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On the robustness of higher-moment factors in explaining average expected returns: Evidence from Australia

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A B S T R A C T

This study tests the importance of systematic skewness and systematic kurtosis of Australian stock returns in the spirit of the higher-moment asset pricing model. We apply the Dagenais and Dagenais (1997) higher-moment estimators to correct for the errors-in-variables (EIVs) problems commonly found in the Fama and MacBeth (1973) two-pass regression methodology. After correcting for the EIVs problems, the two higher-moment factors, especially systematic skewness, are important in pricing Australian stocks. Systematic kurtosis appears to replace beta which plays a diminished role in the heavy-tailed return distribution.

1. Introduction

One strand of asset pricing literature that follows closely in the spirit of Sharpe's single-factor Capital Asset Pricing Model (CAPM) is the higher-moment factor models. Beyond the mean-variance framework imposed by CAPM, skewness and kurtosis may arguably be important as stock returns are well known to exhibit non-normal distribution. Likewise, an investor's objective function is unlikely to be described by a quadratic utility function but is more likely to include preference for positive skewness and aversion to higher kurtosis.

Based on these theoretical underpinnings, Kraus and Litzenberger (1976) expand the investor's utility function beyond the second moment in a Taylor series to examine the importance of skewness.

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In a series of recently related work, Harvey and Siddque (2000) and Smith (2007) demonstrate that stocks with large negative skewness tend to earn a higher risk premium. Dittmar (2002) and Potì and Wang (2010) find that coskewness and cokurtosis are priced in the cross-section of industry-sorted stock portfolios. Beaulieu et al. (2010) show that heavy tailed distributions may accommodate some stylized asset pricing anomalies. You and Daigler (2010) suggest that skewness is priced for portfolios of international stocks.

A common methodology for testing the importance of higher moment factors is based on the two-pass regressions by Fama and Macbeth (1973, FM thereafter) or its variants. In the first pass, each beta is estimated from time-series regressions for each underlying risk factor. However, since the risk factors are unobservable, their proxies are likely to contain errors of measurement. It follows that the estimated betas may induce errors-in-variables (EIVs) problems when stock returns are regressed on estimated betas in the second pass cross-section regressions. Since skewness and kurtosis are constructed similar to beta, they are also likely to encounter EIV problems.

This potential EIV problem has been highlighted by Litzenberger and Ramaswamy (1979), Gibbons (1982), Shanken (1992), Jagannathan and Wang, 1996, and Kan and Zhang (1997). In particular, Shanken (1992) questions the asymptotic statistical properties of the finite sample distribution in the two-pass methodology and suggests that EIVs in the second-pass estimators are severe in small samples. Dagenais and Dagenais (1997, DD thereafter) show that EIVs may cause inconsistency in the ordinary least squares (OLS) estimators with larger mean-squared errors. More importantly, it leads to larger than the intended size of Type I errors in Student's *t*-test. Given the econometric complications due to EIV problems, a further investigation on the explanatory power of higher moment factors might be warranted.

To this end, we re-examine the importance of higher moment factors by correcting the EIVs in the beta estimates. The standard approach to solve EIV problems is to identify appropriate instrumental variables related to the true variables but unrelated to the measurement errors. Such variables however may often not be readily available. Bikel and Ristov (1987) and Cragg (1997) suggest that consistent estimators based on the original, unaugmented set of observables can be constructed using information contained in higher order moments. DD contend that if regressors in multivariate models exhibit skewness and/or kurtosis in their return distributions, estimators based on moments of higher order may help to address EIV problems. Accordingly, they propose a higher moment estimator that is also an instrumental variable estimator but requires no extraneous information. Consistent with DD, Coen and Racicot (2007) who use the Dagenais and Dagenais higher moment (DDHM) estimators to mitigate EIVs problems, show that they are more precise than the OLS estimators.

We find that systematic skewness and systematic kurtosis are important in capturing variations in average Australian stock returns. Correcting for the EIVs problems lowers their significance, but they remain important pricing factors for Australian stocks. In particular, systematic skewness is robust across different periods and is the most important risk factor. In contrast, beta is weak in explaining average stock returns. Removing the test bias due to EIVs causes a further diminished role for beta. Overall, higher moment factors are more robust than beta after addressing the EIVs problems.

Our results complement those of Carmichael and Coen (2008) who examine the explanatory power of the Carhart (1997) four-factor model (including market, size, book-to-market equity, and momentum) using the DDHM estimators. They find that the significance of these factors is reduced after correcting for EIV problems. They suggest that real sources of these risk premiums may ultimately be related to higher moments.

Furthermore, our work extends Doan et al. (2010) who report that Australian and the US stocks tend to exhibit co-skewness and co-kurtosis behavior respectively. However, in examining the importance of the higher-moment factors, they fail to account for the potential EIVs problems in the OLS estimators. Applying DDHM estimators reveal that both systematic skewness and kurtosis are important in pricing Australian stocks. Kurtosis appears to replace beta in capturing the volatility of the heavy-tailed stock return distributions.

The rest of the paper is organized as follows. In Section 2, we discuss the estimates of the four-moment factor model that incorporates systematic skewness and systematic kurtosis based on the FM and DDHM methods. We then describes the data and portfolio formations in Section 3 before