

# Employing Systematic Equity Strategies

## Distinguishing Important Sources of Risk from Common Sources of Return

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# Introduction

In this paper, we introduce the concept of Systematic Equity Strategies, review their main characteristics, and explain why they represent important sources of risk for investment managers.

Systematic Equity Strategies, when represented as factors in risk models, allow investment managers to better understand and monitor the sources of risk and return of equity portfolios. We believe that they also improve forecast accuracy and help construction of portfolios that tilt towards these strategies. For an illustration of these benefits, please see "Systematic Equity Strategies: a Test Case Using Empirical Results from the Japan Equity Market," Bayraktar, et al (2013).

Systematic Equity Strategies (SES) refer to the systematic (i.e., rules-based or computer-based) implementation of fundamental or technical investment anomalies/strategies. There are two main reasons for incorporating SES into a risk forecasting model (as SES factors).

1. The majority of SES factors that we consider have been shown to be predictors of future cash flows of companies. As a result, they are drivers of expected stock returns. In practice, these factors have also been viewed as important sources of abnormal<sup>1</sup> returns. As drivers of stock returns, SES factors are also drivers of volatilities and correlations among stocks. SES factors in risk models allow investment managers to capture this volatility and correlation effect.
2. Some Systematic Equity Strategies may lead to crowding risk as large pools of capital pursue these strategies. Investors using risk models with SES factors are able to measure and monitor their exposures to these crowded strategies and make more accurate risk and return tradeoff decisions.

Table 1 shows SES factors that are currently in Barra equity risk models as well as the new SES factors. We group Systematic Equity Strategies along four broad categories: Valuation, Quality, Sentiment, and Momentum. Each of the four strategies is in turn broken into sub-strategies and underlying factors. With the exception of price-based Value ratios and Stock Momentum (using 1 year returns) that already exist in Barra equity risk models, most of the SES factors capture new sources of risk.

**Table 1: Individual factors that we consider for each of the sub-strategies.**

Systematic Equity Strategies			
Valuation	Quality	Sentiment	Momentum
<b>Value</b> Book-to-Price Dividend-to-Price Sales-to-Price Cash Flow to Price <b>Earnings Yield</b> EBIT/EV* Fwd E/P	<b>Earnings Quality</b> Accruals* Cash Earnings* Sales Turnover*, ROA* <b>Financing Quality</b> Composite Issuance* Net Stock Issuance* <b>Management</b> Management Bias* Insider Transactions* Investment Decisions*	<b>Analyst Estimates</b> Estimate Revisions* <b>Analyst Ratings</b> Ratings Changes*	<b>Price Momentum</b> Stock Momentum Industry Momentum* <b>Linkages</b> Geographic* Economic * Analyst Coverage* <b>Flows</b> Mutual Fund Flows* <b>Reversal</b> Short-* & Long-Term*

\* New SES factors

<sup>1</sup> According to the Capital Asset Pricing Model (CAPM).

The extent of crowding in a strategy, i.e., large pools of capital following the strategy, can be significant in determining its effectiveness. Crowding in a strategy generally results in improved market efficiency, i.e., faster price discovery. While crowding reduces effectiveness of the strategy in predicting stock returns, it is still an important source of risk during the price discovery period, due to frictions such as shorting constraints and transactions costs.

There is, however, an additional dimension of crowding risk that is valid for a wide range of “unanchored” strategies where the investor does not know how much capital is pursuing the strategy (Stein (2009)). Crowding in these strategies may result in prices moving towards and then further away from fundamental prices. When there is enough of a deviation from fundamental prices, other managers (following valuation strategies) may step in to benefit from the investment opportunity. In this case, crowding in the strategy introduces additional volatility during the price discovery process.

## Summary of Observations

In this paper, our key observations are as follows:

- Sources of risk evolve over time. Our research agenda is geared toward identifying sources of risk as they evolve. SES factors reflect our research focus on capturing additional sources of risk.
- We discuss four distinctive groups of systematic equity strategies – Valuation, Quality, Sentiment and Momentum. Each strategy consists of several related sub-strategies with underlying factors. For example, Valuation is a Systematic Equity Strategy, which consists of two sub-strategies: Value and Earnings Yield. The Value sub-strategy consists of four factors, (1) Book-to-Price, (2) Dividend-to-Price, (3) Cash Flow-to-Price, and (4) Sales-to-Price.<sup>2</sup>
- We explain the role that Systematic Equity Strategies play as risk factors. In fact, SES factors serve as important complements to traditional fundamental equity risk factors.
- SES factors capture important risks, including crowding risk, risk due to co-movement of stocks with common drivers of cash flows, and time-varying risks related to macro-economic and seasonal cycles.
- Incorporating SES factors into fundamental risk models may improve portfolio risk forecast accuracy, particularly for portfolios that have exposures to SES factors.
- Managers can evaluate a portfolio’s sensitivity to crowded trades and positions by calculating a portfolio’s exposure to SES factors in the risk model and measuring risk and return contributions of SES in equity portfolios.

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<sup>2</sup> In practice, the exact definition of sub-strategies and the factors that go into each sub-strategy may vary by country or region.

## Background

Systematic Equity Strategies refers to the computer- or rules-based implementation of fundamental or technical equity investment anomalies. Such strategies have been richly documented in the academic finance literature and have a wide following among many quantitative-based fundamental equity investment professionals, as well as other fundamental equity managers who use specific filters to narrow the universe of attractive stocks. In addition to being well-known and relatively straightforward to implement,<sup>3</sup> Systematic Equity Strategies have the following characteristics:

1. Demonstrated periods of significant out-performance:

A typical requirement for managers to follow a particular investment strategy is that it can explain the cross-sectional variation of stock returns as well as produce superior in-sample and out-of-sample performance. Strategies that we consider have been shown to generate abnormal returns in a CAPM asset pricing framework.

2. Motivated by investment or economic insight:

It is often easier to allocate capital to a strategy if one understands the underlying key drivers of risk and performance. The better an investment is understood, the easier it is to explain its ex-post performance. Insight into the Investment strategy may lead to understanding the sources of risk and return. The SES factors that we focus on are supported by sound economic theories, often with more than one potential economic explanation.

3. Implemented systematically:

The strategy has a better chance of being adopted by a large number of investors if it can be implemented in an efficient, scalable manner. In general, the systematic implementation of a strategy implies buying or selling a set of “target” stocks according to pre-specified rules or computer algorithms. For example, long-only managers implement their strategy by buying top-ranked stocks according to that strategy. The long/short managers purchase the top-ranked stocks and short the bottom-ranked stocks.

## Including SES Factors in Risk Models

We believe there are three main reasons for including SES factors in a risk model:

1. Investment insight:

The SES factors we consider are proxies for the expected earnings and/or cash flows of companies. This is the fundamental driver for the effectiveness of these factors in predicting stock returns. However, the returns associated with SES factors are risky because they do not predict stock returns perfectly. A risk model including SES factors forecasts risks associated with systematic equity strategies more accurately than a model omitting these factors. Investors using the model with SES factors make better risk and return trade-off decisions when implementing these strategies. Furthermore, since companies with similar expected cash flows and/or earnings are also expected to co-move with changes in economic conditions, then SES factors in the risk model allow investors to better capture correlations in stock returns.

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<sup>3</sup> Putting transaction costs aside.

## 2. Crowding:

SES factors that exhibit abnormal returns have been well-documented in academic finance literature and most of them are easily accessible.<sup>4</sup> Since these strategies are based on sound economic theories, they are widely adopted by investors and can lead to crowding risk. We discuss the notion of crowding in more detail in the *Crowded Positions and Trades* section of this paper. In brief, we argue that crowding in a Systematic Equity Strategy can result in significant overlap in portfolio positions and allocations among managers that implement similar strategies. By incorporating SES factors in a risk model, we monitor exposures to crowded positions that may in turn help reduce potential over-reaction of managers to fire sales driven by these shared strategies during crisis periods. Furthermore, large pools of capital following and trading shared strategies may introduce deviations from market equilibrium prices, which in turn may result in sharp corrections in subsequent periods. SES factors in a risk model also help investors monitor exposures to crowded trades.

## 3. Cyclical and Seasonality:

SES factors help capture co-movement and volatility of stocks during periods that coincide with arrival of new information. For example, around earnings announcements and year-end periods there tend to be more price discovery. Furthermore, some strategies may move with the macroeconomic environment or become more significant during crisis periods. By incorporating SES factors in the risk model, we capture risks related to these strategies that may have time-varying characteristics.

# Crowded Positions and Trades

Crowded trades refer to trading activity involving a significant number of market participants with large pools of capital who trade in and out of stock positions in order to pursue the same or similar investment strategies. A crowded position, on the other hand, happens when there is a significant overlap of portfolio positions and allocations as a result of crowded trades.

Crowded trades generally result in improved market efficiency, i.e., faster price discovery. This implies that market prices move towards fundamental prices more quickly. As a result, the risk-adjusted return of the strategy declines. While crowding reduces effectiveness of a given strategy in predicting stock returns, depending on the extent of frictions such as shorting constraints and transactions costs, it may result in overlap of positions among managers pursuing the crowded strategy, during the price discovery process. Overlap of portfolio positions and allocations among investors following similar strategies may result in extreme levels of risk when those same investors experience negative shocks in other parts of their portfolios, forcing them to liquidate their positions. Examples of shocks may include unexpected outflows or leverage constraints that may cause fire sales. This may cause losses for other investors following the same strategy and generate further rounds of sales and purchases that drive price volatility. The Quant Crisis of August 2007 is now a classic example of such a crowded trade bubble bursting, explained by over-crowding and over-leverage.

Unanchored strategies refer to investment strategies where some investors do not rely on an independent estimate of fundamental value of underlying companies. For these strategies, the demand for stocks may be a non-decreasing function of the stock price (Stein (2009)). Investors, not knowing how much capital in aggregate is pursuing these strategies, implement the strategy following some

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<sup>4</sup> Note that some of the SES factors leverage large data-sets or data that are local to a market which may require analytics and data expertise.

capacity assumptions with implementation rules such as “percent ADV” (limiting trades to be less than a certain level of average daily volume), “percent float” (limiting aggregate holdings to be less than a certain level of a company’s shares outstanding). The capacity assumptions and the implementation rules of each manager may underestimate that aggregate amount of capital following the strategy when there is crowding. In this case, stock prices may over- or under-shoot their fundamental value and experience a sharp correction in subsequent periods as prices adjust to reflect fundamentals. Momentum or Quality strategies are examples of unanchored strategies that exhibit this risk.

Given the inherent risks associated with such trades, it is important for managers to recognize and measure them. We view SES factors as proxies for crowded trades that need to be included in risk models.

## Defining Systematic Equity Strategies

To include SES factors into a risk model, we use the following framework:

1. We first identify four distinctive Systematic Equity Strategies: i) Valuation, ii) Quality, iii) Sentiment, and iv) Momentum.
2. Next we identify several related sub-strategies within each Systematic Equity Strategy.
3. Finally, we identify individual factors that may be combined to build sub-strategies.

In practice, there may be an array of alternative factor specifications to capture the investment idea at the sub-strategy level. To form sub-strategies, we may group several related factors. Grouping of factors has several advantages compared to using individual factors, particularly as it relates to their inclusion in risk models. This approach allows the introduction of new factors and expansion of the information set without increasing the complexity of the linear factor model, keeping the number of factors the same. It also helps us deal with the problem of multicollinearity in the model. Many individual factors in the sub-strategies are highly correlated. Introducing all individual factors rather than sub-strategies may create a multicollinearity problem that compromises the model stability.

To understand the intuition behind our classification of Systematic Equity Strategies, it is useful to understand how we think about the value of a firm. A firm’s value is determined by present value of current and future cash flows that may originate from two sources:

- (i) Assets already in place from past investments that generate cash flows today, and
- (ii) Growth opportunities from future investments that are expected to generate a stream of cash flows in the future.

The **Valuation** strategy allows investors to determine the attractiveness of a company’s assets relative to the current market price. An important feature of this strategy is that it uses both fundamental information and pricing information in factor construction.

The three remaining categories of Systematic Equity Strategies refer to investment strategies that are rough proxies for expected cash flows (and expected returns) from future growth opportunities. We categorize these strategies by their information content. **Quality** relies on fundamental information that may indicate future cash flows. **Sentiment** relies on explicit predictions of market participants about the

expected cash flows. And **Momentum** employs historical pricing information to form an expectation about future cash flows.

To make the notion concrete of how the factor may proxy for future cash flows, consider the Composite Issuance factor listed under the sub-strategy Financial Quality. Composite Issuance favors firms that buyback their stocks and dislikes firms that issue new shares. Firms that repurchase stock tend to have higher current as well as expected net cash flows (high earnings relative to investment), and the reverse is true for firms that issue stock (Fama and French (2005)). Accruals is a factor under the Earnings Quality sub-strategy that conveys information about future cash flows (Fairfield, Whisenant, and Yohn (2003)). Firms with more Accruals tend to have lower expected net cash flows (high investment relative to earnings).

For Sentiment strategy, it seems reasonable that stocks upgraded by sell-side analysts (i.e., high Sentiment stocks), who are considered to be experts in the industry the company operates in, are expected to have higher cash flows compared to their peers. For the simple definition of Momentum strategy, high returns over the last year (high Momentum) may signal market's improved view of the expected cash flows of the company.

The four categories of SES factors are not only useful to form expectations about future prospects of companies but also to form risk forecasts. By definition, every expectation of cash flow has uncertainty around it which determines its riskiness. Furthermore, drivers of cash flow expectations are expected to be drivers of co-movement in stock returns. By introducing SES factors that proxy for expected cash flows into the risk model, we aim to improve company overall risk forecasts.

We now turn to each of these strategies and examine their risk and return properties.

## Valuation

Valuation strategy distinguishes between value stocks and glamour (growth) stocks. One of the common explanations for the Valuation strategy is that investors have a tendency to overestimate future earnings performance of glamour stocks while forming more realistic expectations for the prospects of value stocks. Over time, value stocks achieve the market's realistic expectations while glamour stocks tend to fall short. Thus, all else being equal, stocks trading at lower price ratios may be more attractive than stocks selling at higher multiples.

We believe that Valuation factors tend to predict excess returns because they have risk premia associated with them. Cheap companies may have significant risk associated with them. Many cheap 'value' companies go through periods of restructuring and may possibly be on the verge of bankruptcy. For valuation strategies to work, value investors must invest when the investment is most uncomfortable, be ready to pursue their investments for a long time period. There is significant risk of a company staying a high value company for an extended period, so called value trap, without rebounding in price<sup>5</sup>.

We capture Valuation with price based factors using *Book-to-Price*, *Dividend-to-Price*, *Sales-to-Price* and *EBIT/EV* and *Forward Earnings* information.

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<sup>5</sup> Please see following papers for further discussion on Valuation: Lakonishok, Schleifer, and Vishny (1994), Haugen (1995), Fama and French (1993, 1995, and 1996).



## Quality

The Quality strategy captures a company's potential to generate high earnings in the future. The first component of Quality focuses on Earnings Quality which explains return differences between high-quality and low-quality stocks, based on each firm's accrual and cash/earning accounting information. One of the common explanations for the existence of the Quality anomaly is that the market participants do not fully appreciate the distinction between the cash component of earnings (which is highly persistent), and the accrual component of earnings (which is more transitory). As a result, companies with large accruals are more likely to disappoint investors in the future than are companies with strong cash earnings (Sloan (1996)).

There is risk premia associated with Accruals. We tend to agree with the explanation for accrual anomaly offered by Fairfield et al. (2003). In particular, these authors argue that the growth in net operating assets may be disaggregated into accruals and growth in long-term net operating assets. They find that that the market appears to equivalently overvalue accruals and growth in long-term net operating assets suggesting that the accrual anomaly may be a special case of general growth anomaly which may be explained by the presence of risk premia.

The second component of Quality differentiates stocks based on company management decisions. Poorly managed companies have a tendency to raise capital to pursue questionable acquisitions or investments, while better-managed companies will often expand along core competencies. Better management may also repurchase outstanding shares as they return excess capital to shareholders. Investors tend to under-react to such management information initially, so share changes often act as a precursor to later price adjustments.

We believe that while companies with high Quality scores might seem to be attractive from an investment standpoint, both Accruals strategies and Composite Issuance factors have been well documented in academic finance literature and have a wide following among practitioners. Therefore, there may be significant crowding risk associated with the implementation of these strategies.

We capture Quality with factors including *Accruals*, *Cash Earnings*, *Composite Issuance*, and *Management Bias*, and *Insider Transactions*.

## Sentiment

The Sentiment strategy differentiates stocks based on their sell-side analyst estimate revisions. Sell-side analysts are considered to be experts in the companies and industries that they cover. Therefore, they may have insights about the future of an industry or the management of the company that is not reflected in the company's financial statements. Sentiment strategy allows us to capture this additional information content in our risk predictions.

One of the common explanations for the existence of the Sentiment anomaly is that analysts have a tendency to change their views gradually so that a revision in one direction is often followed by similar revisions in the same direction. Furthermore, investors are also slow to react to changes in analyst estimates. All things being equal, stocks with positive estimate revisions have outperformed stocks with negative estimate revisions over long periods of time.

We believe that the price reaction of stocks with respect to analyst estimate revisions or ratings changes happens relatively quickly. When implemented by many investors at the same time, this strategy may result in prices over shooting fundamentals and hence causing sharp corrections in subsequent periods.

We capture Sentiment strategy with *Consensus Estimate Revisions* and *Analyst Ratings Changes* factors.

## Momentum

The Momentum strategy captures the continuation of trends (Price Momentum) in individual stock or industry returns together with stock Linkages and Flows information. One of the common explanations for the existence of momentum effects is that investors are slow to react to the release of information, especially when its implications are unclear or uncertain. As investors come to understand the implications of such information, prices trend upwards (or downwards) following good (or bad) news.

Stock returns also exhibit linkages along many dimensions, including geography of operation, industry exposure, earnings announcements, analyst coverage, and economic operations. Due to information delays, investor over- or under-reaction, and short-term supply and demand imbalances, there may be temporary divergences in performances of linked securities that then correct over time.

Furthermore, the Flows strategy differentiates between stocks that experience positive and negative aggregate mutual fund flows. One of the common explanations for the Flows anomaly is that mutual fund managers tend to expand their existing holdings with inflows and liquidate their positions with outflows. Funds that experience inflows/outflows tend to have similar positions at the aggregate mutual fund industry level and may have significant price pressure in the short run which reverses in the medium term. As a result, stocks that experience positive aggregate mutual fund flows outperform stocks with negative mutual fund flows in the short run but underperform in the medium term.

We believe that there is significant risk associated with the implementation of Momentum-based strategies. Momentum strategies imply a non-traditional upward-sloping demand function where the stock becomes more attractive as its price increases. If large pools of investors allocate capital to this strategy, “target” stocks may become overvalued and there may not be an immediate offsetting price mechanism to signal or correct this overvaluation. This artificial bubble becomes a big source of risk for the portfolio of stocks that implements the strategy. It is well documented in the literature that Momentum strategies experience significant and persistent crashes (Daniel (2011)).

We capture Momentum strategy with *Stock Momentum*, *Industry Momentum*, *Linkages*, *Mutual Fund Flows*, *Short-term* and *Long-term Reversal* factors.

## Conclusion

In this paper, we introduced the notion of Systematic Equity Strategy (SES) factors, discussed why these factors should be included in risk models, and how they are related to risk of crowded trades. Furthermore, we provided an economic intuition behind the SES factors that we propose including in equity risk models.

We believe that incorporating SES factors in risk models will do the following:

- improve portfolio risk forecasts, especially for portfolio managers who purposefully take large bets on SES Factors
- help investors make better trade-off decisions between risk and returns of these strategies
- provide a framework for analyzing potentially crowded investment strategies

For an illustration of these benefits, please see "Systematic Equity Strategies: a Test Case Using Empirical Results from the Japan Equity Market," Bayraktar, et al (2013).

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