



# Macroeconomic risk and hedge fund returns<sup>☆</sup>



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## ABSTRACT

This paper estimates hedge fund and mutual fund exposure to newly proposed measures of macroeconomic risk that are interpreted as measures of economic uncertainty. We find that the resulting uncertainty betas explain a significant proportion of the cross-sectional dispersion in hedge fund returns. However, the same is not true for mutual funds, for which there is no significant relationship. After controlling for a large set of fund characteristics and risk factors, the positive relation between uncertainty betas and future hedge fund returns remains economically and statistically significant. Hence, we argue that macroeconomic risk is a powerful determinant of cross-sectional differences in hedge fund returns.

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## 1. Introduction

It is widely accepted that unexpected changes in macroeconomic variables can generate global impacts on firm fundamentals, such as cash flows, risk-adjusted discount factors, and investment opportunities. There are several channels by which macroeconomic fundamentals such as inflation, short-term and long-term interest rates, unemployment, and economic growth have significant impact on prices of risky assets such as stocks, bonds, currencies, and their derivatives. To the extent that hedge funds aggressively pursue opportunities arising from changing economic circumstances, we would expect that their performance from investments in these financial securities are influenced by the extent to which they vary their exposure to leading economic indicators.

We argue that these changes can be regarded as a source of macroeconomic risk that is interpreted as economic uncertainty. We quantify this risk using the

time-varying conditional volatility of macroeconomic variables associated with business cycle fluctuations. This paper attempts to determine the extent to which exposure to this source of risk explains cross-sectional dispersion of hedge fund returns. We find that exposure to macroeconomic risk is a more powerful determinant than is the exposure to financial risk commonly used to explain hedge fund returns.

The macroeconomic variables we consider include default spread, term spread, short-term interest rate changes, aggregate dividend yield, equity market index, inflation rate, unemployment rate, and the growth rate of real Gross Domestic Product (GDP) per capita. Alternative measures of macroeconomic risk are generated by estimating time-varying conditional volatility of the aforementioned economic indicators based on a Vector Autoregressive–Generalized Autoregressive Conditional Heteroskedasticity (VAR–GARCH) model, which allows for asymmetric response of volatility to changes in economic circumstances, and accounts for serial correlation and cross-correlations among the macroeconomic factors. For each fund, we estimate time-varying uncertainty betas via a 36-month rolling regression of excess returns on the measures of macroeconomic risk. Finally, we examine the performance of these uncertainty betas in predicting cross-sectional variation in future fund returns.

Both portfolio-level analyses and cross-sectional regressions indicate a positive and significant link between these uncertainty betas and future hedge fund returns. Quintile portfolios are formed each month by sorting individual hedge funds according to their uncertainty betas. Out-of-sample average quintile returns for the following month are used to examine whether exposures to macroeconomic risk factors explain the cross-sectional dispersion in hedge fund returns. Depending on the proxy for macroeconomic risk, hedge funds in the highest uncertainty beta quintile generate 6% to 9% higher average annual returns than do funds in the lowest uncertainty beta quintile. After controlling for the Fama–French (1993) and Carhart (1997) four factors of market, size, book-to-market, and momentum, and the five Fung–Hsieh (2001) trend-following factors of stocks, short-term interest rates, currencies, bonds, and commodities, the positive relation between uncertainty betas and risk-adjusted returns (nine-factor alpha) remains economically and statistically significant. In multivariate cross-sectional regressions, we also control for a large set of fund characteristics and risk attributes, and find that the average slope on uncertainty beta remains positive and highly significant across alternative regression specifications.

In addition to individual measures of macroeconomic risk, we use a statistical approach to develop a broad index of macroeconomic risk. To sufficiently capture the common variation among the correlated factors of economic uncertainty, we use the principal component analysis that uses orthogonal transformation to convert a set of highly correlated economic indicators into a set of linearly uncorrelated variables called principal components. After building the broad index of macroeconomic risk, we test its performance in predicting the cross-sectional variation in hedge fund returns. The results indicate a positive and

significant relation between exposures to the broad uncertainty index and future hedge fund returns: funds in the highest uncertainty index beta quintile generate 0.80% to 0.90% higher monthly returns and alphas than do funds in the lowest uncertainty index beta quintile. Overall, the significant predictive relation between fund returns and the newly proposed measure of macroeconomic risk validates our measure as a descriptive quantitative indicator of economic uncertainty.

A natural question is, why do hedge funds with higher exposure to macroeconomic risk generate higher returns? Is there a theoretical framework supporting this finding? The positive relation between uncertainty betas and expected returns is justified in the Merton (1973) intertemporal capital asset pricing model (ICAPM), where investors are concerned not only with the terminal wealth that their portfolio produces, but also with the investment and consumption opportunities that they will have in the future. In other words, when choosing a portfolio at time  $t$ , ICAPM investors consider how their wealth at time  $t+1$  might vary with future state variables. This implies that like CAPM investors, ICAPM investors prefer high expected return and low return variance, but they are also concerned with the covariance of portfolio returns with state variables, which affects future investment opportunities.

There is substantial evidence that macroeconomic risk is a relevant state variable affecting future consumption and investment decisions. Bloom (2009) and Bloom, Bond, and Van Reenen (2007) introduce a theoretical model linking macroeconomic shocks to aggregate output, employment, and investment dynamics. Chen (2010) introduces a model that shows how business cycle variation in economic uncertainty and risk premiums influence firm financing decisions. The Chen model also shows that countercyclical fluctuation in risk prices arises through firm response to macroeconomic conditions. Stock and Watson (2012) find that the decline in aggregate output and employment during the 2008 crisis period are driven by financial and macroeconomic shocks. Allen, Bali, and Tang (2012) show that downside risk in the financial sector predicts future economic downturns, linking economic uncertainty to a future investment opportunity set. Hence, our finding that individual hedge funds that have greater exposure to macroeconomic risk earn commensurately higher returns than other funds is consistent with the ICAPM of Merton (1973), which suggests that such exposure should be rewarded.

Hedge funds use a wide variety of dynamic trading strategies, and make extensive use of derivatives, short-selling, and leverage. The elements that contribute to a hedge fund's strategy include the fund's approach to the particular financial sector that the fund specializes in, the specific financial instruments used, the method used to select financial securities, and the amount of diversification within the fund. Since there are so many elements affecting hedge fund investment decisions, fund managers have heterogeneous expectations and different reactions to changes in the state of the economy. There is also substantial evidence of disagreement among professional forecasters and investors on expectations about macroeconomic fundamentals (e.g., Kandel and Pearson, 1995;

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