Determinants of the cross-sectional stock returns in Korea: evaluating recent empirical evidence☆

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ABSTRACT

This paper provides empirical evaluation of recently proposed determinants of the cross-sectional stock returns in Korea, taking into account recent critique of empirical asset pricing literature such as the low power of test diagnostics and the bias induced by noise in prices. We do not find convincing empirical evidence supporting the Fama-French three-factor model as a benchmark asset pricing model for risk adjustment. In addition, empirical evidence indicates that the bias induced by noisy prices is substantial enough in mean returns of equal-weighted portfolios to change the economic and statistical significance of the estimated risk premium for factor portfolios, suggesting that researchers exercise caution in designing factor portfolios and interpreting results.

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1. Introduction

Since Fama and French's (1992, 1993) comprehensive empirical investigation of the cross-sectional determinants of stock returns in the US, their three-factor model proposed in Fama and French (1993) has been widely regarded as a benchmark model of empirical asset pricing both in academia and financial industry. Empirical research on the Korean stock market also broadly followed this practice by using the Fama-French three-factor model as an empirical benchmark for risk-adjustment in various applications.

Despite its weak theoretical link to equilibrium asset pricing models, the empirically motivated Fama-French three-factor model provides a comprehensive description of various stock return anomalies discovered in the 1980s in a parsimonious three-factor framework in the US and other major stock markets, which is why it has been used widely as a benchmark asset pricing model for risk-adjustment.[1]

[1] Empirical research over the past two decades produced a host of new anomalous patterns in cross-sectional stock returns that are not well described by the Fama-French three factor model, but there appears to be no consensus yet on a new empirical benchmark to replace the Fama-French three-factor model. See Fama and French (2008); Cochrane (2011); Chen et al. (2011); Goyal (2012) and Nagel (2013), among others, for recent discussion on this topic.

It is not clear, however, whether there exists strong enough empirical evidence supporting the use of the Fama-French three factor model as an empirical benchmark in the Korean stock market.[2] While many studies examine the cross-sectional stock returns in Korea in the framework of Fama and French (1992, 1993), they provide fragmented empirical evidence due to different sample periods, sample firms, and methods of constructing factor portfolios, which makes comprehensive interpretation of empirical evidence difficult.[3]

In this paper, we provide empirical evaluation of recently proposed determinants of the cross-sectional stock returns in Korea, such as Amihud's (2002) illiquidity measure (Choe and Yang, 2009), share turnover (Yun et al., 2009), innovations in the future money growth (Jung and Kim, 2011), and the degree of foreign ownership (Jung et al., 2009). We reevaluate these recent findings in a common dataset covering the recent two decades in order to facilitate comprehensive interpretation of determinants of the cross-sectional stock returns in Korea, and also to identify which of the proposed risk factors survive in a horse race that takes into account recent critique of empirical asset pricing literature. In our empirical evaluation, we take into account the presence of the bias in mean returns induced by noisy prices by comparing the mean returns of the proposed risk factors across equal- and value-weighting schemes of factor portfolio construction. Asparouhova, Bessembinder, and Kalcheva (2013, ABK hereafter) argue that this bias is substantial even for monthly frequency, particularly when portfolio returns are equal-weighted, and they also find that the bias is substantially reduced when portfolios are value-weighted. For evaluation of asset pricing model specifications, we focus on the pricing errors (alphas) rather than cross-sectional R-square measures and increase the dimensionality of test assets by adding ten industry portfolios to the set of test assets, following the suggestions of Lewellen et al. (2010) and Nagel (2013).

We first examine which firm characteristics are significantly associated with cross-sectional stock returns using the regression methodology of Fama and MacBeth (1973) at the firm (i.e., individual stock) level. Asparouhova et al. (2013) report substantial bias in parameter estimates induced by noisy prices in return regressions such as cross-sectional Fama-Macbeth regressions in which rates of return are used as the dependent variable. Following their suggestion for bias correction, we estimate the Fama-MacBeth regression by WLS, using the prior-month gross return as the weighting variable.

Among firm characteristics based on financial ratios, we find the market value of equity, book-to-market ratio, and earnings-to-price ratio to be significant determinants of the cross-sectional stock returns in Korea for the full sample period (1992–2012). We also investigate whether two measures of liquidity, Amihud's (2002) illiquidity measure and share turnover, are also significant determinants of the cross-sectional returns. Both measures of liquidity show significant association with the cross-sectional stock returns in a univariate setting, but in the presence of financial ratio variables in a multivariate setting, only share turnover remains significant.

Interpreting the observable firm characteristics found to be significant in the Fama-MacBeth regression as proxies for exposure to systematic risk, we construct several sets of factor mimicking portfolios in the manner of Fama and French (1993). If equal-weighted, then all candidate factor portfolios' mean returns are significantly positive. But when value-weighted, the significance of the size factor disappears with substantial reduction in the magnitude of its mean return, while the book-to-market, earnings-to-price, and turnover factor portfolios' returns remain significantly positive. Our results indicate that the bias in mean returns induced by noisy prices is quite relevant in terms of both economic and statistical significance when portfolios are formed based on firm size, which is also what ABK (2013) find in the US. While they do not investigate portfolios formed on the basis of the earnings-to-price ratio and turnover, they report that the bias is less relevant for the book-to-market ratio, similar to our finding for the book-to-market factor in Korea.

We also investigate whether a mimicking portfolio for innovations in the future money growth (Jung and Kim, 2011) and a foreign ownership factor (Jung et al., 2009), recently proposed as important determinants of the cross-sectional stock returns in Korea, retain pricing information in the presence of other factor portfolios. Our regression results indicate that the money growth factor is well-priced by other factor portfolios, and that the foreign ownership factor's significance mostly disappears when the factor is value-weighted, suggesting the presence of the bias induced by noisy prices in mean returns of the foreign ownership factor if equal-weighted.

For cross-sectional estimation of the factor risk premium, we construct four sets of decile portfolios using firm characteristics found to have significant association with the cross-sectional stock returns, namely the market value of equity, book-to-market ratio, earnings-to-price ratio, and share turnover ratio. Formal test diagnostics (GRS F-test and J-test) and the significance of the risk premium estimates suggest that there is no convincing empirical evidence supporting the use of Fama and French's (1993) three-factor model as a benchmark for risk-adjustment in Korea. In addition, we find that the turnover factor is significantly related to the cross-sectional stock returns, consistently through the sample period and regardless of how its risk premium is estimated. Share turnover has been widely interpreted as a proxy for liquidity, but more recently, the negative cross-sectional relation between turnover and stock returns has been also interpreted as the effect of investor sentiment (Baker and Wurgler, 2006) or firm-specific uncertainty (Barinov, 2013). Examining the economic nature of the relationship between share turnover and stock returns is beyond the scope of this empirical study and we leave the question for future research.

The paper proceeds as follows. Section 2 describes data and investigates which firm characteristics are significantly associated with the cross-sectional stock returns using the Fama-MacBeth regressions at the firm level. In Section 3, we construct various

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[2] While earlier papers such as Gam (1997); Song and Lee (1997); Song (1999), and Kim and Kim (2000) provide empirical evidence in the Korean stock market broadly supportive of Fama and French (1992, 1993); Yun et al. (2009) question the validity of using the Fama-French three-factor model as an empirical benchmark for risk adjustment in the Korean stock market.

[3] As pointed out by Kim (2011, footnote 20 on p. 199), even summary statistics of factor portfolios (for example, means and correlations) vary across these papers, in some cases substantially.