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Conditional asset pricing in international equity markets

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ABSTRACT

This paper tests conditional asset pricing models in international markets on value, momentum, and the COMBO anomaly of Asness, Moskowitz and Pedersen (2013) (AMP). We find that incorporating instruments to capture the time variation in risk exposure can significantly reduce the bias in unconditional alpha documented in recent international studies. Particularly, employing the instrumental variables regression approach of Boguth Carlson, Fisher and Simutin (2011) to estimate the conditional Fama-French model can successfully explain returns on COMBO portfolios in North America, Europe, Japan, and the global market. Furthermore, instrumenting the global Fama-French model with lagged component betas can reduce the unconditional AMP's 50–50 COMBO alpha by 11–72%, pointing to the efficacy of this instrumental variable in international markets. Our findings have important implications for international asset pricing theory.

1. Introduction

Jegadeesh and Titman (1993) document the profitability of momentum investing strategies that exploit historical trends in stock prices by buying winner stocks, those stocks that perform well over the past year, and simultaneously short selling losers, those stocks that earned the worst returns over the same period. There is also evidence that value stocks (those with high book-to-market ratios) outperform growth stocks (those with low book-to-market ratios).[2] Recently, Asness et al. (2013) (henceforth, AMP) find that a simple 50-50 COMBO strategy that equally invests in momentum and value portfolios yields even more persistent and stable average returns in the U.S., Japan, and European markets. Interestingly, this strategy is also profitable in Japan, where the return on momentum portfolios is insignificant. These anomalies represent a challenge to the existing asset pricing theory.

A common approach to testing asset pricing models is to examine the unconditional alpha from the time-series regression of portfolio returns on the risk factors. Fama and French (1996), Jegadeesh and Titman (2002) find that the unconditional Fama and French (1993) model cannot explain returns on the momentum strategy, and the unconditional alpha is even higher than the average raw return. In international markets, unconditional asset pricing models face similar challenges. Fama and French (2012) document that momentum and value alphas remain significant under their three-factor model in four regional markets. Karolyi and Wu (2014) find that an augmented unconditional Fama-French model that is constructed using cross-listed stocks produces better goodness of fit than the original Fama-French model in explaining returns on value and momentum portfolios in international markets.[3] AMP find

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[2] Early studies that document value anomaly include Stattman (1980), Rosenberg, Reid and Lanstein (1985), Fama and French (1992).

[3] In these studies, the superiority of competing asset pricing models is judged by a simple comparison of absolute alphas or some goodness-of-fit measures. The fit of an asset-pricing model is examined in a multivariate context using the Gibbons et al. (1989) F statistic, the average R^2 across test assets as well as a range of other metrics constructed around alpha such as average Sharpe ratio for the intercept, average absolute alpha and average standard error of alpha.

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that the alpha of 50-50 COMBO portfolios remains statistically significant with reference to the global Capital Asset Pricing Model (CAPM).

Recent development in the U.S. asset pricing literature has shown that the alpha from unconditional asset pricing models could be biased because betas are time-varying and covary with either the market risk premium or market volatility (Jaganathan & Wang, 1996; Lewellen & Nagel, 2006; Boguth et al., 2011). Specifically, Boguth et al. (2011) show that when the CAPM is conditioned on the lagged realized beta of individual component stocks (rather than portfolios' betas), the average momentum alpha declines by 20–40% in the U.S. market. Applying this methodology to explain the value premium, Choi (2013) finds that incorporating the time variation in value stocks' betas can explain approximately 40% of the value premium. More recently, Cederburg and O'Doherty (2016) find that the conditional CAPM can explain away the premium that low beta stocks earn over high beta stocks. In international markets, however, recent asset pricing tests are still limited to unconditional examinations, even though the conditional estimation has received considerable attention in the U.S. literature.

Our study contributes to the international asset pricing literature in a number of ways. First, we provide one of the first conditional tests of the Fama-French asset pricing model in international markets, using the contemporary regression method of Boguth et al. (2011). Given the existing international evidence on the failure of unconditional models (Fama and French, 2012), it is imperative to examine whether the conditional estimation can help resolve this issue in international asset pricing tests. Second, in contrast to the U.S. literature where there is abundant evidence on the pricing power of various conditioning variables, little research has been conducted on the choice of conditioning variables in international asset pricing tests. As such, we aim to examine the pricing implication of a range of conditioning variables in international settings. Specifically, we offer the first evidence on the pricing power of lagged component (LC) betas of Boguth et al. (2011) in 23 equity markets and compare its ability in explaining anomalies to other standard state variables such as dividend yield, term spread, and default spread of Fama and French (1989).

Third, our study is one of the first (in both the U.S. and international markets) to examine whether conditional asset pricing models can explain the new COMBO anomaly of AMP. As Lewellen, Nagel and Shanken (2010), Fama and French (2016) note, it is important to test the asset pricing model on anomalies that are not the original target of the risk factors, thereby avoiding the perception of playing "home games".[4] Fourth, whereas AMP examine a simple 50-50 COMBO strategy in the U.S., U.K., Europe, and Japan, we test the conditional asset pricing model on a range of COMBO strategies (from 10-90 COMBO to 90-10 COMBO) in 23 countries, including countries not considered in AMP such as Australia, Hong Kong, Singapore, and New Zealand. Finally, while existing international asset pricing tests rely on simple comparisons of absolute alphas generated under competing models (e.g., Fama & French, 2012; Karolyi & Wu, 2014), we assess the superiority of the conditional asset pricing model by conducting formal statistical inference on the apparent reduction in alpha, thereby adding a further degree of rigor to the exercise.[5]

The main findings of this paper can be summarized as follows. First, using an analysis of raw returns between July 1992 and June 2015, we find evidence of statistically and economically significant COMBO effects in all regional and global markets. This COMBO effect is particularly strong and persistent in Asia Pacific (i.e., Australia, Hong Kong, Singapore, and New Zealand). Analyzing a range of possible weightings between momentum and value portfolios, we find that a simple 50-50 COMBO strategy earns a significant average return in all markets, though other combinations tailored to specific markets are also profitable. Specifically, COMBO strategies that are tilted toward value portfolios yield a higher average return than the 50–50 COMBO portfolio in Japan, while strategies that overweight momentum portfolios are more profitable in North America, Europe, Asia Pacific, and the aggregate global market. For example, in Japan the 10–90 COMBO strategy that assigns 10% weight into momentum portfolios and 90% weight into value portfolios earns an average return of 0.68% per month, compared to an average return of 0.5% per month for the 50–50 COMBO strategy. On the other hand, a 90–10 COMBO strategy earns an average return of 0.96% per month in Asia Pacific, compared to a 0.67% return for the 50–50 COMBO portfolio. These combinations take advantage of the fact that in Japan the value effect is strong (and the momentum is known to be non-existent), whereas in other markets, the momentum effect is more persistent. The 50–50 COMBO portfolio, nevertheless, remains a simple strategy that yields the highest Sharpe ratio in the global market.

Our second, and more important, finding is that LC betas, which are estimated at the individual stock component level, carry useful information to explain returns on anomaly portfolios in global markets. For example, examining the coefficients in the instrumental variables regression of global momentum returns on the Fama-French model, we find that the loading on LC betas is statistically significant to explain returns on either winner or loser portfolios, even after we control for standard instruments (dividend yield, term spread, and default spread). Instrumentation using both LC betas and standard instruments helps reduce the global unconditional momentum alpha from 0.88% ($t=3.70$) to 0.34% ($t=1.58$). The alpha reduction of 0.54% (or 61%) has an associated t-statistic of 2.36, which is statistically significant at the conventional level. We also find similar results for the COMBO anomaly. Specifically, employing LC betas as the sole instrument to estimate the conditional Fama-French model can reduce the unconditional 50–50 COMBO alpha by 72% in North America, 32% in Europe, 35% in Japan, 11% in Asia Pacific, and 64% in the composite global market. On the whole, these findings suggest that LC betas are an important instrumental variable in international markets.

Our third finding is that the conditional estimation of asset pricing models is more powerful than the unconditional model in explaining anomalies everywhere, except Asia Pacific, where these models give similar pricing errors. For example, when we incorporate the full set of instruments into the conditional estimation, the 50-50 COMBO alpha is reduced to -0.01% ($t=-0.05$) in

[4] Fama and French (2016) suggest that asset pricing tests that ask size and value risk factors to explain returns on size and value portfolios could be playing "home games".

[5] We are grateful to the referees for helpful guidance on refining the objectives and contributions of this study.