



Introduction to Factor Investing

Pinnacle Investment Research

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Introduction

The world of investing has evolved much from the beginning of 20th century into the current modern world. One of the ground-breaking ideas are factor investing, widely discussed in the current investment world. This report address several things, namely

1. What is factor investing
2. Factors as return drivers
3. How do we assess factor investing

In chapter 1, we highlight the current investment culture in Indonesia, in which technical and fundamental analysis are usually performed. We assess the shortcomings of both methods and how it can be resolved by the systematic factor investing. We also look at why investors should explore factors. Finally, we take a look at how factors redefine active and passive management.

In chapter 2, we look at factors as source of returns. We take a brief-look at Capital Asset Pricing Model (CAPM) to give an example of return drivers, then we give an overview of well-known return drivers outside market. We also highlight that factors must be grounded on sound research. Finally, we also give an overview about reasoning of factors outperformance.

In chapter 3, we look at performance of the factors. First, we look at some of factors' performance. Finally, we show that combining two factors have diversification potential and can result in even more outperformance.

Chapter 1

What is Factor Investing

1.1 Systematic Factor Investing

In Indonesia, an investor wishes to evaluate a stock generally uses two methodologies, fundamental analysis and technical analysis. Fundamental analysis seeks to find undervalued companies and estimating each company intrinsic valuation and compare it to the current market valuation. Technical analysis seeks to predict future price movements using past price movements.

In academia, however, more common way to construct a portfolio is to find a *common factors* of equities. Common factors are any characteristic that relates a group of securities that can explain the future return and risk of securities. For example, we look at list of equities and only buy those whose price has increased recently. Another example, we choose to buy those which are cheap in book to market terms *alone*. Another motivating example is to buy companies which have good quality. As such, instead of digging deep into one security, factor investing take a broad view over all securities and choose them based on one or several criteria.

1.2 Why should Investors Explore Factors

Factor investing is different from traditional fundamental and technical analysis. Factor investing is systematic (rule-based) and can be replicated by other investors as long as the methodology is known. On the other hand, both technical and fundamental analysis are generally conducted in a non-systematic (non-rule based) way.

The systematic nature of factor investing offers many advantages compared to the traditional fundamental analysis and technical analysis. First, factor investing is consistent and is easier to replicate compare to traditional analysis method. Second, because of the systematic nature, we can test factor investing performance over time, while it is hard to do so for fundamental and technical analysis. Finally, because of the broad view of investing, factor investing also offers more diversification compared to both technical and fundamental investing as both usually take a deep view over few securities.

Table 1.1: Factor Investing vs Technical and Fundamental Analysis

Criteria	Fundamental Analysis	Technical Analysis	Factor Investing
Definition	Values an equity using its intrinsic value	Uses past market activity to predict future price movements	Exploit common behaviors of stocks
Data from	News, macro reports, earnings reports	Chart pattern analysis	Common factors (can be both fundamental or technical data)
Systematic	Not-systematic	Not-systematic	Systematic
Diversification	Low	Low	High
Testability	Hard	Hard	Easy

There are also more advantages as factors are generally thought as the return and risk drivers of securities. We will look more into that in chapter 2

1.3 Active and Passive Management

Traditionally, there are two ways to invest, either invest actively or passively. Active investing seeks to beat the broad market performance using superior stock selection. In contrast, passive investing seeks to capture the broad market performance using market capitalization as weights of the portfolio. The introduction of factor investing changes the way on how we look at active vs passive management.

Traditional active investing finds the outperformance in the superior stock selection by finding under-valued stocks across the market (fundamental) and invests it on the right time (technical), usually with certain characteristics, such as cheap. The arrival of factor investing changes the dynamic within active management. Because of transparency that usually factor investing provides, the role of active management is shifted to finding source of returns that are not common.

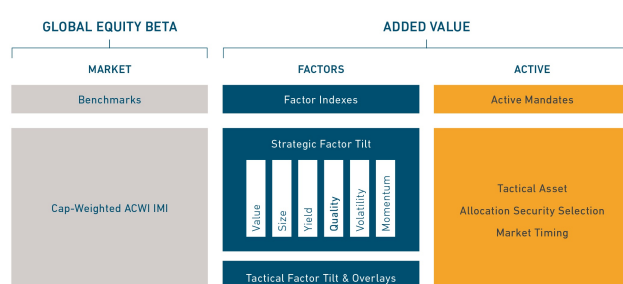


Figure 1.1: Source : MSCI

As such, factor investing *does not replace active and passive management*. Active management role is still prominent by combining elements of factors and stock selection, while passive management offers investors who want to invest in cap-weighted index.

Chapter 2

Factors as Return Drivers

2.1 Defining Return Drivers

Factors are return drivers, the drivers of expected returns of securities across the market. Return drivers are essentially factors or characteristics that drives the return and risk. To give an example of return driver, we need to go back to (Sharpe, 1964), which introduces the Capital Asset Pricing Model. A simple breakdown of return states that

$$\text{Total Return} = \text{Systematic Return} + \text{Specific Return}$$

The CAPM is groundbreaking in a sense that it states that the only systematic and risk is market return. As such, outside of market return, each stock return is independent of other stock return, that is why it is often named as 'residual return' or 'specific return'.

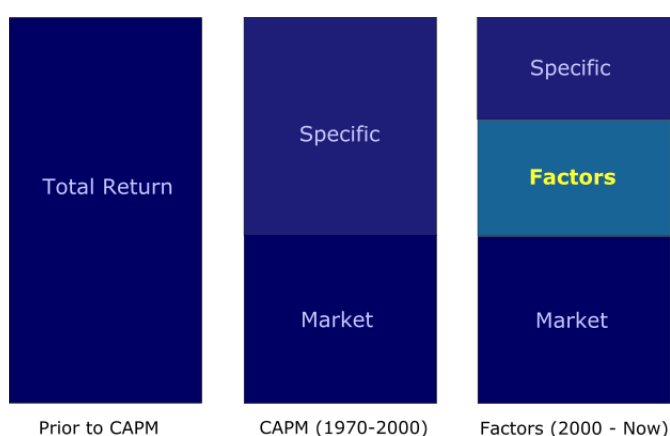


Figure 2.1: Source : Pinnacle

Furthermore, given sufficient number of stocks, the specific return and risk diminishes into 0, therefore, the only returns that left are the market return. The market return is one of the example of

return drivers.

It turns out that while CAPM says that the only systematic factors are market factors, the academia found other factors. (Fama & French, 1992) and (Fama & French, 1993) found systematic factors in form of value and size. There are other factors also, (Cathart, 1997) found that momentum also explains stock returns. Many other researches find host of other stock characteristics outside market factors that explain stock returns.

As such, currently, we can see that

$$\text{Total Return} = \text{Market} + \text{Factors} + \text{Specific}$$

where the market and factors return are systematic returns. Therefore, as important source of returns, investors are looking into factors more.

2.2 Well-Known Factors

In this section, we document some well-known systematic factors.

Exhibit 1: Well-Known Systematic Factors from the Academic Research

Systematic Factors	What It is	Commonly Captured by
Value	➤ Captures excess returns to stocks that have low prices relative to their fundamental value	➤ Book to price, earnings to price, book value, sales, earnings, cash earnings, net profit, dividends, cash flow
Low Size (Small Cap)	➤ Captures excess returns of smaller firms (by market capitalization) relative to their larger counterparts	➤ Market capitalization (full or free float)
Momentum	➤ Reflects excess returns to stocks with stronger past performance	➤ Relative returns (3-mth, 6-mth, 12-mth, sometimes with last 1 mth excluded), historical alpha
Low Volatility	➤ Captures excess returns to stocks with lower than average volatility, beta, and/or idiosyncratic risk	➤ Standard deviation (1-yr, 2-yrs, 3-yrs), Downside standard deviation, standard deviation of idiosyncratic returns, Beta
Dividend Yield	➤ Captures excess returns to stocks that have higher-than-average dividend yields	➤ Dividend yield
Quality	➤ Captures excess returns to stocks that are characterized by low debt, stable earnings growth, and other "quality" metrics	➤ ROE, earnings stability, dividend growth stability, strength of balance sheet, financial leverage, accounting policies, strength of management, accruals, cash flows

Figure 2.2: Source : MSCI

The six factors are well-known in the academia. (Fama & French, 1992) and (Fama & French, 1993) found that value and size explains the expected return. Again, (Jegadeesh & Titman, 1993)

and (Cathart, 1997) found that momentum also explains the stock return. Recently, low volatility is researched by (Haugen & Baker, 1996) and (Frazzini & Pedersen, 2014) and found its ability to explain stock returns and to achieve outperformance. Finally, (C. S. Asness, Moskowitz, & Pedersen, 2013) explores the outperformance of quality factors.

As an example, we collect data from AQR website (www.aqr.com) on long-short quality factors and long-short beta factors. We also collect data from Kenneth French website for value, momentum and size factors. We do this for the US market. We cut from 1960 to June 2016 and scale the returns to have 1% monthly standard deviation. Do note that different methodology from two sources may affect the result.

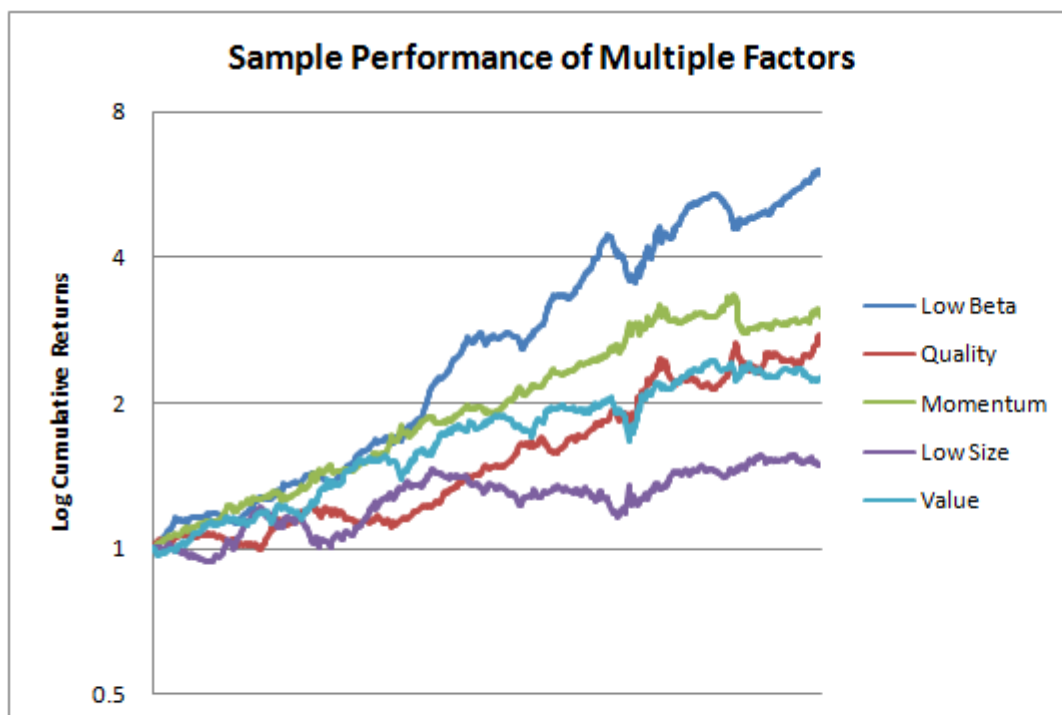


Figure 2.3: Source : AQR and Fama French

Clearly, the factors offer significant outperformance for each factors, at least in the US Market. Many researchers also provide outperformance in global markets.

2.3 Risk vs Behavioral

The source of outperformance of systematic factors are continuously being debated by researchers and investors. There are two major camps in this debate, whether the source comes from additional

Table 2.1: Reason of Outperformance of Factors, Adapted from MSCI

Factors	Risk	Bias
Value	Higher exposures to business cycle risk	Errors in Earnings Expectations
Momentum	Higher systematic business cycle risk and higher systematic tail risk	Underreaction and overreaction
Size	Higher exposures to business cycle risk	Bias in Expectations
Quality	NA	Bias in Expectations
Low Volatility	Higher tail risk	Lottery, overconfidence and leverage aversion effect

risks taken from investing on the factors, or the outperformance comes from systematic bias from investors. We explore several reasoning behind outperformance of several factors.

Suppose we start from value factors. The risk explanation of outperformance of value factors is that cheap stocks have higher risks due to usually incapable to adapt to economic change, compared to the leaner counterparts. Moreover, value stocks require higher cost of capital and greater business risks. The behavioral explanation comes from the hypothesis that investors often have bias against value stocks, as they do not grow as much as the growth stocks. Moreover, investors can also extrapolate high earnings growth from growth stocks and assume the same thing will happen in the future (often, they do not happen).

Future outperformance may or may not happen in the future. For investors who believe risk-based view, outperformance may persists in the future if factor investors bear systematic risks. For investors who believe the behavioral-based view, future outperformance may persist as long as there are strong reasons in which investors will continue to have bias in the future.

Chapter 3

Performance and Implementation

3.1 Methodology

We have seen sample performance in US Market. We will take a look at performance of portfolio in Indonesia market, so that we have relevant information for Indonesian investors. We will construct simple methodology to test the factors in Indonesia market.

We first limit the universe to LQ45 universe, so that our investment portfolio is tradable and liquid. Next, every three months, we collect factor data from our database. For each factor f , we take the stocks with 15 biggest f and take the stocks with 15 lowest f . Here, we have 'high-group' stocks and 'low-group' stocks for each factor f . For each group (whether high or low), we construct the portfolio using logarithm of market capitalization as weights at the beginning of each three months and calculate its daily return.

The reason we use logarithm of market capitalization is motivated by the fact that the best way to minimize the specific return for specific number of stocks is to use the inverse of stock-specific risk. We find out that the logarithm of market capitalization is the best proxy for the required weight.

We start at trading day after 1 January 2006 until 31 December 2015. Finally, after calculating the high factor portfolio return and low factor portfolio return, we take the difference to get our long-short factor return.

The data come from our database and have been adjusted to reflect corporate actions. Specifically, fundamental data are moved back to three months to avoid look ahead bias.

3.2 Sample Performance

The long short portfolio performance made from value and momentum factors are positive and significantly above 0. The beta factors are slightly above 0, while the size factor is significantly below

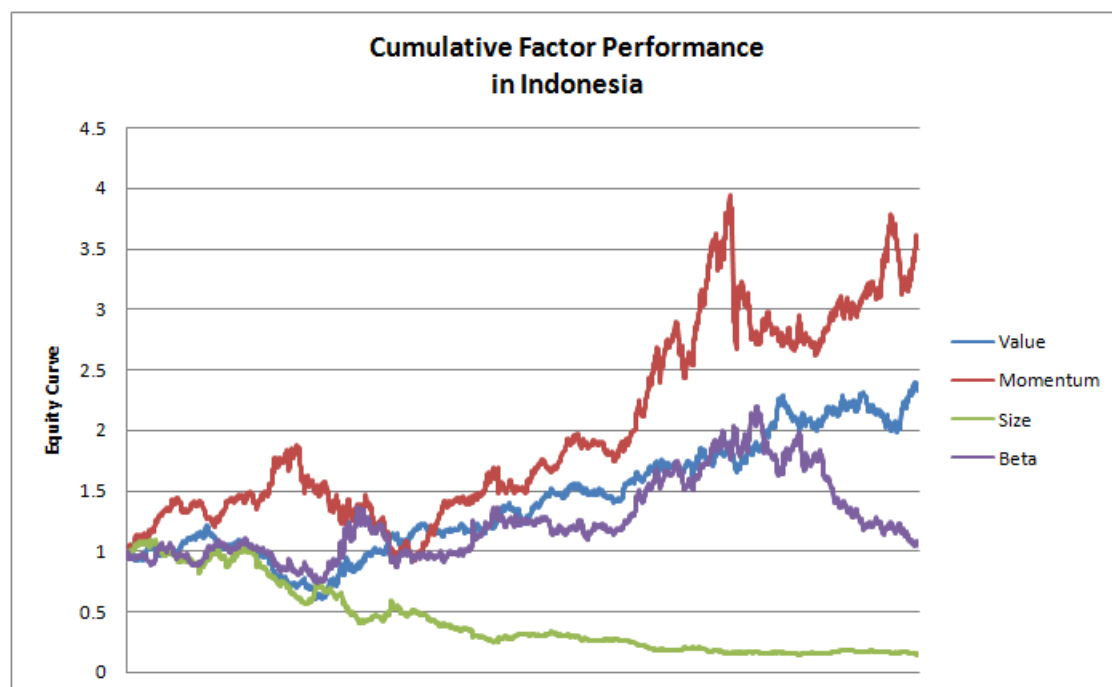


Figure 3.1: Source : Pinnacle

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The size factor, in particular, is interesting in a sense that it is against what is known in academia. There are several possible reasons, one of them is we test the performance in the biggest stocks in Indonesia market (LQ-45). Investors may want to test in broader universe. We also note that the performance covers only 10 years, as opposed to usual research in this area which can cover more than 30 years. As such, the cyclical nature of factor may result in underperformance of several years.

3.3 Factors Combination

Indeed, while in long term, factor investing provides outperformance from typical index investing, however factors can suffer medium length of underperformance, around 3 to 5 years. For typical investors, the length of underperformance may not be bearable and may put investors off.

Fortunately, the cyclical nature of factors can be reduced by diversification. By combining two or more factors into a composite factor, we can reduce the effect of cyclical nature of factor investing, as well as reducing the risk of factor investing, while maintaining same level of return.

We combine the 50-50 portfolio from value and momentum and name it 'ValMom'.

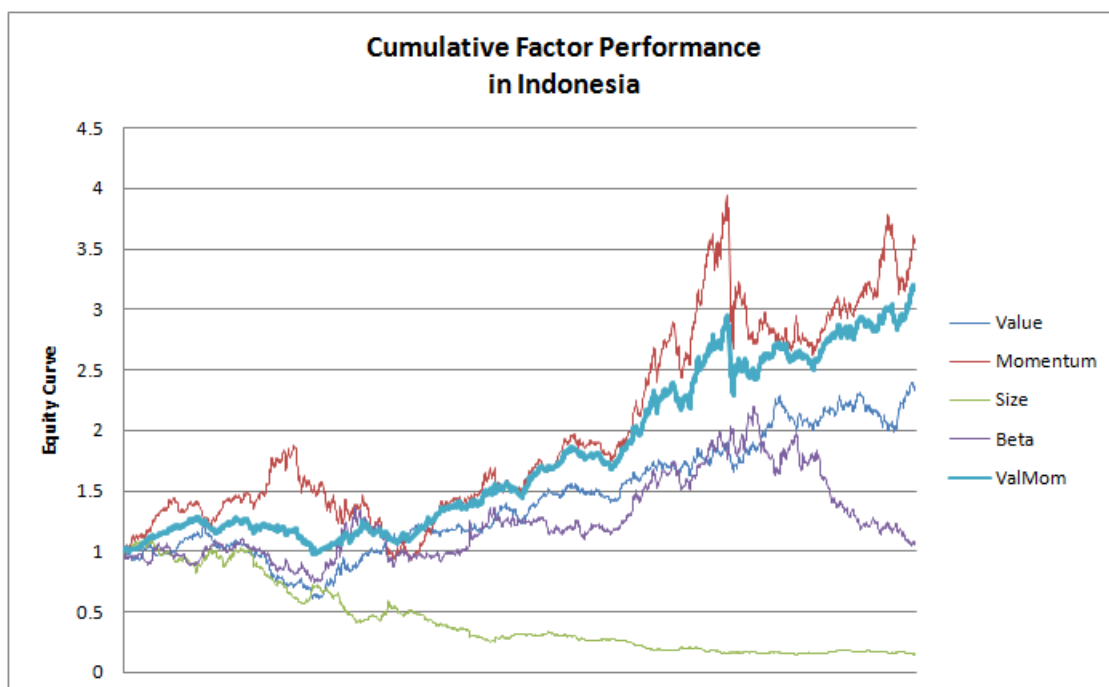


Figure 3.2: Source : Pinnacle

Table 3.1: Risk and Return of Value, Momentum and ValMom

	Value	Momentum	ValMom
Annualized Return	9.61	14.48%	12.05%
Annualized Risk	15.92%	19.29%	11.26%

We can see that the ValMom portfolio offers slightly less return than momentum portfolio and higher return than value portfolios. Moreover, we can see that the returns are much more smoother than momentum portfolio. Indeed, in 3.1, we can see that ValMom portfolio has comparable return with much less risk than value or momentum portfolio alone.

Indeed, we can see in the beginning, (it is around year 2006 to 2007, in which the value performance lags the market due to the equity bubble) underperformance of value portfolio is offset by the superior performance by momentum portfolio. We also can see that the drop in sharp drop in momentum portfolio is offset by the stable value return at that particular time.

As such, in the factor investing, combining multiple factors may benefit investors more than using one single factor alone.

Chapter 4

Conclusion

Grounded in academic theory and well-tested in empirical world, factor investing can be the back-bone of investors portfolio. While many in Indonesia invest using fundamental and technical analysis, both usually are performed in non-systematic way, factor investing offers exposures to well-tested sources of superior returns.

Some well known factors are value, momentum, low beta and low volatility, size and quality factors. All factors outperformance are usually backed by either risk-based or behavioral-based explanations. Regardless, the outperformance are likely to persist in the future.

Factor investing, however, can be cyclical and may result in lower performance in medium length period. Thus, we can also diversify using several factors to reduce the cyclical nature of factors and improve our performance on short to medium term.

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