Abstract: Analyzing the Fama-French Five-Factor Model - Implications of Low-Volatility and Momentum Factors in Extending the Capital Asset Pricing Model (CAPM)

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In 1993, Fama and French introduced their three-factor model designed to augment the capital asset pricing model (CAPM). To characterize asset returns, their framework specifies the existence of size and value risk premiums, the small-minus-big (SMB) and high-minus-low (HML) factors, arguing that these factors captured a dimension of systematic risk beyond the market beta specified by the CAPM. Since the inception of the Fama-French three-factor model, it has become standard practice to report 3-factor alphas in asset pricing literature.

In 2015, Fama and French proposed two additional factors, profitability in terms of robust-minus-weak (RMW) and investment in terms of conservative-minus-aggressive (CMA) to address the limitations of the 3-factor model in characterizing stock returns (i.e. prevailing literature suggests that the 3-factor alphas are non-zero).

Despite these extensions, numerous concerns have been raised regarding the validity of the five-factor model. For instance, value investing (the purchase of high book-to-market firms and shorting low book-to-market firms) has demonstrated diminishing returns following the great recession as growth stocks have exploded in value. In particular, one could argue that the HML value-to-price metric does not sufficiently capture the value of intangible assets.

Meanwhile, while RMW has consistently characterized excess returns, "quality factors" have been defined in terms of varied combinations of signals - while profitability and investment-related characteristics tend to capture most of the quality return premium, the lack of a clear consensus as to signal definition leads to variation in the evidence of a quantifiable risk premium.

To address these concerns, this report examines the robustness of the additional RMW and CMA factors comprising the five-factor model. In particular, we examine the inability of the five-factor model to capture the momentum factor, well-documented in factor model analysis as winners-minus-losers, WML. We demonstrate that even the simple inclusion of the WML momentum factor to produce a six-factor model fails to fully characterize the momentum phenomenon in asset pricing due to the low explanatory power of the RMW and CMA factors in explaining related variables.

Furthermore, while the assumptions underlying the five-factor model suitably explain equity risk premiums, they continue to emphasize the relationship between market beta and returns in the CAPM - that higher market beta should result in higher expected return. We propose several reasons as to why prevailing asset pricing literature suggests that there exists a low-beta (low-volatility) risk premium, which Fama and French do not suitably address in their model specification and analysis.