we look at the definition of a strategic factor allocation, and underline the importance of diversification across factors. We then analyze the benefits of dynamic allocation between these factors depending on the economic cycle. A section is devoted to discussing macroeconomic factors, which allow investors to get exposure to or hedging against certain macroeconomic shocks susceptible to impact their assets or liabilities. Finally, we emphasise the difficulties that may arise when implementing factor-based portfolio allocation.

Key points

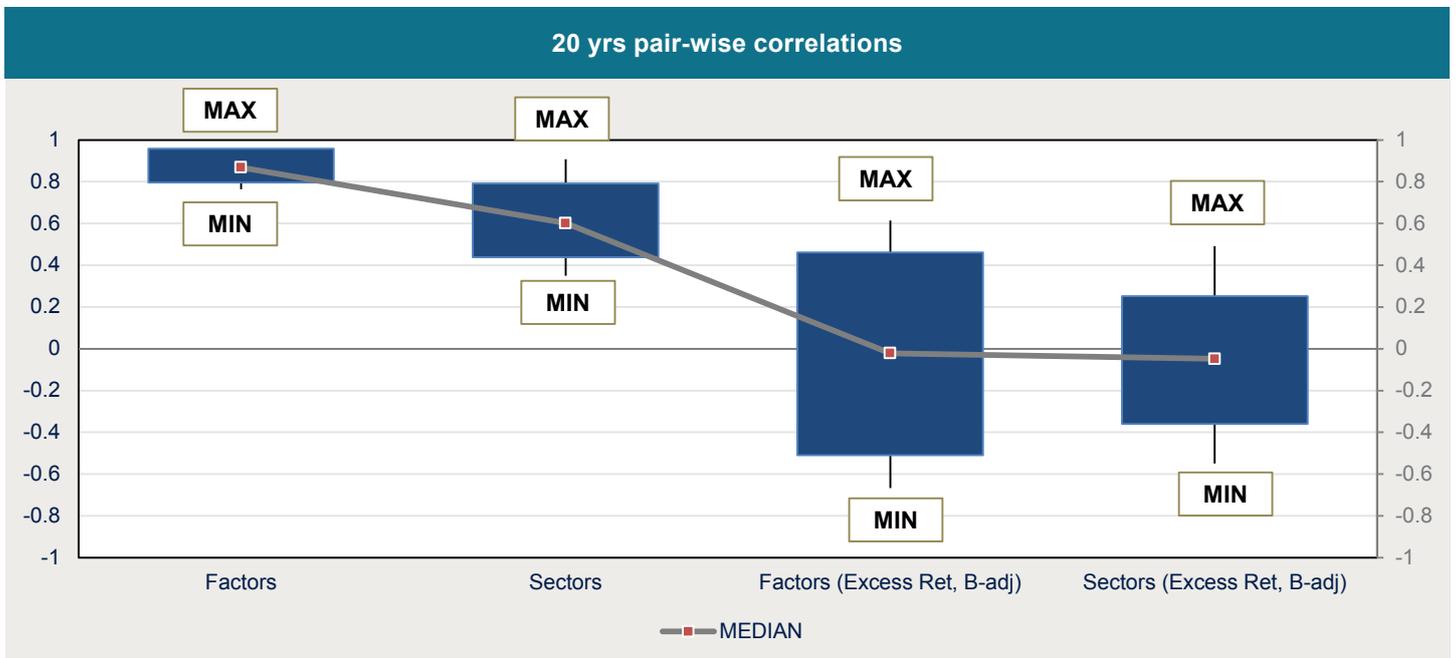
- Risk factors are the building blocks that explain asset returns.
- A number of factors, particularly on equity markets, have a proven capacity to add value.
- Diversification between different factors is key to limit volatility and maximum drawdown on an international equity portfolio.
- The performance of a naive diversification strategy across factors can be further improved using dynamic factor weighting based on the current position in the economic cycle.
- Some factors follow very long cycles and may not work at all for several years.
- A factor-based approach is particularly helpful for investors whose assets and/or liabilities are sensitive to certain macroeconomic shocks.
- Investors should nonetheless be aware of certain difficulties with factor implementation, linked to the integration of transaction costs as well as the multiple, and sometimes common exposures in factor indices.
- The factor-based approach is a source of added value in terms of allocating a portfolio and analysing its risk level.

1 The importance of strategic allocation across risk factors

The main benefit of factor investing lies in helping investors capture different risk premia available in the market. The most commonly used factors on the equity market show very attractive performances, higher than the market and than sectors, in the long term, and in periods of bull markets and economic expansions (Brière and Szafarz, 2015), with an admittedly higher risk on average as well.

Is factor-based diversification preferable to diversification across traditional asset classes? The answer depends on what you mean by factors. For example, statistical factors resulting from PCA are independent by definition. But they pose other problems: temporal instability in factor composition and difficulty in their economic interpretation. Factors built like long-short portfolios (as with Fama and French's style factors) on asset classes also provide attractive diversification (Idzorek and Kowara, 2013). But when short-selling is not allowed, results depend on the choice of factors. The 10 most commonly used style factors on the US equity market, when considered in the form of a long-only investment, show more correlation between themselves than sectors do (Brière and Szafarz, 2015), and this result holds in the case of the 7 MSCI World factor indices (the 6 mentioned in the table next page, in addition to the growth factor). Nevertheless, correlations are comparable when they are estimated on beta-adjusted excess returns (see graph below). Moreover, correlations between factors are more stable on average than those between sectors. In fact, correlation between sectors was significantly reduced in 2000-2001, when the Internet bubble appeared and then burst. This reduced correlation also occurred with factors, but to a lesser extent.

“Correlations between factors are more stable on average than those between sectors”



A strategy of diversification across factors does allow investors to benefit from an excess return: the following table shows the performance of MSCI factors (considered over the MSCI World universe) as well as that of a portfolio that equally weights these factors. The latter offers higher return than the MSCI World (8.6% vs 6%), without significant increase in risk (volatility and maximum drawdown are even slightly lower) over the 20-year period of analysis.

Comparison of returns on six factors and of an equally-weighted factor-based portfolio with the MSCI World index

	MSCI World	Minimum Volatility	High Dividend	Quality	Value*	Momentum	Mid Cap**	Equally Weighted Strategy***
Annual Return	6.0%	7.4%	7.5%	9.0%	9.8%	9.5%	7.2%	8.6%
Sharpe Ratio	0.20	0.41	0.31	0.44	0.40	0.41	0.26	0.40
Active Return		1.4%	1.6%	3.1%	3.9%	3.5%	1.2%	2.6%
Information Ratio		0.20	0.27	0.66	0.70	0.43	0.25	0.89
Volatility	15.4%	11.0%	15.1%	14.0%	17.3%	16.1%	16.3%	14.1%
Max Drawdown	54.0%	43.5%	59.4%	44.9%	58.2%	52.8%	56.1%	52.7%
Tracking Error		7.2%	5.7%	4.6%	5.6%	8.2%	4.9%	2.9%
Max Relative Drawdowns		20.1%	23.4%	19.6%	16.3%	20.3%	27.0%	5.4%

Source: Amundi Quantitative Research (FactSet data, not hedged in USD, from 30/09/1995 to 30/09/2015)

1 month USD Libor: 2.9%

* Prior to 30/11/1997, we used the MSCI World Index Value as a proxy

** Prior to 31/12/1998, we used the MSCI World Mid Cap as a proxy. The MSCI World Equal Weighted Index is now routinely used as an index with a bias toward small- and mid-cap stocks

*** Prior to 31/12/1998, we equally weighted various strategies. After that date, we based our calculations on the MSCI Diversified Mix index

Factor-based diversification also helps benchmarked investors reduce their active risk. The table above shows that while drawdowns relative to each of the factors taken individually are relatively high (between 16.3% and 27%), they are particularly low (5.4%) in the case of an equally-weighted factor portfolio. Due to its positive relative return, this strategy of equally weighting factors resulted in an information ratio of 0.89, a clear improvement on returns over each of the factors chosen (between 0.2 for minimum volatility and 0.7 for the value factor).

“ Such a diversified strategy across factors results in a clear improvement on the information ratio ”

2 Dynamic allocation based on factors

The performance of this strategy of naive diversification across factors can be further improved by introducing dynamic weighting. We have explored different approaches to dynamic factor allocation: based on valuation, on statistical techniques such as Markov processes... We focus hereafter on dynamic allocation depending on the position in the economic cycle, based on a research recently published by Amundi. It relies on the observation that certain factors -for instance low volatility or high dividend- behave in a defensive manner, while others, such as momentum, are associated with market upswings. To confirm this intuition, A.Russo (2015) studied¹ the performance of various factors on the US equity market over the last 20 years based on cyclical situations, which have been segmented between phases of:

- expansion,
- deceleration,
- recession,
- recovery.

These phases are described using an indicator related to the labour market² and a stress indicator, in this case the spread between interest rates on BBB-rated corporate bonds and on Treasury bonds.

These studies have shown that investors should favour:

- The mid-cap factor over quality and low volatility in a recovery,
- Momentum and quality in periods of expansion,
- Low volatility and high dividends in decelerations,
- Low volatility and quality over momentum in recessions,

¹ Russo A., *Equity Factor Investing According to the Macroeconomic Environment*, Amundi Discussion Papers Series DP-11-2015, November 2015

² US initial jobless claims

Factor performance according to phases in the economic cycle				
Phase	Recovery	Expansion	Deceleration	Recession
Minimum Volatility	under	under	over	over
Momentum	=	over	=	under
Quality	under	over	=	over
Value	over	Neutral	=	=
Growth	=	=	Neutral	=
Mid Cap	over	Neutral	=	=
High Dividend	=	=	over	=

A portfolio based on this blueprint for dynamic weighting outperforms a portfolio that is equally weighted between factors, and rarely underperforms.

However, value added based on these observations depends on the ability of managers to properly identify which phase in the cycle we are in at any given moment. This task may be a delicate one due to structural changes in the way our economies operate, such as the impact of monetary policies that focus on quantitative easing. In addition, the transition period between one phase of the cycle and the next is most often tied to a catalyst: an economic or market event (such as the Fed Reserve's interest-rate hike in February 1994, which kicked off a cycle in which mid-cap stocks outperformed) that the investor must correctly detect without mistaking it for mere market noise.

Furthermore, cyclical analysis is not enough to determine allocation between factors: valuation criteria must also be included in the analysis. As such, during the correction on the equity markets last August and September, high-momentum stocks turned in such strong outperformance that their excess value relative to low-momentum securities justified rebalancing away from the latter in some portfolios.

We must also realise that aside from purely cyclical factors, some factors may follow very long return trends and may not work at all for several years. This is the case for the factor on currencies, which investors could expect to outperform in the long term, but which stopped working after the 2008 crisis. High-carry currencies, especially from emerging markets, offered relatively modest returns compared to the 2002-2008 period, which was particularly favourable for them. They were probably hit by the negative consequences of the dollar's appreciation and a re-emergence of volatility on the markets.

Similarly, we can question whether the historical outperformance of the low volatility factor will persist in the future. If this outperformance is due to behavioural biases, it may be destined to continue. Some believe in particular that the impact of the incentives received by portfolio managers, who are compensated more for their ability to beat their competitors during market upswings than their ability to limit losses, encourages them to favour high-risk securities. Such securities therefore become overvalued, while expected performance drops. As a consequence, investors are advised to make an active selection of those factors to which they should be allocating from a long-term perspective.

“ A portfolio based on this blueprint for dynamic weighting outperforms a portfolio that is equally weighted between factors, and rarely underperforms ”

3 Allocation by macroeconomic factors

We have emphasised the impact of the macroeconomic environment on the behaviour of factors. Another approach consists in directly considering macroeconomic variables (inflation, economic growth, interest rates, exchange rates, commodity prices) as risk factors, which influence investors' assets and liabilities. This justifies taking them into account when constructing a strategic allocation. As an example, a pension fund for which obligations are indexed to

inflation must hold assets that are themselves sensitive to this factor. In contrast, a sovereign investment fund in a commodities-producing country will be incited, outside of liability constraints, to diversify its financial portfolio toward asset classes that are likely to post strong performance in scenarios when commodities prices fall (Bodie and Brière, 2014).

At Amundi, we have developed a strategic allocation approach that is based on Diversification Across Macroeconomic Scenarios³, which represents every asset and therefore every combination of assets through their exposure to changes in three key macrofinancial factors: growth, inflation and stress. As an example, nominal bonds are clearly biased toward falling growth and inflation and rising stress, meaning that these scenarios are especially good for these bonds and are environments in which they will outperform compared to a risk-free asset. Similarly, commodities are biased toward higher growth and inflation and lower stress.

This method makes it possible to add another aspect to the notion of diversification beyond the traditional mean-variance approach in order to reduce the vulnerability of an asset allocation to some types of macrofinancial environments. It also helps position a portfolio strategically on some scenarios (rising or falling inflation, for example⁴). To do so, our analysis shows that the use of factors helps fill in certain areas, which are poorly covered by conventional asset classes, in the three-dimensional space that represents the exposure of financial assets to growth, inflation and stress. For example, a portfolio invested in high-profitability⁵ and short on low-profitability stocks has a bias toward declining growth and rising stress, features that are particularly attractive for investors who want to position themselves on equity markets while controlling the amount of risk in their portfolio.

“ For example, a portfolio invested in high-profitability and short on low-profitability stocks has a bias toward declining growth and rising stress ”

4 Difficulties with factor implementation

The capacity for dynamic allocation across factors assumes that investors have access to instruments that are indexed on the performance of these factors as purely as possible.

Implementing a factor-based allocation strategy must deal with the problem that different factor indices are exposed to multiple, and sometimes common risk sources. A value strategy may also include exposure to size, which is associated with overweighting of mid-cap stocks. Investors must therefore be able to use risk analysis tools that allow them to estimate the various exposures of their portfolio toward such-and-such factor. Another consequence is that the investor should build her own portfolio of securities to represent the factor risk to which she wants to be exposed, as a first step of a factor allocation process.

Furthermore, the results of academic studies on factors most often refer to the US market. Our assessment of a security's value must be analysed in reference to the market on which that security is listed, and the performance of factors varies depending on the markets due to possible cyclical divergence. Moreover, the indicators representing a factor may differ according to the country considered: for example, although our diversified portfolios describe the “value” factor using the yield on earnings before interest, taxes, depreciation and amortisation (EBITDA)⁶, our estimates indicate that it is less appropriate to take

³ Pola G., *Managing Uncertainty with DAMS, Asset Segmentation in Response to Macroeconomic Changes*, Amundi Working paper, May 2013.

⁴ In particular, see Pola G. and Tazé-Bernard E., *Asset allocation in a context of falling oil prices: the case of institutions in commodity-exporting countries*, Amundi Cross-Asset Special Focus, January 2015.

⁵ A factor recently added by Fama and French (2015) to their three-factor model, along with the investment factor.

⁶ Although academic studies define the value factor by the P/B (price to book value) ratio, the EBITDA yield is more commonly used by analysts and portfolio managers because it offers a more fine-grained approach. However, it is poorly suited for historical studies due to unavailability of data covering a long period of time.

this depreciation into account for the Japanese market where EBIT should be used. This suggests that we should implement a different factor-based strategy for different regions.

Investors must also keep transaction costs in mind. For more dynamic factors, which require a lot of turnover (like the momentum factor), such costs may prove to be substantial and significantly reduce the profitability of factor-based strategies (Novy-Marx and Velikov, 2014). Transaction cost models allow us to estimate the limits of each investment strategy, like the maximum portfolio size, beyond which transaction costs exceed the expected return for the strategy. Frazzini et al. (2014) use a database of transaction data to estimate breakeven sizes of \$103bn, \$83bn and \$52bn respectively for the size, value and momentum factors, but there is still no consensus on these figures (Lesmond et al., 2004, Korajczyk and Sadka, 2004).

Conclusion

Factor-based allocation is currently highly popular among investors. It is widely recognized as a source of added value for portfolio allocation due to the proven excess return of a number of factors, and because it provides an additional dimension to diversification aside from asset classes, regions and sectors. Through the explicit exposures to risk factors (or sensitivity to economic scenarios or market events), it also allows investors to capture additional risk premia, implement dynamic allocation, and improve their portfolio risk analysis.

Despite those undoubtable advantages, some difficulties may arise when implementing factor-based allocation, which imply mobilizing sizable resources in research and analysis. As a consequence, it could be wise to exploit factor allocation as a complement rather than as a substitute for traditional asset allocation.

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