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## PRACTITIONER'S DIGEST

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### **HOW DO FACTOR PREMIA VARY OVER TIME? A CENTURY OF EVIDENCE PAGE 15**

*Antti Ilmanen, Ronen Israel, Rachel Lee, Tobias J. Moskowitz and Ashwin Thapar*

We examine four prominent asset pricing factors—value, momentum, carry, and defensive—commonly used in both the academic literature and in quantitative investment models in practice, and study them across six asset classes over a century. Our approach, utilizing a long and broad sample, offers advantages over past attempts that have been challenged by limited time-series data and a tendency to narrowly focus on just U.S. equities. In our extended data set we are able to identify significant time variation in factor risk premia and risks and aim to understand the source of this variation. In other words, strategies tied to factor investing, such as style, smart beta, and multifactor portfolios can experience significant performance changes over time; our assessment of the sources and predictability of such changes can help improve investment strategies based on these concepts.

We first rule out spurious or non-economic sources of variation, such as overfitting from data mining in the original studies, providing more conviction in the efficacy of these factors persisting out of sample. We also provide a novel test that separates the influence of data mining from another potential source of time variation in factor premia—informed trading by arbitrageurs, and find evidence consistent with some overfitting in the original sample, but no evidence that arbitrage activity has influenced returns to these factors. We further attempt to link factor variation to economic sources by exploiting our long time series and many markets to provide a wealth of economic shocks and events. However, we find that factor returns are largely unrelated to macroeconomic risks, suggesting these market neutral factors are exposed to different risks than traditional asset classes and hence are diversifying to traditional asset allocation strategies.

Finally, in attempting to capture variation in factor returns, we examine factor timing strategies that attempt to improve upon a static factor investment allocation strategy. We find relatively modest efficacy of factor timing strategies that may be challenged to overcome implementation frictions in practice. Hence, the marginal benefit of factor timing to a diversified static factor portfolio appears minimal.

**THE U.S. TREASURY TERM STRUCTURE AND THE DISTRIBUTION OF REAL GDP GROWTH****PAGE 58***J. Benson Durham*

Several studies report a positive correlation between the slope of the yield curve and future real GDP growth. This literature emphasizes the extremes of both variables, episodes of inversion that subsequently “cause” recession. But three underused lenses further assess any predictive power from the slope. First, existing studies do not exhaustively decompose the precise sections of the yield curve that may matter most. This study parses the yield curve not only by maturity but also the distinction between anticipated short rates and term premiums, which have different implications for real activity. The relation between the slope and growth owes primarily to the front end. However, both the estimated path of monetary policy and near-dated term premiums have statistically significant effects. This result suggests a role for investors’ perceptions and attitudes toward risks, in addition to standard monetary policy transmission.

Second, the literature highlights recession “risks” semantically, but instead focuses on the mean of the growth distribution. To address this void, quantile regressions provide a lens on the so-called higher moments of the real GDP forecast density, namely its width and skew. Narrower slopes have a greater absolute impact on the left compared to the right tail of the distributions. However, these isolated results imply a boost to the width of the projections rather than its balance. Despite the literature’s preoccupation with recession, there is no consistent evidence that slope compression deteriorates the downside balance of risks.

Third, studies are also silent on whether the term structure has information about shorter-run fluctuations around trend output, or conversely about much longer-run growth cycles. This distinction matters. The stronger the higher-frequency effects, the more relevant the term structure’s signal is for active tactical investors as well as central bankers who attempt to smooth the business cycle. Yet the evidence does not support this view. Instead, spectral analysis of the underlying time series suggests that lower-frequency cycles largely account for the total variance in both growth and yield curve factors, as opposed to shorter time scales. Moreover, decompositions of the covariance between the term structure and growth indicate that longer-run cycles primarily drive the relation, rather than short-run oscillations. The preponderance of low-frequency power implies that any forecast signal from the term structure is less relevant for myopic and some longer-run investors alike.

**GOOD STATES, BAD STATES: WHAT DO OPTIONS TELL US ABOUT SCHIZOPHRENIC BEHAVIOR OF MR. MARKET AND WHAT CAN WE DO ABOUT IT?****PAGE 79***Vineer Bhansali and Jeremie Holdom*

It is generally understood that the behavior of markets is unpredictable over short horizons, and this behavior is sometimes compared with the schizophrenic behavior of a person subject to bouts of euphoria and depression, greed and panic. It is also well known that option prices encapsulate the risk-neutral probability distribution implied by the market. Thus, hidden inside the option implied

distribution are sub-distributions for good states (bullish) and bad states (bearish) market outcomes which provides a lens into the split personality of market participants in the aggregate.

By using a simple mixture of distributions we extract time series of expected returns, volatilities and mixture probabilities of these mixed outcomes over history. We also focus on events such as the current US elections where uncertainty increases. From a practical perspective, the bimodality of asset return distributions suggests important modifications for asset allocation and risk management.

We demonstrate that the probability of being in these states changes with time and during important events, showing the importance of dynamic asset allocation and risk management. Since a mixture of distributions can exhibit fatter tails and negative skew, we also illustrate the need for tail hedging when options markets reflect elevated degrees of implicitly schizophrenic behavior.

## **HORIZON-ADJUSTED PORTFOLIO PERFORMANCE MEASURE**

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*Yoram Kroll and Moshe Ben-Horin*

Most, if not all practitioners, advocate higher portfolio risk for longer term investment horizons. This intuitive policy is supported by the widely accepted approach of Tversky and the Nobel laureate Kahneman who estimated that for a typical investor, it takes about 2.25 USDs gain to compensate for a one USD loss. Practically, performance measures are usually based on monthly returns and entirely ignore the risk reduction benefit of long term investment horizons. This paper suggests a practical way to quantify the risk reduction factor of a long horizon investment and integrate it into performance measures that employ short-term (e.g., monthly) data.

For illustration, we apply our model to the S&P-500 index over the period of 2008 to 2018 and found the following: The average monthly return of the S&P-500 of about +0.7% was equivalent to about -0.4% monthly certain return, for a one-month horizon investment, implying a risk factor of about 1.1% per month. However, for a 60 month horizon investment, the +0.7% average monthly return was equivalent to about +0.6% certain return, implying a risk factor of a mere 0.1%.

Our model avails practitioners with an easy way to implement the long horizon risk reduction benefit into the short-term performance measure by presenting risk-adjusted average short-term (e.g., monthly) returns with an imbedded risk factor that matches the investor's horizon.

## **PRIVATE EQUITY VALUATION BEFORE AND AFTER ASC 820**

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*Peter Easton, Stephannie Larocque and Jennifer Sustersic Stevens*

Investment in private equity continues to grow, reaching \$3.4 trillion in North America and \$6.5 trillion globally in 2019, according to McKinsey & Company. We seek to better understand accounting in this large and opaque sector by examining the impact of ASC 820 on valuations reported by US private equity funds to their investors. By clarifying the definition and measurement of fair values, ASC 820 (formerly known as SFAS 157) resulted in a change in 2008 to the most important accounting policy for private equity funds. Private equity's underlying investments are both difficult to value and highly illiquid. While some fair values were used prior to ASC 820, application was inconsistent.

We find that, following ASC 820 adoption, private equity funds make more frequent, upward valuation adjustments to their quarterly reported net asset values (NAVs). We further find that private equity NAVs estimate future, realized net distributions with greater accuracy following ASC 820 implementation. Our results suggest a post-ASC 820 accuracy improvement of six to seven percent of NAV. We also find evidence of a greater increase in accuracy for the NAVs of smaller funds, funds with less experienced fund managers, and high-performing funds. Moreover, given that private equity limited partner investors generally incorporate the fair value provided by the private equity fund in their own financial statements, private equity financial reporting, and the influence of ASC 820, potentially affects the financial reporting, asset allocation decisions, and returns of an economically significant cross-section of the capital markets—private equity funds, limited partners, and their beneficiaries.