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World market risk, country-specific risk and expected returns in international stock markets

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ABSTRACT

This paper determines whether the world market risk, country-specific total risk, and country-specific idiosyncratic risk are priced in an international capital asset pricing model (ICAPM). Portfolio-level analyses, country-level cross-sectional regressions, stacked time-series, and pooled panel regressions indicate that the world market risk is not, but country-specific total and idiosyncratic risks are significantly priced in an ICAPM framework with partial integration. This result is robust to different methods for estimating risk measures, different investment horizons, and after controlling for the countries' aggregate dividend yield, earnings-to-price ratios, inflation risk, exchange rate uncertainties, aggregate volatility risk, and past return characteristics. The main findings turn out to be insensitive to the choice of one-factor vs. multifactor models used to estimate systematic and idiosyncratic risk measures.

1. Introduction

This paper investigates whether the world market risk, country-specific total risk, and country-specific idiosyncratic risk are priced in an international capital asset pricing model (ICAPM). The paper also tests if the price of risk associated with each factor is common across countries in a partial integration model that falls in between segmentation and integration and that allows for the degree of market integration to change through time. Following Bekaert and Harvey (1995), we define conditionally expected returns in any country as a function of their conditional covariance with a world market portfolio and the conditional variance of the country returns.

We test whether differences in countries' stock market returns can be explained by differences in systematic and/or country-specific risks. Our sample includes 23 developed and 14 emerging markets, for a total of 37 countries, plus the world market portfolio. The portfolio-level analyses and the country-level cross-sectional regressions indicate that there is a significantly positive relation between country-specific risks and the cross-section of expected returns on countries' stock market indices, whereas the cross-sectional relation between expected returns and world market risk is flat. This result is robust across different methods for risk estimation, different investment horizons, and after controlling for the countries' aggregate dividend yield, earnings-to-price ratios, inflation risk, exchange rate risk, aggregate volatility risk, and past return characteristics. Our findings turn out to be insensitive to the choice of one-factor vs. multifactor models used to estimate systematic and idiosyncratic risk measures.

In very early work on stocks trading in the United States, Lintner (1965) find that average stock returns are significantly related to the estimates of betas and total (or idiosyncratic) variances. However, Miller and Scholes (1972) indicate important statistical problems with these results and suggest that considerable caution should be exercised when using total or idiosyncratic risk as an explanatory variable. Fama and MacBeth (1973) introduce a more powerful cross-sectional test and find no idiosyncratic risk effect when residual variances and betas are estimated in an earlier period to mitigate the Miller–Scholes problem. In a more recent study, Fama and French (1992) provide strong evidence that firms' size and book-to-market ratio have significant explanatory power for average stock returns, while market beta has little or no power.

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In addition to these empirical studies on the relation between expected returns and systematic, total and idiosyncratic risk measures, there is some theoretical evidence that idiosyncratic volatility is positively related to the cross-section of expected returns if investors demand compensation for not being able to diversify firm-specific variance. Levy (1978) theoretically shows that idiosyncratic risk affects equilibrium asset prices if investors do not hold many assets in their portfolio. Merton (1987) indicates that if investors cannot hold the market portfolio they will care about total risk, not simply market risk. Therefore, firms with larger total (or idiosyncratic) variance require higher returns to compensate for imperfect diversification.[1]

In a recent article, Ang et al. (2006) provide contradictory evidence that the US stocks with low idiosyncratic risk earn high average returns, and the average return difference between quintile portfolios of the lowest and highest-idiosyncratic risk is about −1.06% per month, indicating a strong negative relation between idiosyncratic volatility and expected returns. In a follow-up paper, Ang et al. (2009) extend their original study on the US market by considering individual stocks in 23 developed markets. They conclude that the anomaly exists in other markets and the difference in average returns between the highest and lowest idiosyncratic volatility portfolios is about −1.31% per month. In contrast to Ang et al. (2006), Fu (2009) finds a significantly positive relation between the in-sample estimates of the conditional idiosyncratic variance and expected stock returns. Spiegel and Wang (2005) focus on the out-of-sample predictive power of idiosyncratic volatility, and find that expected stock returns are increasing with the level of idiosyncratic risk. Bali and Cakici (2008) shed light on the methodological differences in previous studies that mainly led the existing literature to present conflicting evidence. As discussed above, there has been a lively debate on the existence and direction of a risk-return tradeoff in the US stock market. Although some studies find a positive relation between idiosyncratic volatility and expected returns, the cross-sectional relation has been found insignificant, and sometimes even negative.

The aforementioned studies examine the cross-sectional relation between risk and return within the context of a "domestic economy" ignoring the partial integration/segmentation in international equity markets. Ang et al. (2009) test whether a relation between lagged idiosyncratic volatility and future stock returns exists in each of the 23 developed markets separately. They do *not* test if the price of idiosyncratic risk is common or different across countries. Instead, they focus on the price of stock-level idiosyncratic risk within countries.

The main contribution of this paper is to determine whether the world market risk, country-specific total risk and country-specific idiosyncratic risk are priced in an international setting, and whether the price of risk associated with each factor is common across countries. Specifically, we investigate the significance of a cross-sectional relation between risk and return on countries' stock market indices, and find that the world market risk is not, but country-specific total and idiosyncratic risks are significantly priced in an ICAPM framework with partial integration.

The paper also tests the presence and significance of a time-series relation between expected returns on countries' stock market indices and covariance and country-specific risk measures. The parameter estimates from stacked time-series and pooled panel regressions indicate a significantly positive intertemporal relation between country-specific risk and expected return on countries' equity indices. However, the results provide no evidence for a significant relation between world market risk and expected returns.

Our findings can be interpreted as evidence against the null of fully integrated capital markets. Earlier studies consider deviations from purchasing power parity (PPP) in perfect markets (e.g., Solnik, 1974a,b; Stulz, 1981a; Adler and Dumas, 1983) or they take into account the impact of barriers to international investment when PPP holds (e.g., Stulz, 1981b). Chaieb and Errunza (2007) introduce a more realistic model that incorporates both deviations from PPP and barriers to international investment. In the theoretical model of Chaieb and Errunza (2007), markets are not fully integrated and purchasing power parity (PPP) is violated (consistent with the majority of national markets). In this paper, we use portfolio-level analysis and country-level cross-sectional regressions to examine whether the markets are integrated or segmented. Here, we start with an exploratory analysis based on the sample correlations.

To test whether the markets are integrated in our sample, we use daily returns within a month from January 1973 to September 2006, and compute the average of individual cross-country correlations of returns on stock market indices. Since our sample includes both the developed and emerging markets, total of 37 countries, with significantly different market values, we think that the *value-weighted* average cross-county correlation coefficients will be more appropriate to quantify integration of national stock markets than the equal-weighted measure. As presented in Panel A of Fig. 1, the value-weighted average cross-country correlation coefficients display substantial and statistically significant variation over time. There is an upward trend, indicating an increase in the degree of market integration through time. However, the positive trend is not strong and hence it does not seem to indicate *full* integration of international capital markets.[2]

As an alternative measure of market integration, we also calculated the average correlations of stock market index returns with the world market portfolio returns. As shown in Panel B of Fig. 1, the value-weighted average correlations of countries' stock market indices with the world market portfolio presents significant time-variation over the sample period of January 1973–September 2006, but there is no evidence for an upward trend in the market integration measure.

The value-weighted correlation measures in Fig. 1 provide evidence for the empirical validity of partial integration model that allows for the degree of market integration to change through time.[3] In a partial integration or mild segmentation model, expected returns are affected by their covariance with a world market portfolio and by the variance of country returns. That is, both systematic and country-specific risks matter in explaining the time-series and cross-sectional variation in returns on countries' stock market indices. To test whether the world market and country-specific risks display significant time-series variation, we compute the value-weighted average total and idiosyncratic risk measures as well as the monthly volatility of value-weighted world market portfolio returns. Although not presented in the paper to save space, the value-weighted systematic and country-specific risk measures indicate significant time-series variation over the sample period of January 1973–September 2006. As will be discussed later in the paper, the country-specific risk measures display significant cross-sectional variation as well. Since our sample includes both developed and emerging markets, systematic, total and

[1] The theoretical evidence that idiosyncratic risk is positively related to the cross-section of expected returns is provided within the context of a domestic economy. There is no theoretical or empirical study that considers the presence and significance of a different price of idiosyncratic risk across countries in an ICAPM framework.

[2] King et al. (1994) compute the equal-weighted average cross-country correlation coefficients for 16 developed countries using the past 12 months of return data and find that there is no upward trend in the equal-weighted measure over the sample period of 1971–1988.

[3] For the significance of time-varying cross-correlations in international markets, see Bartram et al. (2007), Cai et al. (2009), Markwat et al. (2009), and You and Daigler (2010).