The World Price of Credit Risk

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Abstract

Global asset-pricing models have failed to capture the cross section of country equity returns. Emerging markets have displayed strikingly large and robust positive pricing errors. Country-level characteristics have played a significant role in pricing international equities, suggesting that financial markets may not be fully integrated. This paper offers a risk-based explanation that resolves these deviations from global asset pricing. A world credit risk factor explains the positive pricing errors in emerging market equities. Moreover, in the presence of this credit risk factor, country-level characteristics no longer play a role in pricing global equities. Factor models that include the world credit risk factor uniformly outperform, both in the time-series and the cross-section, competing specifications that exclude this factor. Over the 1989-2009 period, the risk premium for systematic credit risk exposure is 83 basis points per month and its importance has dramatically increased in recent years.

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The CAPM of Sharpe (1964) and Lintner (1965) and its intertemporal extension by Merton (1973) apply to a single national market. Extending the model internationally is nontrivial, as shown by Solnik (1974a). Theoretically, a single world market factor could explain the cross-section of country asset returns if purchasing power parity (PPP) holds and markets are fully integrated, or, alternatively, if the world market returns are perfectly correlated with world consumption growth (Stulz, 1981). When PPP is violated, however, foreign exchange rate risk is also priced. Moreover, in non-integrated financial markets, country-level information plays an important role in explaining the cross section of country returns. Empirically, testing the international CAPM requires the joint hypotheses of model validity, the existence of PPP, and market integration.

Since Solnik (1974b), the evidence on the pricing ability of the international CAPM has been mixed.[1] While weak support for the conditional version of the model is documented in developed markets (Harvey, 1991 and Harvey and Zhou, 1993), international pricing models have been unable to explain the cross section of emerging market returns. For example, using a sample of 20 emerging markets, Harvey (1995) rejects the world CAPM as well as a two factor model consisting of the world market and foreign exchange factors. Harvey (1995) also uncovers large, often 'massive', positive pricing errors for all emerging countries. Moreover, Harvey shows that emerging market country returns exhibit little correlation with developed markets, and display little exposure to global risk factors. Further, Erb, Harvey, and Viskanta (1995, 1996) show that country-level credit ratings exhibit substantive cross-sectional predictive power, and Harvey (2000) shows that country-level variance and co-skewness are important drivers of country returns. The literature attributes this failure of global asset-pricing models to deviations from full market integration. Subsequently, the literature tests for the degree of market segmentation by allowing for both local and global factors in asset pricing specifications. A number of studies find evidence of partially segmented markets and suggests a role for both local and global factors.[2]

This paper shows that accounting for a world credit risk factor resolves the above-noted deviations from international asset pricing. Our proposed world credit risk factor is computed

[1]See Solnik (1977), Stehle (1977), Ferson and Harvey (1993), Dumas and Solnik (1995).

[2]See Karolyi and Stulz (2003), Bekaert, Harvey, and Lundblad (2007), Bekaert, Hodrick, and Zhang (2009), Bekaert, Harvey, Lundblad, and Siegel (2011), Hou, Karolyi, and Kho (2011), and Lee (2011).

as the difference between equity returns of high and low credit risk country portfolios sorted on credit ratings. Our sample consists of 24 developed and 51 emerging countries over the January 1989 through December 2009 period.

The choice of a world credit risk factor is motivated as a response to bad consumption data as well as the restrictive assumption that the world market portfolio is perfectly correlated with changes in world consumption. As Cochrane (2001) points out, "the consumption-based model is, in principle, a complete answer to all asset pricing questions, but works poorly in practice". Consumption data is low frequency and too smooth, making it impossible to infer its true volatility. As a result, proxies for consumption risk are plausible alternatives in empirical asset pricing tests (see Savov, 2011). We argue that high credit risk assets are more likely to do poorly in bad states of nature when consumption is low. The default of such distressed assets would directly decrease consumption due to interrupted income streams. Hence high credit risk assets pose higher consumption risk, which would lead investors to demand high premiums on such assets.

Our empirical evidence indeed reveals a strong cross-country relation between credit ratings and the volatility of consumption growth. Moreover, countries that experience a sovereign credit rating downgrade exhibit a 27-32% drop in consumption growth, suggesting that credit downgrades are quite costly from a consumption standpoint. Furthermore, Andrade and Chhaochharia (2011) find that a sovereign default leads to a 37% destruction of a country's equity capital. Finally, we find that a country's risk exposure to the world credit risk factor is significantly cross-sectionally related to the volatility of consumption growth. Overall, accounting for the world credit risk factor provides a considerably improved proxy for investors' marginal utility.

We show that equities of countries in the high credit risk tercile outperform equities of countries in the low credit risk tercile by 57 basis points (bps) per month over the 1989-2009 period. This return differential is more pronounced (125 bps per month) in the second half of our sample period. Cross-sectional regressions also show that sovereign credit ratings exhibit a significant correlation with future country equity returns. High returns in higher credit risk countries are not explained by global risk factors proposed in the literature, such as the world market, value, momentum, foreign exchange, and liquidity factors. In contrast, asset-pricing tests indicate that the world credit risk factor is significantly priced in the cross-section of country equity returns, is robust to the inclusion of alternative factors advocated in the international asset-pricing literature, fully captures the high returns of high credit risk countries, and crowds out the relevance of country level variables in pricing equities. In particular, the risk premium for exposure to world credit risk averages 83 basis points per month. In the presence of this credit risk factor, the previously documented large positive pricing errors in emerging markets disappear. Adjusting for systematic exposure to world credit risk, country-level attributes, such as credit ratings, variance, liquidity, and co-skewness, do not exhibit any residual explanatory power, suggesting that international equity markets need not be segmented. Finally, the efficiency of the world credit risk factor cannot be rejected based on the Gibbons, Ross, and Shanken (1989) finite sample tests, while the efficiency of alternative global factors is typically rejected.

The majority of high credit risk countries are also emerging markets. Nevertheless, the evidence shows that the world credit risk factor remains strong in the presence of an emerging market factor, while the emerging market factor loses explanatory power in the presence of the world credit risk factor. Hence, emerging markets earn higher returns not because they are classified as emerging or have worse credit ratings, but because they display higher exposure to the world credit risk factor.

In sum, the ability of international models to explain the cross section of country equity returns has been called into question. The higher returns delivered by emerging market countries have been considered anomalous. Moreover, country-level variables, such as variance, liquidity, co-skewness, and credit rating, have displayed strong explanatory power for the cross section of country returns. This paper offers a risk-based explanation for these anomalous patterns. Specifically, the higher returns earned by emerging markets represent compensation for higher exposure to the world credit risk factor – these higher returns reflect a premium for bearing systematic risk. Country-specific attributes do not explain any further cross-sectional differences in equity returns adjusted for exposure to the world credit risk factor. The pricing ability of the credit risk factor is confirmed in both time-series and cross-sectional tests.

The next section surveys the international asset-pricing literature. Section 2 discusses the data, section 3 presents the results and section 4 concludes.

1 International Asset-Pricing: Background

A lively debate is still centered on whether asset-pricing models are able to capture the cross-sectional variation of global equity returns. In developed markets, Ferson and Harvey (1993, 1994) and Dumas and Solnik (1995) show that PPP may indeed be violated as multiple beta models fare much better than the world CAPM and foreign exchange risk is significantly priced. Moreover, using latent factors, Harvey, Solnik, and Zhou (2002) find that the first extracted factor resembles the world market portfolio, while the second is related to foreign exchange risk.

While the beta pricing approach displays some explanatory power in developed markets, even multiple global factor models fail to explain emerging market country returns. In particular, Harvey (1995) finds no relation between betas and expected returns in 20 emerging market countries. Every emerging country in his sample exhibits large positive abnormal returns, little exposure to global risk factors, and is mostly influenced by local information, including the variance of its country's equity returns. Bekaert and Harvey (1995) also find that emerging market returns are affected by the country's total variance, while Harvey (2000) shows that total variance, idiosyncratic variance, and coskewness explain cross-sectional differences in country equity returns. Furthermore, Bekaert, Harvey, and Lundblad (2007) identify local market liquidity as an important driver of emerging market returns and Lee (2011) finds that the relative importance of local and global liquidity factors varies with the degree of financial market integration.

On the other hand, Rouwenhorst (1999) argues that emerging markets return premiums do not compensate for illiquidity as there is no relation between returns and turnover in these markets. He also finds that, while size, value, and momentum effects exist within individual emerging markets, these local factors have little correlation across countries and global factors cannot explain them. Furthermore, Erb, Harvey, and Viskanta (1995, 1996) show that country credit ratings have substantive predictive power for emerging country equity returns. In contrast, market betas do not explain the cross-section of country returns.

Overall, global pricing models vastly underestimate emerging market returns. To account for these positive pricing errors, Damodaran (1999) suggests adding an equity risk premium for emerging markets that equals the sovereign yield spread times the ratio of volatilities of equities and sovereign bonds. This pricing adjustment is, however, quite ad-hoc and lacks a solid theoretical asset-pricing interpretation.

The documented importance of local factors in pricing international equities suggests some degree of market segmentation. A number of studies find that markets are partially integrated, making both local and global factors important.[3] For example, Hou, Karolyi, and Kho (2011) show that a multifactor model, including the market, momentum, and cash flow-to-price factors, captures time-series variation in global stock returns better than the world CAPM or size and book-to-market factors. However, versions of their multifactor model that include both local and international factors perform better than versions based solely on global factors, especially in emerging markets . Moreover, Bekaert, Harvey, Lundblad, and Siegel (2011) find that, while developed markets have been integrated for some time and financial markets liberalization has increased, segmentation in emerging markets remains high. Fama and French (2011) also find that, while the size, value, and momentum factors are significant within most developed markets, market integration across regions is not supported even in developed markets.

In sum, the literature suggests that existing global risk factors have been unable to capture the cross-sectional variation in international equity returns, especially for emerging markets. The importance of local variables and local factors has been attributed to imperfect world market integration.

This paper shows that credit risk is a major risk factor across world financial markets. Indeed, failures in measurement, management, and pricing of credit risk have been considered primary drivers of the global financial crisis of 2007-2009, leading to the failure of some of the world's largest companies and banks, unprecedented drops in world equity and commodity markets, and declines in consumer wealth estimated in the trillions of US dollars[4]. In 2008,

[3]See Fama and French (1998), Karolyi and Stulz (2003), Bekaert, Harvey, and Lundblad (2007), Bekaert, Hodrick, and Zhang (2009), Bekaert, Harvey, Lundblad, and Siegel (2011), Hou, Karolyi, and Kho (2011), Lee (2011).

[4]For example, between June 2007 and November 2008, Americans lost more than a quarter of their net worth. Further, GDP, disposable personal income, and consumption also decreased drastically.

leaders of the Group of 20 stressed the leading role credit risk played in the crisis: *"market participants sought higher yields without an adequate appreciation of the risks"*.[5] The global financial crisis triggered the 2008-2009 Russian financial crisis[6], the 2008-2009 Icelandic financial crisis[7], and precipitated sovereign rating downgrades in weaker European economies and even the unprecedented loss of the US AAA rating.

2 Data

We compute monthly country equity returns using country-level total return indexes available in DataStream. Morgan Stanley Capital International (MSCI) total return equity indexes are available for 67 out of the 75 countries included in our sample. For the remaining 8 countries, we use country total return equity indexes from DataStream based on alternative data providers. Our sample covers the period from January 1989 to December 2009. January 1989 is when emerging market equity returns become available. The 'emerging market' classification refers to countries that are experiencing rapid socio-economic growth. Lists of emerging market countries are published by Dow Jones, FTSE Group, S&P, MSCI, and the Economist, among others.[8] Our sample totals 24 developed and 51 emerging countries. Figure 1 displays country composition through time. The number of developed countries is quite stable with a minimum of 21 and a maximum of 24 developed countries. In contrast, there is one emerging market country in January 1989, increasing to 29 emerging countries in the middle of the sample, and ending with 50 in December 2009. Indeed, emerging countries mostly populate the second half of the sample period.

Sovereign credit ratings are obtained from Standard and Poor's (S&P) RatingsXpress database available in Wharton Research Data Services (WRDS) within 'Other Compustat'. RatingsXpress provides issuer (entity) ratings for private and public corporations and for

[5]From the 11/2008 "Declaration of the Summit on Financial Markets and the World Economy".

[6]The Russian financial crisis caused stock markets to plummet, several suspensions of trading, the imminent bankruptcy of 50 to 70 banks, and sovereign rating downgrades.

[7]The Icelandic crisis lead to the collapse the country's three major banks, a drop in the Icelandic stock market by more than 90%, a severe economic recession, and drastic sovereign rating downgrades.

[8]Information on the classification of Emerging markets is available online, through http://en.wikipedia.org/wiki/Emerging_markets. This information is compiled from the websites of the companies publishing the Emerging country lists.

sovereign governments. To obtain the sovereign ratings, the search needs to be restricted to 'issuers' identified as 'sovereign'.[9] We use a country's long-term issuer credit rating as our measure of credit risk. RatingsXpress provides ratings on 117 countries dating back to 1941. However, many of these countries do not have active equity markets.

Our final sample contains monthly country-level equity return and rating data on 75 countries from January 1989 to December 2009. Panel A of Table 1 displays the 24 developed and 51 emerging countries in our sample and presents their average numerical ratings and average monthly equity returns. The numeric rating is increasing in credit risk: $1 = AAA$, $2 = AA+$, $3 = AA$, $4 = AA-$, $5 = A+$, $6 = A$, $7 = A-$, $8 = BBB+$, $9 = BBB$, $10 = BBB-$, $11 = BB+$, $12 = BB$, $13 = BB-$, $14 = B+$, $15 = B$, $16 = B-$, $17 = CCC+$, $18 = CCC$, $19 = CCC-$, $20 = CC$, $21 = C$, $22 = D$. The average rating across developed countries is 1.97, corresponding to $AA+$; for emerging countries it is 9.10, corresponding to BBB. The average monthly return of developed countries over the sample period is 0.84%, while the corresponding return for emerging countries is 1.05%.

Sovereign rating observations are widely distributed across the rating spectrum. Panel B of Table 1 shows the frequency distribution of monthly rating observations and average country ratings. Our sample contains a total of 12,799 country-month rating observations – 5,821 from developed and 6,987 from emerging markets. The sample contains rating observations from all but the C and D rating categories. Developed markets have all the AAA rating observations in the sample, and for a large fraction of the sample: 3,489 out of the 5,821 developed country-month observations are AAA. Moreover, all developed country-month observations are investment grade, i.e. $BBB-$ or better.[10] In contrast, emerging market ratings range from $AA+$ to CC.

Out of the 12,799 country-month rating observations in our sample, there are 314 rating downgrades (43 in developed and 271 in emerging markets) and 342 upgrades (50 in devel-

[9]Sovereign ratings are identified by their sector, subsector, and SIC attributes. Sovereign issuers are classified as part of the sovereign (SOV) subsector of the global issues (GLOBISS) sector. Such sovereign issuers can fall under a number of SIC classifications. In addition to governments, sovereign issuers can also be international banks or organizations such as the African Development Bank, EBRD, or the International Finance Corporation. However, sovereign debt issued by governments falls under SIC 9191. Therefore, we collect ratings only for SOV subsector entities with a SIC of 9191.

[10]Recently this is no longer the case as S&P has downgraded Greece to non-investment grade. Portugal has also been downgraded to the lowest investment grade rating.

oped and 292 in emerging markets). The average size of a downgrade is 1.94 notches (1.35 notches in developed and 2.04 notches in emerging markets). The average upgrade is 1.89 notches (1.36 notches in developed and 1.98 notches in emerging markets). About 220 downgrades are attributable to investment grade countries and 94 to non-investment grade ones. In addition, 187 upgrades occur in investment grade countries and 155 in non-investment grade ones. Panel C of Table 1 presents the full transition matrix of sovereign ratings for our sample.

Figure 2 shows that the average rating of emerging market countries deteriorates over the sample periods from a minimum of 5 ($A+$) to a maximum of 10.52 (between $BBB-$ and $BB+$, a non-investment grade rating). In contrast, developed countries have a stable average rating of about $AA+$ throughout. Given the increasing number of emerging market countries and their deteriorating credit rating, the overall average rating deteriorates over the sample period from 2.55 (between $AA+$ and AA) to 6.79 ($A-$). Since upgrades and downgrades in emerging markets are about equal in number (271 downgrades and 292 upgrades), the deteriorating average credit rating in emerging markets is driven mostly by the addition of new lower-rated countries in the first half of the sample.

Monthly returns for the world market factor are based on the MSCI World total return index from DataStream. Monthly returns for the emerging markets factor are obtained from the MSCI Emerging Market total return index from DataStream. Excess returns are computed relative to the US risk free rate. The excess returns on the emerging market factor are orthogonalized relative to the excess returns of the world market factor. All country equity returns as well as world and emerging market factor returns are in US dollars.

The analysis also uses the foreign exchange risk factor following Adler and Dumas (1983) and Ferson and Harvey (1993). The exchange risk factor is the return on a trade-weighted portfolio of US dollar exchange rates. We use two alternative foreign exchange indexes: one based on a broad basket of currencies and one based on major currencies. Both are available from the Federal Reserve Bank of St. Louis. The broad index is a weighted average of the foreign exchange values of the U.S. dollar against the currencies of a large group of major U.S. trading partners. The index weights, which change over time, are derived from U.S. export shares and from U.S. and foreign import shares. The major currencies index is a weighted average of the foreign exchange values of the U.S. dollar against a subset of currencies in the broad index that circulate widely outside the country of issue. The weights are derived from those in the broad index. We take log differences of the monthly index series to obtain foreign exchange factor returns.

To understand credit risk implications for the cross section of average country returns, we also analyze the relation between sovereign credit risk and country-level consumption growth. Two alternative measures of consumption growth are examined. The first is *household final consumption expenditure* (in constant 2000 USD). This measure represents the market value of household purchases of all goods and services, including durable goods. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments for permits and licenses. Also included are the expenditures of nonprofit institutions serving households. The second consumption measure is *final consumption expenditure* (also in constant 2000 USD). Final consumption expenditure is the sum of *household final consumption expenditure* and *general government final consumption expenditure*. Data on both consumption measures are available at an annual frequency from The World Bank.[11] Annual consumption growth is derived from the consumption level series and is assumed to be the same for all months of the year when the analysis involves monthly data.

Finally, the world credit risk factor is constructed as follows. Each month, countries are sorted into terciles based on their long-term sovereign credit rating at the end of month $t-1$. In month t, the return for each tercile is calculated as the equally-weighted average return across all countries in the tercile. We define our world credit risk factor as the return differential between high and low credit risk countries. The world credit risk factor represents the returns on a well-diversified portfolio of traded assets. It is desirable to use such traded factors in asset-pricing tests because, as Kan and Robotti (2009) show, using non-traded factors can lead to significant positive bias in t-statistics, thereby falsely validating misspecified models.

[11] http://data.worldbank.org/indicator/all

3 Results

3.1 Sovereign Credit Risk and Consumption Growth

The motivation for our world credit risk factor lies in the link between consumption risk and credit risk. Indeed, we show below that the volatility of country-level consumption growth is tightly linked to country-level sovereign credit rating. In particular, we examine the relation between credit ratings and the volatility of consumption growth, the impact of rating changes on consumption growth, as well as the direct link between consumption growth and exposure to the world credit risk factor.

We hypothesize that high credit risk countries earn higher returns because sovereign credit ratings are linked to consumption growth risk, which in turn is at the asset-pricing core of the required risk premium. To test this hypothesis, we run a single cross-sectional regression of the volatility of consumption growth on a constant and average sovereign credit rating. The estimated coefficients and adjusted R^2 are reported in Panel A of Table 2. The results show a significant link between credit rating and the volatility of consumption growth. To illustrate, the slope coefficient in the regression of the standard deviation of consumption growth on average rating is 0.31 with t-value of 7.19.[12]

Panel B of Table 2, documents the implications of sovereign credit rating downgrades on consumption growth. For each country with available consumption data and at least one rating downgrade over the sample period, we run time-series regressions of country consumption growth on a constant and a dummy taking the value 1 in month t if a downgrade occurs within ± 6 months of this month, 0 otherwise. The dependent variable is either household consumption growth or total consumption growth[13] We investigate two alternative downgrade dummies: a 0/1 dummy as described above and a 0/n dummy, where n is the size of the downgrade in points, i.e. 1 for a rating move between adjacent ratings (say from A to $A-$), 2 for a two-notch downgrade (say from A to $BBB+$), etc. The table presents

[12] Results are based on total consumption growth. Using household consumption growth (unreported) produces similar results.

[13] Consumption data is available on an annual basis. We obtain monthly series from the annual growth series assuming consumption growth is spread uniformly throughout the year. The lags are taken relative to the prior year consumption growth.

the cross-sectional average of the time-series regression coefficients (in percentages per year). The results in this panel are based on 57 out of the total of 75 countries, which both had consumption data available and experienced downgrades during the sample period.

The standard errors are computed to allow for cross-sectional correlation across the residuals. The regression equation can be written as: $y_m = X_m\beta_m + \eta_m$, where $m = 1, \cdots, M$, and M is the total number of regressions. The $k \times 1$ vector of coefficient estimates from the m^{th} regression is $\widehat{\beta}_m$ and the average coefficient estimates that we report is $\widehat{\overline{\beta}} = \frac{1}{M}\sum_m \widehat{\beta}_m$. The variance of this average estimate is given by:

$$\mathrm{Var}(\widehat{\overline{\beta}}) = \frac{1}{M^2}\left[\sum_{m=1}^{M}\mathrm{Var}(\widehat{\beta_m}) + \sum_{m=1}^{M}\sum_{n=1,n\neq m}^{M}\mathrm{Cov}(\widehat{\beta_m},\widehat{\beta_n})\right], \tag{1}$$

where $\mathrm{Var}(\widehat{\beta_m}) = \frac{(\widehat{\eta_m'}\widehat{\eta_m})}{(T-k)}(X_m'X_m)^{-1}$, and $\mathrm{Cov}(\widehat{\beta_m},\widehat{\beta_n}) = \frac{(\widehat{\eta_m'}\widehat{\eta_n})}{(T-k)}(X_m'X_m)^{-1}(X_m'X_n)(X_n'X_n)^{-1}$.

The first row of Panel B of Table 2 shows that total consumption growth averages 3.54% per year. The next row shows that with a sovereign rating downgrade total consumption growth decreases by 0.95% . This represents a 26.84% [=-0.95%/3.54%] drop from the average consumption growth. The impact is similar when we control for lagged consumption growth. The results based on household consumption growth (available upon request) show show an even larger impact of downgrades – household consumption growth falls by 32.11% around downgrades.

Panel B of Table 2 also shows that each notch of S&P sovereign credit rating downgrade is associated with a decline of 0.67% (a 19% drop from the average of 3.54%) in total consumption growth with more sizable downgrades having bigger impact. Again, household consumption is more affected than total consumption by each notch – household consumption growth falls by 0.80% (a 22.5% drop from the average) with each notch of rating downgrade.

These results show that sovereign rating downgrades, which are more likely among low-rated countries, pose a major risk for consumption growth, which in turn is the main driver of required returns in asset-pricing. Consumption growth drops by 27-32% on average, suggesting that credit risk is quite costly from a consumption standpoint.

Last, we test the link between consumption growth and the world credit risk factor. We run time-series regressions of country returns on a constant and the world credit risk factor to obtain credit risk betas for each country. We then run a cross-sectional regressions of the standard deviation of consumption growth on the estimated credit risk betas. The estimated coefficients and adjusted R^2 are reported in Panel C of Table 2.

The evidence shows that the volatility of consumption growth is significantly positively related to the world credit risk factor betas. The numbers in the table are based on total consumption growth, but the results remain unchanged if household consumption is used. To illustrate, the slope coefficient in the cross-sectional regression of volatility of consumption growth on credit risk betas is 2.16 with a t-value of 5.31. In canonical equilibrium models, the equity premium depends on the volatility of consumption growth. Higher consumption growth volatility leads to higher required returns. Here the volatility of consumption growth is proxied by credit risk factor loading - thus a higher credit risk beta amounts to a higher required premium.

3.2 Sovereign Credit Ratings and Equity Returns

We examine the potential link between sovereign credit rating and average country return over the sample period. The analysis starts with portfolio sorts. In particular, each month, t, countries are sorted into terciles based on their sovereign credit rating. For each tercile, we compute the equally-weighted cross-sectional mean country equity return for month $t+1$. Panel A of Table 3 reports the average of these monthly means and the difference between the return of worst- versus best-rated portfolios, $C3-C1$. The t-statistics for cumulative returns are computed using Newey and West (1987) adjusted heteroscedastic-serial correlation consistent standard errors. The overall evidence from Panel A of Table 3 shows that countries with lower sovereign credit ratings earn higher average returns, consistent with Erb, Harvey, and Viskanta (1995, 1996).

Over the full 1989-2009 period, the best-rated countries ($C1$) realize average equity returns of 84 bps per month. These countries have an average S&P rating of 1.38 (slightly below AAA). Over the same period, the worst-rated countries ($C3$) have an average S&P

rating of 10.92 (a non-investment grade rating of $BB+$) and realize equity returns of 141 bps per month. The return differential between worst- and best-rated countries is 57 bps per month and is significant at the 5% level (t-value of 2.15). The return differential grows to 3.58% (6.77%) for 6 (12) month holding periods. It is economically large and statistically significant at the 1% level.

Over the 1999-2009 period, the worst-rated countries outperform the best-rated countries by 125 bps per month (t-value of 4.10). Over 6 (12) months this return differential becomes 6.64% (13.72%), statistically significant at the 1% level. In the first half of the sample (1989-1998), the returns of the best- and the worst-rated countries are indistinguishable.

Figure 3 further illustrates the strong outperformance of the worst-rated country tercile in the second half of the sample. The top two subplots in Figure 3 illustrate the wealth process of investing in $C1$ and $C3$ countries (first plot) and being long in $C3$ countries and short in $C1$ countries (second plot). The wealth increases almost monotonically over the second half of the sample. Note from the bottom graph, that the average monthly return differential ($C3-C1$) is always positive over any 36-month window in the second half of the period, even during the recent financial crisis and when the dot-com bubble burst in 2001. The lowest part of Panel A of Table 3 shows that the average $C3-C1$ profitability before the recent financial crisis (up to 2007) is 60 bps per month. The recent severe financial crisis reduced this profitability by only 3 bps per month (to 57 bps - top part of Panel A).

The higher relative returns of the worst-rated countries are quite robust in the second half of the sample period. However, note from Figure 2 that there are only a few poorly-rated countries in the first half of the period. The sample starts with an average numeric S&P rating of around 2.5 (between $AA+$ and AA) and has a stable average around 6.5 (between A and $A-$) in the second half. This suggests that the lack of credit rating effect in the first half of the sample is possibly due to the lack of poorly-rated countries in that period.

The higher returns of high-credit risk countries cannot be explained by existing international asset-pricing models. In particular, we run several time-series asset-pricing specifications, where we regress the excess returns of each credit rating sorted portfolio, $C1$ to $C3$, and the return differential, $C3-C1$, on a constant and various factors and report the portfolio alphas (in percentages per month) and betas in Panel B of Table 3. When only the world market factor is considered (Panel B1), the world market betas of $C1$ and $C3$ country portfolios are indistinguishable and the world CAPM alpha of $C3-C1$ returns is 58 bps per month (t-value of 2.21) versus 57 bps in raw returns (Panel A). The $C3-C1$ alpha relative to the world equity market and the foreign exchange risk factors is 65 bps per month (t-value of 2.42, Panel B2) when the foreign exchange factor is based on a broad currency basket.[14] Similarly, the $C3-C1$ alpha relative to the Fama and French (1998) [FF] international MKT and HML factors is 58 bps per month (t-value of 2.16, Panel B3).[15] In addition, in Panel B4, we add an international momentum factor to the FF international MKT and HML factors.[16] The alpha of $C3-C1$ relative to the international MKT, HML, and momentum factors is 63 bps per month (t-value of 2.24). We also attempt to control for the Hou, Karolyi, and Kho (2011) [HKK] market, momentum, and C/P international factors. While the data on their factors is available mostly for the first half of our sample period, where the raw return differential between high and low credit risk firms is insignificant (see Panel A), it should be noted that even for that period, the $C3-C1$ HKK alpha is larger than the raw returns (results are available upon request).[17]

Next, following Lee (2011), we test whether liquidity factors based on global and local liquidity exposure explain the higher returns of high credit risk countries.[18] Note that the liquidity factors of Lee (2011) are mostly available for the second half of our sample period, hence we compare the alpha of $C3-C1$ portfolios to their raw returns in the second half of the period, where the raw return differential between $C3$ and $C1$ stocks is 125 bps per month (Panel A). For the second half of our period, adjusting with the global liquidity factor produces a $C3-C1$ alpha of 133 bps per month (t-value of 3.70, Panel B5), higher than the raw $C3-C1$ return differential of 125 bps. Moreover, adjusting for Lee's (2011) local liquidity factors, along with the global liquidity factor and the world market factor, results

[14] Results based on the nominal major currencies foreign exchange factor as well as the results based on real major or broad currency basket foreign exchange factors are similar.

[15] The dollar-denominated international MKT and HML factors are available at Professor Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. The US risk-free rate is subtracted from the MKT factor to obtain excess returns.

[16] Andreas Schrimpf has graciously provided us with data on the international momentum factor from Schmidt, Arx, Schrimpf, Wagner, and Ziegler (2011).

[17] We are grateful to Andrew Karolyi for providing us with the international HKK factors from the Hou, Karolyi, and Kho (2011) paper.

[18] We thank Kuan-Hui Lee for providing us with his Lee (2011) liquidity factors. The factors are described in Table 11 of Lee (2011).

in the $C3 - C1$ alpha of 119 bps per month (still significant at the 1% level, t-value of 3.09, Panel B6). While this alpha is only slightly lower than the raw returns differential of 125 bps per month and the 133 bps alpha with respect to the global liquidity factor, it still indicates that local liquidity factors are indeed more important than global liquidity factors as predicted by Lee (2011). These results are also consistent with Rouwenhorst (1999), who shows the return premiums in emerging countries do not compensate for illiquidity.

Lee (2011) also shows that the US market is an important driving force of global liquidity risk. Hence, to assess the impact of liquidity risk over the entire sample period, we test whether the high returns of high credit risk countries can be explained by the Pastor and Stambaugh (2003) US liquidity factor, for which data is available over our entire sample period. Over the 1989 to 2009 period, the $C3 - C1$ alpha is 56 bps per month (t-value of 2.09, Panel B7).[19] Overall, the results in Panel B of Table 3 suggest that the higher returns of higher credit risk countries are not captured by existing risk factors.

The significant positive relation between credit rating and equity returns is also confirmed cross-sectionally. Specifically, each month t, we run cross-sectional regressions of time $t+1$ country equity returns on a constant, S&P sovereign credit ratings at time t, and rating interacted with an emerging market dummy, indicating whether the country is developed (0) or emerging market (1). The dependent variable is either raw (r_{t+1}) or risk-adjusted (r^*_{t+1}) one-month ahead returns. Returns are risk-adjusted as in Brennan, Chordia, and Subrahmanyam (1998). The risk-adjusted return, r^*_{t+1}, is the intercept and residual from time-series regressions of excess country returns on various asset-pricing factors. Table 4 presents the results.

The regression coefficient on the rating variable is uniformly 0.07% using both raw and risk-adjusted returns (with any risk factors considered[20]), suggesting that a notch deterioration in credit rating (say from AA to $AA-$) brings about 7 bps per month in additional risk-adjusted returns. To illustrate, the regression results suggest that a BB+ rated country (numeric rating of 11) has on average 70 bps per month higher equity returns than a AAA

[19] We use the Pastor-Stambaugh traded value-weighted liquidity factor provided on WRDS. Alphas based on the Sadka (2006) transitory-fixed factor or permanent-variable liquidity factors (from WRDS) are identical.

[20] We have also tested adjusting for additional risk factors, presented in Panel B of Table 3, and the results are similar, not reported for brevity.

rated country (numeric rating of 1). All slope coefficients are significant at the 5% level. The difference is that with raw returns, the cross-sectional regression intercept is significant, while with risk-adjusted returns, it is insignificant regardless of the factors considered. When rating interacted with the emerging market dummy is included in the regression (Specification 3), rating is still significant but at the 10% level, though it is now slightly higher at 9 or 10 bps per month.[21] In contrast, rating interacted with the emerging market dummy is always insignificant in cross-sectional regressions.

In sum, the analysis, based on both portfolio sorts and cross-sectional regressions, demonstrates a significant positive relation between sovereign credit risk and country equity returns. The higher returns in higher credit risk countries are not explained by existing asset-pricing models, consistent with findings in past work. In particular, the alpha of a strategy that is long in high-credit risk and short in low credit risk countries is similar or higher than the corresponding raw payoff. Later, we investigate whether these positive pricing errors in high credit risk countries are compensation for exposure to a world credit risk factor.

3.3 Impact of Rating Changes on Country Equity Returns

Rating changes, especially downgrades, have a well documented major impact on individual stock and bond prices, while sovereign rating changes can have nontrivial consequences for entire financial markets.[22] Here, we examine the impact of sovereign rating changes on country equity returns. The goal is to examine whether the credit risk effect in average country equity returns could be attributed to periods around credit rating changes.

Countries are divided into terciles based on their sovereign credit rating. Within each tercile, we focus on countries experiencing either downgrades or upgrades. Figure 4 presents the six-month moving average monthly portfolio returns for the best (C_1) and worst (C_3) rated tercile portfolios around periods of downgrades (top plot) and upgrades (bottom plot).

The evidence shows that equity prices drop sharply around sovereign rating downgrades

[21] The results are similar if the emerging market dummy is included in the regressions, instead of the emerging market dummy interacted with the rating.

[22] See Dichev (1998), Brooks, Faff, Hillier, and Hillier (2004), Hooper, Hume, and Kim (2008), and Kaminsky and Schmukler (2002).

in both best-rated ($C1$) and worst-rated ($C3$) countries. Indeed, a strong impact of rating downgrades on worst-rated stocks has been documented for US stocks while best-rated US stocks display only a mild response (see Avramov, Chordia, Jostova, and Philipov, 2009). However, at the country level, sovereign credit rating downgrades impact both best- and worst-rated countries. One clear asymmetric response between worst-versus-best rated countries is that rating changes are more likely to occur among the worse-rated countries. In particular, there are 39 (141) [134] downgrades in the best- (medium-) [worst-] rated country tercile. Similarly, there are 13 (115) [214] upgrades in the best- (medium-) [worst-] rated country tercile.

In contrast, the bottom plot of Figure 4 shows no clear pattern in country returns around upgrades (the $C1$ returns are more scattered due to the very few upgrades over the sample period). Hence, the overall impact of rating changes on the credit risk effect is still unclear.

We further examine whether the higher returns of high credit risk countries originate from periods around rating changes. In particular, we remove return observations from six months before to six months after a rating downgrade (upgrade) and re-compute the equally-weighted average equity returns by credit rating terciles. Table 5 reports the evidence. The average returns of $C1$ countries after eliminating periods around downgrades or upgrades are almost unchanged at 84 and 83 bps per month, respectively, possibly due to the fewer downgrades and upgrades in these countries. In contrast, after eliminating periods around downgrades, $C3$ countries' returns increase from 141 bps (Panel A of Table 3) to 162 bps per month (Table 5). The return differential $C3 - C1$ increases from 57 bps per month (Panel A of Table 3) to 78 bps per month (t-value=2.57, see Table 5). Hence, the worst-rated countries outperform the best-rated ones even more during periods of stable or improving credit conditions. Removing periods around upgrades slightly reduces the outperformance of worst-rated countries, $C3 - C1$, from 57 bps (Panel A of Table 3) to 55 bps per month (Table 5). Finally, excluding periods around both downgrades and upgrades leads to a slight increase in the $C3 - C1$ return differential to 66 bps per month (t-value of 2.18).

The overall evidence thus suggests that even though upgrades and downgrades do display some effect on equity country returns, they cannot explain the higher payoffs recorded in high credit risk countries. While the return differential, $C3 - C1$, is lower around downgrades and higher around upgrades, as shown earlier, this return differential potentially compensates for exposure to world credit risk throughout the entire sample period, and not solely around periods of rating changes.

3.4 The World Credit Risk Factor

Our goals in assessing the role of the world credit risk factor in international asset pricing are threefold. First, we test whether the world credit risk factor is priced in the cross-section of country equity returns. Second, we examine whether exposure to the world credit risk factor captures the higher returns of high credit risk countries in general, and of emerging equity markets in particular. Third, we analyze whether any pricing errors in emerging and high credit risk countries remain after adjusting for exposure to the world credit risk factor.

We first examine whether the world credit risk factor is priced. Specifically, we first run time-series regressions of monthly country equity excess returns on a constant and various global factors. Then, we run monthly cross-sectional regressions of country excess returns on a constant and the estimated betas from the first pass. The second pass specification delivers estimates of the factor risk premiums. Table 6 presents the estimated risk premiums (i.e. regression coefficients from the second pass cross-sectional regressions) for the overall sample (top panel), the first (middle panel), and second half (bottom panel) of the period. Following Shanken (1992), the reported t-statistics are corrected for sampling error due to the fact that the regressors in the second pass are themselves noisy estimates – not actual data realizations.

Panel A of Table 6 examines various combinations of the following factors: 'MKT', 'FOREX', 'CREDIT', and 'EMERG'. 'MKT' is the world equity market factor and 'FOREX' is the foreign exchange risk factor (both used previously in Panel B1-B2 of Table 3). As noted earlier, there are two alternative foreign exchange indexes: one based on a broad basket of currencies and another based on major currencies. Table 6 is based on the latter – results based on the broad index are almost identical. 'CREDIT' is our world credit risk factor, as described above. 'EMERG' is the Emerging Markets Factor (see Data section), which is orthogonalized with respect to the MKT and CREDIT factors. Specifically, it is calculated as the intercept and residual from a time-series regression of the excess return of the MKT and CREDIT factors. The orthogonalization is made to 1) limit the correlation across factors in the asset-pricing tests, and 2) to isolate the returns due purely to emerging countries from those driven by world markets in general and by high credit risk countries in particular. Notice from panel B of Table 1 that emerging countries have ratings ranging from $AA+$ to CC. It is thus important to separate the credit risk-emerging market relation.

The international asset-pricing models of Solnik (1974a), Sercu (1980), Stulz (1981), and Adler and Dumas (1983) suggest that both a world and a foreign exchange risk factor reasonably capture the cross-section of country returns in the presence of deviations from PPP. While the literature has found some support for these models in developed markets, neither factor seems to explain the higher returns in emerging markets. In contrast, we show that the credit risk factor does capture the emerging market effect and improves the overall explanatory power of international asset-pricing models.

Panel A of Table 6 exhibits factor risk premiums and their statistical significance in the sample of developed and emerging market countries. The evidence shows that the world market risk premium (MKT) is insignificant in all cross-sectional specifications in all subperiods. The foreign exchange risk premium (FOREX) is only significant at the 10% level in the overall 1989-2009 sample period and only when the world credit risk factor (CREDIT) is included among the factors (specifications 5 and 6 in the top panel).

The world credit risk factor (CREDIT) is significantly priced in the cross-section of country equity returns in the overall sample period as well as during the second half of the sample period, regardless of the remaining factors included. Over the 1989-2009 period, the risk premium for a unit exposure to the CREDIT factor is about 83 bps per month (t-value of 2.36) when the MKT and FOREX factors are considered. The risk premium in the second half of the period (bottom panel) is 82 bps per month (t-value of 2.39).[23] The risk premium for the CREDIT factor is also positive in the first half of the sample, but it is statistically significant only at the 10% level (risk premium is 108 bps (t-value of 1.72) when the MKT and FOREX factors are included). As previously noted, the lack of high credit risk countries

[23] We've also run the analysis with the CREDIT factor orthogonalized relative to the world market factor (MKT). The risk premiums for CREDIT are similar, usually about two bps higher than the ones in Panel A and are always more significant than in Panel A.

in the first half of the sample may account for the lower significance of the world credit risk factor over the earlier period. Note that the inclusion of the credit risk factor significantly raises the adjusted R^2 in the cross-sectional regressions. Over the 1989-2009 period, the average adjusted R^2 rises from 8.32% (when MKT and FOREX are included) to 14.51% (when CREDIT is added). Similarly, over the 1999-2009 (1989-1998) period, the inclusion of the CREDIT factor raises the average adjusted R^2 from 10.97% (9.74%) to 15.93% (17.78%).

In contrast, the emerging market factor (EMERG) is insignificant in explaining cross-sectional differences in equity returns when the world credit risk factor (CREDIT) is included. In other words, emerging market countries earn higher returns because they have higher credit risk exposure, not because of their emerging market classification.

We have also examined (results available upon request) the significance of the CREDIT factor relative to the Fama and French (1998) international MKT and HML factors, since Fama and French (1998) find that these factors are priced in the cross-section of developed market returns. In our 1989-2009 sample of 24 developed and 51 emerging countries, the international MKT and HML factors are not priced. In fact, when the CREDIT factor is included, the international HML risk premium is significantly negative at the 10% level. The world credit risk factor (CREDIT), however, is significantly priced at the 5% level in both the overall and second half of the sample regardless of the other factors included. The CREDIT risk premium is 84 bps per month (t-value of 2.40) in the overall period and 87 bps per month (t-value of 2.52) in the second half of the period when the international MKT and HML factors are included. In the first half of the period, the risk premium for exposure to the CREDIT factor is 85 bps (t-value of 1.51, insignificant at the 10% level). Over the 1989-2009 period, the average adjusted R^2 almost doubles from 6.73% (when MKT and HML are considered) to 12.57% (when CREDIT is added). The emerging market factor (EMERG) is again insignificant when the CREDIT factor is included in all asset-pricing tests. The results confirm that the higher returns of emerging market countries derive from their exposure to the world credit risk factor rather than from their emerging market status. The world credit risk factor subsumes the explanatory power of the emerging market factor.

We have also tested the significance of the world credit risk premium relative to Lee's (2011) global and local liquidity factors. Panel B of Table 6 presents the results for the global liquidity factor (results based on local liquidity factors are similar). The tests cover the second half of the period (1999-2007) as data are unavailable for most of the first half of the period. The world credit risk premium is 94 bps per month (t-value of 2.42) when the MKT and global liquidity factors are included. Again the inclusion of the CREDIT factor raises the average adjusted R^2 from 12.33% to 18.41%.

Next, we test the significance of the CREDIT factor over the entire period using the Pastor-Stambaugh traded liquidity factor. Over the 1989-2009 period, the world credit risk premium amounts to 77 bps per month (t-value of 2.20, Panel C) when the world market and US liquidity factors are included. The average adjusted R^2 again rises from 7.87% to 13.17% with the inclusion of the CREDIT factor.

The CREDIT factor remains strongly significant at 86 bps per month (t-value of 2.44) over the 1989-2009 period when the world market and international momentum factors are included (see Panel D). The average adjusted R^2 again rises from 9.10% to 14.51% due to the inclusion of the CREDIT factor. However, relative to other international factors studied, the international momentum factor carries a significant positive premium when the world credit risk factors is included in the asset-pricing tests (but not otherwise).

The overall evidence from Table 6 shows that the world credit risk factor stands out. For one, it is significantly priced in the cross-section of country equity returns. Exposure to this factor carries a monthly risk premium ranging between 77 and 94 basis points. Moreover, it is the most significant factor in explaining the cross section of country equity returns compared to previously studied world market, foreign exchange, liquidity, momentum, and emerging market factors.

3.5 Emerging Markets

We now examine whether the newly proposed world credit risk factor is able to capture the positive pricing errors in emerging markets reported in the literature. Table 7 presents the coefficient estimates from the time-series regressions and the average pricing errors from the cross-sectional regressions for the developed and emerging countries. We first run time-series regressions of country excess equity returns on a constant and asset pricing factors, and report the average intercept, factor loadings, and adjusted R^2. We then run cross-sectional regressions (across all countries) of excess returns on a constant and the estimated betas from the first pass specification and report the average pricing errors in developed and emerging markets, i.e. the time-series average of the cross-sectional mean error term in developed and emerging markets. The average adjusted R^2 of these cross-sectional regressions were reported in the last column of Table 6.

The MKT and FOREX factors explain on average about 50% of the time-series variation in developed country equity returns and about 22% of that in emerging markets. These results are consistent with findings in the literature that the global MKT and FOREX factors work better in developed markets. In both developed and emerging markets, the average country MKT (FOREX) beta is significantly positive (negative), but the average country time-series intercept is significantly positive. The regression intercepts reflect pricing errors and their significance attests to the pricing failure of the MKT and FOREX factors.

The average CREDIT beta is a highly significant 0.79 for emerging markets, and for developed markets it is a significant 0.09. The t-statistics are computed as per equation (1). More importantly, the world credit risk factor, CREDIT, is able to capture the positive pricing errors in emerging markets. The second-pass cross-sectional results in Table 7 confirm previous evidence that when the MKT and FOREX factors are considered, the average pricing errors in emerging markets are significantly positive – they are on average 33 bps per month. However, when the CREDIT factor is included, the average pricing errors become statistically insignificant two bps per month. We have also checked that the squared errors are also lower with the CREDIT factor. The higher returns in emerging market countries are explained by their higher exposure to the world credit risk factor. This evidence is novel, as the international asset-pricing literature has documented consistent positive pricing errors in emerging markets unexplained by existing global factors. Of course, because average pricing errors in each cross-sectional regression average to zero, positive pricing errors in emerging markets reflect negative pricing errors in developed markets. In the same vein, pricing errors in developed countries become indistinguishable from zero in the presence of the CREDIT risk factor.

Using risk-adjusted returns, we repeat the analysis previously performed with raw returns and reported in Panel A of Table 3. Risk-adjusted returns are the sum of intercept and residuals in the regression of country equity excess returns on the world market and world credit risk factors (MKT and CREDIT). Panel A of Table 8 summarizes the evidence. Specifically, the worst credit rating tercile ($C3$) delivers risk-adjusted returns that are only ten bps higher (statistically insignificant) than those in the best rated tercile ($C1$). Recall from Panel A of Table 3 that over that same period (1989-2009), $C3$ countries generate 57 bps higher raw returns relative to $C1$ countries. Moreover, recall from Panel B of Table 3 that adjusting for existing international risk factors produces even higher and more significant return differential.

We further examine the impact of credit ratings on average returns through cross-sectional regressions as in Table 4, but after risk-adjusting returns with the world credit risk factor along with the world market and foreign exchange factors. Note that credit rating was significant in explaining cross-sectional differences in country equity returns among all specifications in Table 4. However, when returns are risk-adjusted with the CREDIT factor, all regression coefficients of the credit rating variable in Panel B of Table 8 are insignificant. In other words, controlling for systematic exposure to the world credit risk factor crowds out the power of credit ratings to predict cross-sectional differences in country equity returns. Exposure to the world credit risk factor fully explains the higher returns of high credit risk countries.

The majority of high credit risk countries are also emerging markets. Hence in Table 9 we test whether the premiums demanded by investors cover exposure to credit risk or whether there is additional compensation for merely being an emerging market country. Specifically, as in Table 3, we compute the equally-weighted average equity return of the best, medium, and worst-rated countries, sorted on their prior month sovereign credit rating. We then run time-series regressions of each portfolio, $C1$, $C2$, and $C3$, excess return relative to the risk-free rate and the return differential, $C3 - C1$, on a constant, the world market factor (MKT), and the emerging market factor (EMERG), orthogonalized relative to the MKT and CREDIT factors. We report portfolio alphas and betas. The evidence in Table 9 suggests the emerging market factor does not explain the higher returns of high credit risk countries. In particular, $C3$ countries earn 58 bps higher risk-adjusted returns than $C1$ countries and this difference is significant at the 5% level (t-value=2.21). These $C3-C1$ alphas are slightly higher than the raw $C3-C1$ returns of 57 bps per month in Panel A of Table 3. Moreover, the EMERG beta of $C3$ countries is identical to that of $C1$ countries.

The world credit risk factor captures the explanatory power of other country characteristics found important in the literature. In particular, as in Harvey (2000), we run univariate cross-sectional regressions of average country equity returns on a local risk measure (along with a constant) and report the regression coefficient with respect to the country-level characteristic. Table 10 shows that co-skewness and average credit rating are indeed predictors of average equity returns. In addition, when returns are risk-adjusted for exposure to the market factor (second column) as in Brennan, Chordia, and Subrahmanyam (1998), country-level return variance also significantly explains cross-sectional differences in average returns. However, when returns are risk-adjusted with either the world credit risk factor (third column) or the world credit risk factor along with the world market factor (last column), none of the local country characteristics exhibit any explanatory power for the cross-section of risk-adjusted returns.

3.6 Time-series tests

We now turn to the time-series tests. We show that the efficiency of the world credit risk factor cannot be rejected using Gibbons, Ross, and Shanken (1989) finite sample tests. In contrast, the efficiency of traditional combinations of potentially relevant global factors is typically rejected. Table 11 presents the Gibbons, Ross, and Shanken (1989) [GRS] finite sample test of the efficiency of the world credit risk factor. The GRS sample test statistic is given by:

$$J = \frac{T-N-K}{N}\left[1+\hat{E}(f)'\hat{\Omega}^{-1}\hat{E}(f)\right]\hat{\alpha}'\hat{\Sigma}^{-1}\hat{\alpha} \sim F_{N,T-N-K} \tag{2}$$

where $\hat{\alpha} = [\hat{\alpha}_1, \hat{\alpha}_2, ..., \hat{\alpha}_N]'$ are the estimated intercepts from individual time-series regressions (the statistic tests whether these alphas are jointly equal to zero in population) and $\hat{\epsilon}_t = [\hat{\epsilon}_t^1, \hat{\epsilon}_t^2, ..., \hat{\epsilon}_t^N]'$ for $t = [1, 2, ..., T]$ are the estimated residuals, $\hat{\Sigma} = \frac{1}{T}\sum_{t=1}^{T}\epsilon_t\epsilon_t'$ is the residual covariance matrix, $\hat{\Omega}$ is the estimated variance covariance matrix of the factors, K is the number of factors, N is the number of test assets, and T is the number of time-series observations. The GRS test statistic requires a balanced panel of test asset returns with an equal number of non-missing observations. Due to the limited number of countries in the first half of the period, the tests are based on the second half of the sample: January 1999 – December 2009. Our test portfolios are the 52 country returns with non-missing observations over the sample period.

The efficiency of the world MKT factor in a one-factor model is strongly rejected with a p-value < 0.001. Further, the efficiency of the MKT and the FOREX factors as well as the MKT, FOREX and EMERG factors is also rejected. In contrast, the efficiency of the world credit risk factor, CREDIT, cannot be rejected in a one-factor model. In the presence of CREDIT as the sole risk factor, the p-value of the GRS statistic is 0.55.

To summarize, the world credit risk factor is priced in the cross-section of country equity returns. Exposure to the world credit risk factor captures the higher returns of high credit risk countries in general, and of emerging equity markets in particular. After adjusting for exposure to the world credit risk factor, no pricing errors remain in emerging and high credit risk country returns, and no country-level characteristics play a role in pricing global equities. Finally, GRS portfolio efficiency tests show that the world credit risk factor lies on the global efficient frontier.

4 Conclusion

This paper offers a risk-based explanation for previously documented patterns in the cross-section of country equity returns that have not been explained by international asset-pricing models. Among these prominent cross-sectional patterns are very large positive pricing errors among emerging market country returns, as well as the documented important role of a number of country-level characteristics in pricing international equities.

Using portfolio sorts and cross-sectional regressions, we present evidence of a significant positive relation between sovereign credit risk and country equity returns. Higher credit risk countries earn higher returns that are not explained by existing asset-pricing models.

We find that these higher premiums compensate for exposure to a world credit risk factor.

The choice of the world credit risk factor as an alternative to a consumption based pricing formulation is motivated by a strong link between credit risk and consumption growth risk. Credit rating downgrades significantly impact consumption growth. Also, loadings on the credit risk factor are highly correlated with the volatility of consumption growth.

Our analysis shows that the world credit risk factor is significantly priced in the cross-section of country equity returns. The factor risk premium averages 83 bps per month over the 1989-2009 period and is robust to alternative risk factors proposed in the international asset-pricing literature. Exposure to the credit risk factor explains the higher returns of high credit risk countries. In the presence of credit risk factor, country-level credit ratings, variance, and co-skewness no longer have predictive power for the cross-section of country equity returns. Furthermore, the credit risk factor fully captures the previously documented positive pricing errors in emerging markets relative to existing international asset-pricing models. Moreover, the credit risk factor uniformly subsumes the explanatory power of the emerging markets factor. Emerging markets earn higher returns not because they are classified as emerging or have worse credit ratings. Rather, they exhibit higher exposure to the world credit risk factor.

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Table 1
Descriptive Statistics

Panel A presents the list of countries in our sample, their average long-term Standard&Poor's credit rating, and average equity return. Panel B presents the frequency distribution of monthly rating observations and average country ratings across each rating category. Country observations are based on the average credit rating for the country over the sample period. classified based on FTSE Global Equity Index series country classification. Panel C presents the full transition matrix of country ratings. The sample period is from January 1989 to December 2009.

Panel A: Average Sovereign and Equity Returns by Country

Country	Average Rating	Equity Return	Country	Average Rating	Equity Return
Developed Countries			**Emerging Countries (cont.)**		
Australia	2.02	1.02	Egypt	9.75	2.00
Austria	1.00	0.88	Estonia	6.32	1.46
Belgium	1.74	0.75	Hungary	8.24	1.89
Canada	1.36	0.98	Iceland	7.48	-7.27
Denmark	1.43	1.07	India	10.44	1.31
Finland	1.94	1.22	Indonesia	12.75	1.43
France	1.00	0.90	Israel	5.36	0.92
Germany	1.00	0.94	Jordan	10.99	0.63
Greece	7.76	1.39	Kazakhstan	9.49	4.01
Hong Kong	4.46	1.25	Kenya	14.20	2.73
Ireland	2.00	0.44	Korea	6.23	0.96
Italy	2.91	0.71	Kuwait	4.44	0.02
Japan	2.05	0.04	Latvia	8.43	0.17
Luxembourg	1.00	-1.08	Lebanon	16.08	2.15
Netherlands	1.00	1.01	Lithuania	7.92	1.14
New Zealand	2.22	0.72	Malaysia	6.57	0.97
Norway	1.00	1.10	Malta	4.89	0.89
Portugal	3.45	0.76	Mexico	9.05	1.96
Singapore	1.40	0.99	Morocco	10.14	1.21
Spain	1.98	1.11	Nigeria	12.96	1.69
Sweden	1.45	1.19	Oman	6.59	-0.11
Switzerland	1.00	1.07	Pakistan	14.60	1.09
USA	1.00	0.84	Peru	11.30	1.96
United Kingdom	1.00	0.78	Philippines	10.33	0.85
Average	**1.97**	**0.84**	Poland	8.07	2.20
			Qatar	4.37	0.10
Emerging Countries			Romania	9.96	0.76
			Russia	11.92	2.74
Argentina	14.47	2.23	Saudi Arabia	4.50	-0.52
Bahrain	6.17	-1.58	Slovak Republic	8.36	1.00
Brazil	12.23	2.70	Slovenia	3.74	1.32
Bulgaria	8.42	-0.70	South Africa	8.81	1.35
Chile	6.39	1.70	Taiwan	2.86	0.76
China	7.97	0.56	Thailand	7.76	1.10
Colombia	8.33	1.80	Tunisia	8.73	1.60
Croatia	8.67	1.29	Turkey	13.59	2.80
Cyprus	5.64	2.37	Ukraine	14.05	-2.41
Czech Republic	5.25	1.58	Venezuela	14.33	1.73
Dubai	6.79	1.64	Vietnam	11.03	1.38
Ecuador	16.99	0.17	**Average**	**9.10**	**1.05**

Table 1(continued)

Panel B: Frequency Distribution of Monthly Rating Observations and Average Country Ratings

	By Country-Month Observations			By Average Country Rating		
Rating	Total	Developed	Emerging	Total	Developed	Emerging
AAA	3,489	3,489	0	13	13	0
AA+	1,085	935	150	7	7	0
AA	694	560	134	3	2	1
AA-	768	339	429	4	1	3
A+	664	188	476	4	0	4
A	841	153	688	5	0	5
A-	651	46	605	4	0	4
BBB+	801	0	801	10	1	9
BBB	852	30	822	5	0	5
BBB-	877	81	796	5	0	5
BB+	334	0	334	3	0	3
BB	282	0	282	2	0	2
BB-	556	0	556	2	0	2
B+	243	0	243	5	0	5
B	167	0	167	1	0	1
B-	251	0	251	1	0	1
CCC+	145	0	145	1	0	1
CCC	32	0	32	0	0	0
CCC-	17	0	17	0	0	0
CC	50	0	50	0	0	0
C	0	0	0	0	0	0
D	0	0	0	0	0	0
Total	12,799	5,821	6,978	75	24	51
Average Rating	5.87	2.00	9.10	6.81	1.97	9.10
	A	AA+'	BBB	A-	AA+	BBB

Table 1 (continued)

Panel C: Transition Matrix of Sovereign Ratings

	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC
AAA	99.40	0.37	0.11	0.11																
AA+	1.20	97.79	0.46	0.09	0.37	0.09														
AA	0.72	1.01	96.54	0.72	0.14	0.29	0.43	0.14												
AA-	0.65		0.79	96.34	1.31	0.39	0.39				0.13									
A+		0.61		1.82	93.64	1.52	0.76	1.21	0.15	0.15	0.15									
A		0.12	0.36	0.36	1.79	94.26	0.96	0.60	1.20	0.24	0.12									
A-			0.15	0.93	0.31	2.32	91.33	1.55	0.15	2.48	0.46	0.15		0.15						
BBB+					0.38	0.63	2.51	92.60	1.13	0.38	1.63	0.75								
BBB			0.12		0.71	0.47	0.47	1.30	93.99	1.65	0.47	0.82								
BBB-					0.12	1.04	1.04	0.35	1.50	93.79	0.92	0.81	0.46							
BB+				0.30	0.30	0.30	0.91	5.14	1.21	2.42	84.29	1.81	3.32							
BB							0.36	1.78	3.20	2.49	4.27	79.72	4.63	3.20	0.36					
BB-									0.18	0.73	1.27	2.54	92.92	2.00	0.18	0.18				
B+										0.41	0.41	4.53	3.29	86.01	3.70	1.65				
B													1.81	6.02	87.35	4.22	0.60			
B-															3.21	90.36	4.42	1.20	0.80	
CCC+															0.70	6.34	91.55	0.70		0.70
CCC																6.25	6.25	84.38	3.12	
CCC-																	5.88	5.88	82.35	5.88
CC															2.00	2.00				96.00

Table 2
Consumption Growth and Credit Risk

For Panel A, we run a single cross-sectional regression of the volatility of country-level consumption growth on a constant and average sovereign credit rating and report the estimated coefficients and adjusted R-squared (all in percentages). Consumption data is available (from the World Bank) on 67 of our 75 countries. In Panel B, for each country with available consumption data and at least one rating downgrade over the sample period, we run time-series regressions of country total consumption growth on a constant and a dummy taking the value of 1 from 6 months before to 6 months after a downgrade and 0 otherwise. Panel B reports the cross-sectional mean of these coefficients. The t-statistics are computed as described in the text. We consider two alternative dummies: 1) a 0/1 dummy as described above and 2) a 0/n dummy, where n is the size of the downgrade in points, i.e. 1 for a rating move between adjacent ratings (say from A to $A-$), 2 for a two-notch downgrade (say from A to $BBB+$, 3 for a three-notch downgrade (say from A to BBB), etc. The sequence of numeric ratings is: 1=AAA, 2=AA+, 3=AA, 4=AA-,..., 17=CCC+, 18=CCC, 19=CCC-, 20=CC, 21=C, 22=D. Panel B presents the cross-sectional average of the time-series regression coefficients (in percentages per year) with their associated sample t-statistics in parentheses (*, **, and *** indicating 10%, 5%, and 1% level of significance, respectively). 57 of the 67 countries with consumption data had a downgrade over the sample period of January 1989 to December 2009. For Panel C, we first run time-series regressions of country returns on a constant and the credit risk factor to obtain credit risk betas for each country. We then run a cross-sectional regression of the standard deviation of consumption growth on these estimated credit risk betas and report the estimated coefficients and adjusted R-squared (all in percentages).

Panel A: Cross-Sectional Regression of the Volatility of Consumption Growth on Average Sovereign Credit Rating

Dependent Variable	*Constant* (%)	*Average Rating* (%)	*Adj.* R^2 (%)
St. Deviation of Consumption Growth	1.22 (3.26)***	0.31 (7.19)***	44.20

Panel B: Consumption Growth Around Rating Downgrades

Dependent Variable	*Constant*	*Downgrade Dummy*	*Lagged Consumption Growth*
Consumption Growth (% per year)	3.54 (43.88)***		
0/1 Downgrade Dummy			
Consumption Growth (% per year)	4.39 (65.38)***	-0.95 (-10.88)***	
Consumption Growth (% per year)	3.22 (30.51)***	-0.94 (-10.91)***	0.29 (17.88)***
0/n Downgrade Dummy			
Consumption Growth (% per year)	4.45 (67.28)***	-0.67 (-10.76)***	
Consumption Growth (% per year)	3.16 (30.63)***	-0.62 (-10.07)***	0.30 (18.68)***

Panel C: Cross-Sectional Regression of Standard Deviation of Consumption Growth on World Credit Risk Factor Beta

Dependent Variable	*Constant* (%)	*World Credit Risk Beta* (%)	*Adj.* R^2 (%)
St. Deviation of Consumption Growth	2.38 (8.42)***	2.16 (5.31)***	31.57

Table 3
Country Equity Returns by Sovereign Credit Rating Group

Each month t, countries rated by Standard & Poor's are divided into terciles based on their sovereign credit rating. For each tercile, we compute the equally-weighted average country equity return for month $t+1$. Panel A reports the mean of these monthly averages and the difference between the return of the worst-rated versus the best-rated portfolios (in percentages). The t-statistics for cumulative returns are Newey and West (1987) adjusted heteroscedastic-serial consistent t-statistics. The full sample period is January 1989 to December 2009. The numeric S&P rating is ascending in credit risk, i.e. 1=AAA, 2=AA+, ..., 22=D. In Panel B, we run time-series regressions of each portfolio, $C1$ to $C3$, excess return relative to the risk-free rate and the return differential, $C3-C1$, on a constant and various factors and report the portfolio alphas (in percentages per month) and betas. 'MKT' is the MSCI World equity excess returns factor, calculated as the return of the MSCI World Equity Total Return Index minus the US risk-free rate. 'HML' is the Fama and French (1998) international HML Factor. 'Forex' is the foreign exchange risk factor, calculated as the return on a trade-weighted portfolio of a broad basket of exchange rates relative to the US dollar. The international 'Momentum' factor in Panel B4 is from Schmidt, Arx, Schrimpf, Wagner, and Ziegler (2011) provided to us by the authors. Panels B5 and B6 use the international liquidity factors of Lee (2011) (for which data are available mostly for the second half of our sample). Panel B7 uses the Pastor-Stambaugh traded value-weighted US liquidity factor.

Panel A: Raw Returns

	Sovereign Rating Group (C1=Lowest, C3=Highest Risk)			
	C1	C2	C3	C3-C1
Full Sample: 1989 – 2009				
Average Rating	1.38 (AAA)	5.23 (A+)	10.92 (BB+)	
r_{t+1}	0.84 (2.71)***	0.80 (2.36)**	1.41 (3.58)***	0.57 (2.15)**
$r_{t+1:t+6}$	5.39 (4.37)***	5.78 (3.97)***	8.97 (5.16)***	3.58 (3.54)***
$r_{t+1:t+12}$	10.46 (5.68)***	11.27 (5.06)***	17.23 (6.23)***	6.77 (3.95)***
1989 – 1998				
Average Rating	1.08 (AAA)	3.72 (AA-)	9.10 (BBB)	
r_{t+1}	1.02 (2.66)***	0.67 (1.38)	0.85 (1.50)	-0.17 (-0.39)
$r_{t+1:t+6}$	5.80 (5.70)***	3.72 (2.31)**	5.37 (2.44)**	-0.43 (-0.26)
$r_{t+1:t+12}$	12.53 (8.07)***	7.61 (3.03)***	12.09 (3.53)***	-0.44 (-0.16)
1999 – 2009				
Average Rating	1.66 (AA+)	6.60 (A-)	12.56 (BB-)	
r_{t+1}	0.68 (1.40)	0.95 (1.96)**	1.92 (3.50)***	1.25 (4.10)***
$r_{t+1:t+6}$	4.67 (2.11)**	6.79 (2.84)***	11.31 (4.30)***	6.64 (6.80)***
$r_{t+1:t+12}$	7.95 (2.37)**	12.60 (3.44)***	21.67 (5.09)***	13.72 (8.23)***
Pre-Financial Crisis Sample: 1989 – 2007				
Average Rating	1.33 (AAA)	5.08 (A+)	10.78 (BB+)	
r_{t+1}	1.03 (3.67)***	1.02 (3.25)***	1.63 (4.20)***	0.60 (2.11)**
$r_{t+1:t+6}$	6.34 (6.88)***	6.67 (5.39)***	9.94 (6.15)***	3.60 (3.23)***
$r_{t+1:t+12}$	13.36 (8.50)***	13.99 (6.68)***	20.21 (7.35)***	6.85 (3.61)***

Table 3 (continued)

Panel B: Portfolio Alphas and Betas over 1989-2009

	Sovereign Rating Group (C1=Lowest, C3=Highest Risk)			
	C1	C2	C3	C3-C1
Panel B1: Adjusting for world market factor				
Alpha	0.22	0.20	0.81	0.58
	(1.96)**	(0.98)	(2.82)***	(2.21)**
MKT Beta	1.04	0.98	0.98	-0.06
	(40.19)***	(21.37)***	(15.07)***	(-1.01)
Panel B2: Adjusting for world market and foreign exchange risk factors				
Alpha	0.29	0.34	0.94	0.65
	(2.50)**	(1.71)*	(3.24)***	(2.42)**
MKT Beta	1.01	0.92	0.91	-0.09
	(37.01)***	(19.08)***	(13.32)***	(-1.43)
Forex Beta	-0.29	-0.66	-0.58	-0.30
	(-3.04)***	(-3.99)***	(-2.45)**	(-1.35)
Panel B3: Adjusting for Fama and French (1998) international MKT and HML Factors				
Alpha	0.23	0.14	0.82	0.58
	(1.78)*	(0.66)	(2.71)***	(2.16)**
MKT Beta	0.88	0.84	0.81	-0.06
	(34.18)***	(20.60)***	(13.79)***	(-1.20)
HML Beta	0.16	0.28	0.16	-0.00
	(3.45)***	(3.78)***	(1.48)	(-0.02)
Panel B4: Adjusting for the Fama and French (1998) international MKT, HML, and momentum factors				
Alpha	0.25	0.19	0.89	0.63
	(1.85)*	(0.90)	(2.81)***	(2.24)**
MKT Beta	0.87	0.83	0.81	-0.07
	(32.87)***	(19.85)***	(13.26)***	(-1.22)
HML Beta	0.16	0.26	0.14	-0.02
	(3.15)***	(3.36)***	(1.21)	(-0.18)
Momentum Beta	-0.02	-0.07	-0.10	-0.07
	(-0.85)	(-1.53)	(-1.48)	(-1.24)
Panel B5: Adjusting for world market and Lee (2011) global liquidity factors over 1999-2007				
Alpha	0.44	0.77	1.77	1.33
	(3.17)***	(3.06)***	(4.76)***	(3.70)***
MKT Beta	1.06	0.81	1.01	-0.05
	(30.92)***	(12.93)***	(10.85)***	(-0.58)
Global Liquidity Beta	-0.25	-0.71	-0.79	-0.54
	(-1.92)*	(-2.92)***	(-2.21)**	(-1.55)
Panel B6: Adjusting for world market and Lee (2011) global and local liquidity factors over 1999-2007				
Alpha	0.37	0.52	1.56	1.19
	(2.53)**	(2.02)**	(3.94)***	(3.09)***
MKT Beta	1.06	0.87	1.05	-0.02
	(29.60)***	(13.52)***	(10.68)***	(-0.20)
Global Liquidity Beta	-0.21	-0.22	-0.48	-0.27
	(-1.27)	(-0.76)	(-1.08)	(-0.63)
Local Liquidity Beta	0.20	-0.39	0.02	-0.18
	(1.06)	(-1.19)	(0.04)	(-0.36)
Local Liquidity 2 Beta	0.23	0.68	0.63	0.40
	(1.50)	(2.54)**	(1.53)	(1.01)
Panel B7: Adjusting for the world market and Pastor and Stambaugh US liquidity factors				
Alpha	0.54	0.49	1.10	0.56
	(4.69)***	(2.40)**	(3.81)***	(2.09)**
MKT Beta	1.03	0.98	0.97	-0.06
	(39.93)***	(21.44)***	(15.03)***	(-1.03)
Liquidity Beta	0.02	0.07	0.06	0.04
	(0.70)	(1.35)	(0.87)	(0.63)

Table 4
Cross-Sectional Regressions

Each month t, we run cross-sectional regressions of time $t+1$ country equity returns on a constant, time t S&P sovereign credit ratings, and rating interacted with an emerging market dummy, *EmDummy*. *EmDummy* indicates whether the country is developed (0) or emerging market (1). The dependent variable is either raw (r_{t+1}) or risk-adjusted (r^*_{t+1}) one-month ahead returns. Returns are adjusted as in Brennan, Chordia, and Subrahmanyam (1998) by running time-series regressions of each individual country return on risk factors (as specified in brackets in the heading of each panel). The risk adjusted returns, r^*_{t+1}, is the intercept and residual from these time-series regressions. The table presents the time-series average of the cross-sectional regression coefficients (in percentages) with their associated sample t-statistics in parentheses (*, **, and *** indicating 10%, 5%, and 1% level of significance, respectively). The sample period is January 1989 to December 2009.

Specification	*Constant*	$Rating_t$	$Rating_t \times EmDummy$
Panel A: Raw Returns: r_{t+1}			
1	0.66	0.07	
	(2.04)**	(2.06)**	
2	0.82		0.04
	(2.59)***		(1.16)
3	0.61	0.10	-0.04
	(1.88)*	(1.82)*	(-0.76)
Panel B: Risk-Adjusted Returns: $r^*_{t+1}\|[MKT]$			
1	0.04	0.07	
	(0.28)	(2.07)**	
2	0.19		0.04
	(1.55)		(1.20)
3	-0.01	0.10	-0.04
	(-0.06)	(1.75)*	(-0.67)
Panel C: Risk-Adjusted Returns: $r^*_{t+1}\|[MKT, FOREX]$			
1	0.03	0.07	
	(0.24)	(1.99)**	
2	0.18		0.03
	(1.50)		(1.12)
3	-0.01	0.09	-0.03
	(-0.08)	(1.77)*	(-0.64)
Panel D: Risk-Adjusted Returns: $r^*_{t+1}\|[FF\ international\ MKT, HML]$			
1	0.03	0.07	
	(0.22)	(2.05)**	
2	0.18		0.03
	(1.38)		(1.12)
3	-0.00	0.09	-0.03
	(-0.01)	(1.77)*	(-0.57)

Table 5
Impact of Downgrades and Upgrades on Equity Returns

We repeat the analysis in Table 3 Panel A after first removing returns from 6 months before to 6 months after a rating downgrade or upgrade or both.

	Sovereign Rating Group (C1=Lowest, C3=Highest Risk)			
	C1	C2	C3	C3-C1
Eliminating ±6 months around downgrades				
r_{t+1}	0.84 (2.65)***	0.81 (2.50)**	1.62 (3.89)***	0.78 (2.57)**
$r_{t+1:t+6}$	5.15 (4.32)***	5.12 (4.45)***	8.74 (6.05)***	3.59 (3.93)***
Eliminating ±6 months around upgrades				
r_{t+1}	0.83 (2.65)***	0.82 (2.48)**	1.38 (3.50)***	0.55 (1.87)*
$r_{t+1:t+6}$	5.16 (4.29)***	4.87 (3.91)***	7.15 (5.24)***	1.99 (2.31)**
Eliminating ±6 months around both downgrades and upgrades				
r_{t+1}	0.81 (2.55)**	0.82 (2.49)**	1.47 (3.66)***	0.66 (2.18)**
$r_{t+1:t+6}$	4.96 (4.23)***	4.41 (4.11)***	7.06 (5.56)***	2.10 (2.70)***

Table 6
Asset-Pricing Tests

We run time-series regressions of monthly country equity excess returns on a constant and the factors. We then run monthly cross-sectional regressions of country excess returns on a constant and the beta estimates from the first pass to estimate factor risk premiums. The table shows time-series averages of the estimtated factor premiums (in percent) and their sample t-statistics adjusted by the Shanken (1992) correction to account for errors in the betas. 'MKT', the world market factor, is the return of the MSCI World Equity Total Return Index minus the US risk-free rate. 'FOREX', the foreign exchange risk factor, is the return on a trade-weighted portfolio of US dollar exchange rates. There are two alternative foreign exchange indexes: one based on a broad basket of currencies and one based on major currencies. We use the former for Panel A. 'CREDIT' is the World Credit Risk Factor constructed as the difference in equity index returns of the worst-rated tercile minus the best-rated tercile, $C3-C1$. 'EMERG' is the Emerging Markets Factor, orthogonalized relative to the MKT and CREDIT factors, calculated as the intercept and residual from a time-series regression of the excess return of the MSCI Emerging Market Total Return Index on the MKT and CREDIT factors. All returns are dollar-denominated.

Panel A: Factors: MKT, FOREX, CREDIT, EMERG

	Constant	MKT	FOREX	CREDIT	EMERG	$Adj.R^2$
			Full Sample: 1989 – 2009			
1	0.13	0.72				5.51
	(0.37)	(1.56)				
2	0.15	0.76	0.06			8.32
	(0.40)	(1.64)*	(0.30)			
3	0.62			0.86		6.03
	(2.16)**			(2.50)**		
4	0.17	0.43		0.73		11.24
	(0.46)	(0.97)		(2.15)**		
5	0.41	0.31	0.40	0.83		14.51
	(1.08)	(0.68)	(1.84)*	(2.36)**		
6	0.41	0.29	0.38	0.78	0.04	19.01
	(1.08)	(0.64)	(1.81)*	(2.01)**	(0.11)	
7	0.52				0.82	6.43
	(1.92)*				(2.25)**	
8	0.36	0.40	0.12		0.55	13.96
	(0.98)	(0.88)	(0.63)		(1.50)	
			First Part: 1989 – 1998			
1	1.03	-0.24				5.34
	(1.70)*	(-0.33)				
2	0.96	-0.14	0.10			9.74
	(1.60)	(-0.20)	(0.37)			
3	0.54			1.00		8.97
	(1.53)			(1.71)*		
4	0.48	0.14		0.85		13.06
	(0.90)	(0.20)		(1.45)		
5	0.09	0.51	0.40	1.08		17.78
	(0.17)	(0.75)	(1.25)	(1.72)*		
6	0.40	0.07	0.31	0.69	0.59	24.45
	(0.86)	(0.11)	(0.95)	(0.98)	(0.94)	
7	0.43				1.08	10.22
	(1.18)				(1.92)*	
8	0.92	-0.47	0.13		0.98	18.26
	(1.58)	(-0.65)	(0.45)		(1.76)*	
			Second Part: 1999 – 2009			
1	0.38	0.47				7.61
	(1.28)	(0.97)				
2	0.40	0.51	0.01			10.97
	(1.68)*	(1.06)	(0.08)			
3	0.66			0.95		4.68
	(1.45)			(2.67)***		
4	0.25	0.30		0.82		12.41
	(0.85)	(0.62)		(2.36)**		

5	0.35	0.28	0.08	0.82		15.93
	(1.46)	(0.59)	(0.43)	(2.39)**		
6	0.37	0.22	0.11	0.88	0.15	19.80
	(1.51)	(0.45)	(0.63)	(2.59)***	(0.42)	
7	0.70				0.53	4.97
	(1.66)*				(1.38)	
8	0.42	0.41	0.04		0.32	15.13
	(1.74)*	(0.85)	(0.23)		(0.88)	

Panel B: Factors: MKT, Lee (2011) Global Liquidity [LIQ], CREDIT, EMERG (1999-2007)

	Constant	MKT	LIQ	CREDIT	EMERG	$Adj.R^2$
1	0.94	0.41				8.87
	(2.78)***	(0.83)				
2	0.82	0.29	-0.38			12.33
	(2.43)**	(0.60)	(-1.89)*			
3	1.00			1.05		6.53
	(2.73)***			(2.62)***		
4	0.89	0.07		1.02		15.47
	(2.65)***	(0.14)		(2.59)***		
5	0.87	0.03	-0.20	0.94		18.41
	(2.63)***	(0.07)	(-1.07)	(2.42)**		
6	0.86	0.15	-0.25	1.00	-0.22	22.17
	(2.66)***	(0.31)	(-1.30)	(2.58)***	(-0.59)	
7	1.28				0.12	5.34
	(3.59)***				(0.31)	
8	0.81	0.42	-0.43		-0.11	16.29
	(2.46)**	(0.85)	(-2.12)**		(-0.28)	

Panel C: Factors: MKT, US Liquidity [USLIQ], CREDIT, EMERG (1989-2009)

	Constant	MKT	USLIQ	CREDIT	EMERG	$Adj.R^2$
1	0.15	0.73	-0.59			7.87
	(0.42)	(1.60)	(-0.69)			
2	0.62			0.86		6.03
	(2.16)**			(2.50)**		
4	0.13	0.50	-1.83	0.77		13.17
	(0.36)	(1.12)	(-2.15)**	(2.20)**		
5	0.20	0.32	-1.61	0.62	0.38	17.92
	(0.57)	(0.71)	(-1.77)*	(1.86)*	(0.93)	
6	0.30	0.38	-1.14		0.68	12.64
	(0.85)	(0.85)	(-1.24)		(1.76)*	

Panel D: Factors: MKT, Momentum, CREDIT, EMERG (1989-2009)

	Constant	MKT	MOM	CREDIT	EMERG	$Adj.R^2$
1	0.18	0.72	0.50			9.10
	(0.51)	(1.56)	(0.61)			
2	0.62			0.86		6.03
	(2.16)**			(2.50)**		
4	0.38	0.28	1.71	0.86		14.51
	(1.07)	(0.63)	(1.96)**	(2.44)**		
5	0.48	0.09	1.82	0.71	0.28	19.95
	(1.38)	(0.20)	(2.02)**	(1.98)**	(0.70)	
6	0.48	0.25	1.18		0.64	14.71
	(1.40)	(0.55)	(1.34)		(1.70)*	

Table 7
Abnormal Returns and Pricing Errors

The table presents the abnormal returns (average intercept) from the time-series regressions (first column block) and average pricing errors in the cross-sectional regressions (second column block) for developed and emerging countries. We first run time-series regressions of country excess equity returns on a constant and the factors, and report the average intercept (in percentages per month), factor loadings, and average adjusted R-squared. We then run cross-sectional regressions (across all countries) of excess returns on a constant and the estimated betas from the first pass and report the average pricing errors in developed and emerging markets, i.e. the time-series average of the cross-sectional mean error term in developed and emerging markets. T-statistics are based on the time-series averages. The factors are defined in Table 6. The sample period is January 1989 to December 2009.

	First Pass: Time-Series Regressions					**Second Pass: Cross-Sectional Regressions**
	Constant (%)	MKT	FOREX	*CREDIT*	*Adj.*R^2 (%)	Average Pricing Errors (%)
24 Developed Markets						
1	0.24 (1.74)*	1.04 (34.62)***			50.27	-0.30 (-2.43)**
2	0.22 (1.66)*	1.02 (32.85)***	-0.20 (-2.40)**		50.55	-0.29 (-2.37)**
3	0.15 (1.04)	1.04 (32.82)***	-0.20 (-2.42)**	0.09 (2.44)**	52.20	-0.06 (-1.08)
51 Emerging Markets						
1	0.57 (2.73)***	1.01 (23.07)***			21.48	0.36 (2.72)***
2	0.51 (2.42)**	0.96 (20.12)***	-0.32 (-2.51)**		22.09	0.33 (2.61)***
3	-0.02 (-0.15)	1.01 (28.99)***	-0.34 (-3.61)***	0.79 (15.28)***	28.75	0.02 (0.35)

Table 8
Impact of Rating on Returns
Adjusted for Exposure to the World Credit Risk Factor

For Panel A, we risk-adjust returns by regressing country equity excess returns, $r_{it} - r_{ft}$, on the Market and Credit Risk factors (MKT and CREDIT) following Brennan, Chordia, and Subrahmanyam (1998). The risk-adjusted returns, r^*_{it}, are the intercept and residual from these time-series regressions. We then repeat the analysis in Panel A of Table 3 using risk-adjusted rather than raw returns. For Panel B, returns are again risk-adjusted by the MKT and CREDIT (or MKT, FOREX, and CREDIT) factors. Then, as in Table 4, we run monthly cross-sectional regressions of time $t+1$ risk-adjusted country equity returns, $r^*_{i,t+1}$, on a constant, time t S&P sovereign credit ratings, and rating interacted with an emerging market dummy, *EmDummy*, indicating whether the country is developed (0) or emerging market (1). Panel B presents the time-series average of the cross-sectional regression coefficients (in percentages) with their associated sample t-statistics in parentheses (*, **, and *** indicating 10%, 5%, and 1% level of significance, respectively). The sample period is January 1989 to December 2009.

Panel A: Credit-Risk-Adjusted Returns by Sovereign Credit Rating Group

	Sovereign Rating Group (C1=Lowest, C3=Highest Risk)			
	C1	C2	C3	C3-C1
r^*_{t+1}	0.20 (1.79)*	-0.09 (-0.50)	0.30 (2.27)**	0.10 (1.42)
$r^*_{t+1:t+6}$	1.31 (2.35)**	-0.17 (-0.22)	1.60 (2.19)**	0.29 (0.87)
$r^*_{t+1:t+12}$	2.85 (5.43)***	0.12 (0.16)	3.07 (3.89)***	0.22 (0.53)

Panel B: Cross-Sectional Regressions of Credit-Risk Factor-Adjusted Returns

Specification	*Constant*	$Rating_t$	$Rating_t \times EmDummy$
$r^*_{i,t+1}$ = *returns adjusted for Exposure to MKT and CREDIT*			
1	0.05 (0.43)	0.02 (1.42)	
2	0.14 (1.17)		-0.01 (-0.30)
3	-0.02 (-0.15)	0.08 (1.43)	-0.06 (-1.14)
$r^*_{i,t+1}$ = *returns adjusted for exposure to MKT, FOREX, and CREDIT*			
1	0.05 (0.37)	0.02 (1.24)	
2	0.13 (1.08)		-0.01 (-0.42)
3	-0.03 (-0.19)	0.07 (1.34)	-0.06 (-1.12)

Table 9
Country Equity Returns by Sovereign Credit Rating Group Adjusted for the Emerging Markets Factor

Each month, t, all countries rated by Standard & Poor's are divided into terciles based on their sovereign credit rating. For each tercile, we compute the cross-sectional mean country equity return (based on US dollar-denominated country equity indices) for month $t+1$. We run time-series regressions of each portfolio, $C1$ to $C3$, excess return relative to the risk-free rate and the return differential, $C3-C1$, on a constant, the world market factor (MKT) and the emerging markets factor (EMERG) and report the portfolio alphas (in percentages) and betas. 'MKT' is the world equity market factor. 'EMERG' is the emerging markets factor, orthogonalized relative to the MKT or world credit risk factor (CREDIT), obtained as the intercept and residual from a time-series regression of the return of the dollar-denominated MSCI Emerging Market Total Return Index over the risk-free rate on the MKT or CREDIT factors. The sample period is January 1989 to December 2009.

	Sovereign Rating Group (C1=Lowest, C3=Highest Risk)			
	C1	C2	C3	C3-C1
Alpha	0.18 (1.76)*	0.12 (0.67)	0.76 (2.70)***	0.58 (2.21)**
MKT Beta	1.04 (45.99)***	0.98 (23.75)***	0.98 (15.33)***	-0.06 (-1.01)
EMERG Beta	0.22 (8.83)***	0.35 (7.73)***	0.22 (3.13)***	0.00 (0.00)

Table 10
Cross-Sectional Regressions of Average Returns on Country-Level Characteristics

We run cross-sectional regressions of average country equity returns on a constant and a country-level characteristic previously found to explain cross-sectional differences in country returns. To compute co-skewness, as in Harvey (2000), we use a world version of the single-factor model: $r_{it} - rft = a_i + b_i(r_{mt} - r_{ft}) + e_{it}$, where r_{it} are country's i equity return at time t, r_{mt} is the return on the MSCI world index, r_{ft} is the US risk free rate, and e_{it} is the residual. Coskew1 is coskewness as per definition 1 of Harvey (2000), computed as Coskew1 $= \frac{(\sum_t e_{it} \times e_{mt}^2)/T}{\sqrt{(\sum_t e_{it}^2)/T}(\sum_t e_{mt}^2)/T}$, where $e_{mt} = r_{mt} - mean(r_{mt})$. Coskew2 is coskewness as per definition 2 of Harvey (2000), computed as Coskew2 $= \frac{(\sum_t e_{it} \times e_{mt}^2)/T}{(\sigma_{e_{mt}})^3}$. The table presents the regression coefficient with respect to the country level characteristic with its associated t-statistics in parentheses (*, **, and *** indicating 10%, 5%, and 1% level of significance, respectively). The first column presents results for raw returns, r_{it}. For the remaining columns, we use risk-adjusted returns, $r_{it}^*|factor$. Returns are adjusted as in Brennan, Chordia, and Subrahmanyam (1998) by running time-series regressions of each individual country return on risk factors (as specified in the heading of each column). The risk adjusted returns, r^*, is the intercept and residual from these time-series regressions. The sample period is Jan 1989 to Dec 2009.

Country Characteristic	$\overline{r_{it}}$	$\overline{r_{it}^*\|Mkt}$	$\overline{r_{it}^*\|CREDIT}$	$\overline{r_{it}^*\|Mkt, CREDIT}$
Rating	0.07	0.08	0.03	0.03
	(2.05)**	(2.61)***	(0.90)	(0.92)
Standard Deviation of returns	3.47	7.97	1.33	-2.59
	(0.81)	(2.14)**	(0.31)	(-0.58)
Coskewness 1	2.09	1.60	0.90	1.36
	(2.44)**	(2.14)**	(1.26)	(1.51)
Coskewness 2	0.81	0.53	0.39	0.65
	(1.71)*	(1.21)	(0.88)	(1.34)

Table 11
Gibbons, Ross, and Shanken (1989) Finite Sample Tests

The table presents results from Gibbons, Ross, and Shanken (1989)'s finite sample test: $J = \frac{T-N-K}{N}\left[1+\hat{E}(f)'\hat{\Omega}^{-1}\hat{E}(f)\right]\hat{\alpha}'\hat{\Sigma}^{-1}\hat{\alpha} \sim F_{N,T-N-K}$, of the efficiency of a given factor, where $\hat{\alpha} = [\hat{\alpha}_1, \hat{\alpha}_2, ..., \hat{\alpha}_N]'$ are the estimated intercepts from individual time-series regressions (the statistic tests whether these are jointly zero: the null hypothesis) and $\hat{\epsilon}_t = [\hat{\epsilon}_t^1, \hat{\epsilon}_t^2, ..., \hat{\epsilon}_t^N]'$ for $t = [1, 2, ..., T]$ are the estimated residuals, $\hat{\Sigma} = \frac{1}{T}\sum_{t=1}^{T}\epsilon_t\epsilon_t'$ is the residual covariance matrix, $\hat{\Omega}$ is the estimated variance covariance matrix of the factors, K is the number of factors, N is the number of test assets, and T is the number of time-series observations. The factors are described in Table 6. The test assets are country equity returns with non-missing observations over the January 1999 – December 2009 period – a total of 52 countries. The tests are based on the second half of the sample due to the smaller number of countries with non-missing observations over the entire period.

Factor	J-statistic	p-value	95% Critical Value
MKT	1.92	0.00	1.50
MKT+FOREX	1.86	0.01	1.51
EMERG	1.57	0.03	1.50
MKT+FOREX+EMERG	1.80	0.01	1.51
CREDIT	0.96	0.55	1.50

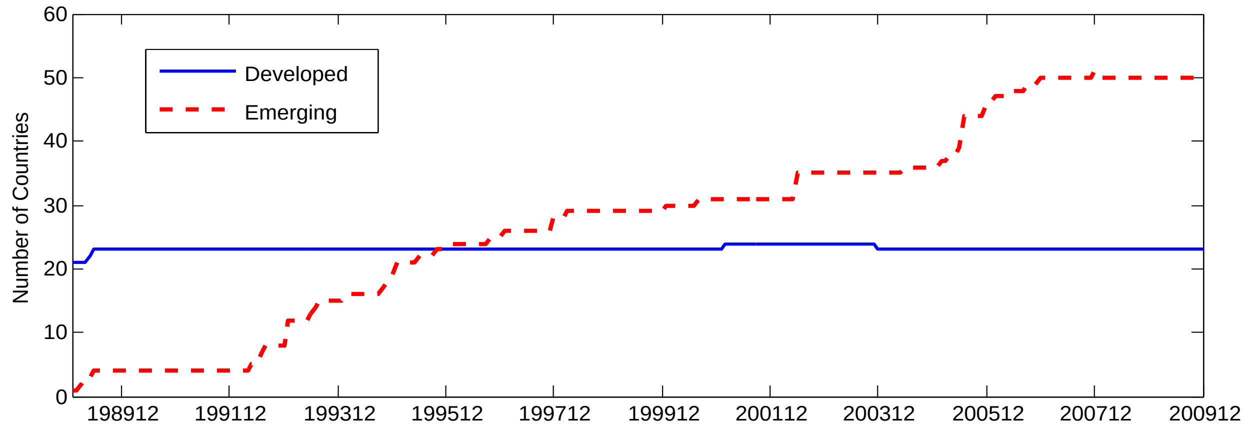

Figure 1. Number of Developed and Emerging Countries in Sample.
The figure presents the number of countries in our sample that have both rating and return data over January 1989 to December 2009.

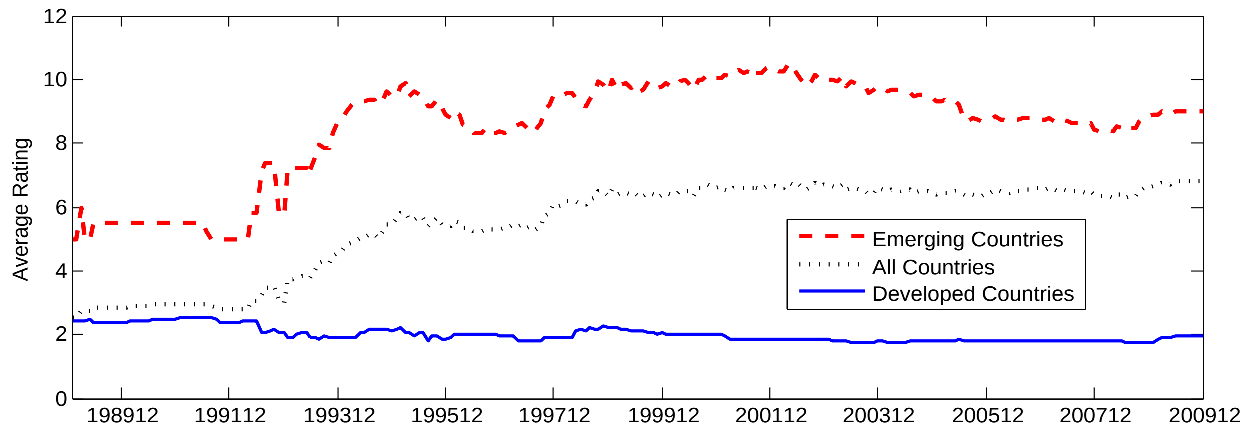

Figure 2. Time-series of Average Rating.
The figure presents the average numeric Standard&Poor's sovereign rating across all countries, as well as across developed and emerging countries. The numeric rating is increasing in credit risk: 1 = *AAA*, 2 = *AA*+, 3 = *AA*, ..., 21 = *C*, 22 = *D*. The sample period is from January 1989 to December 2009.

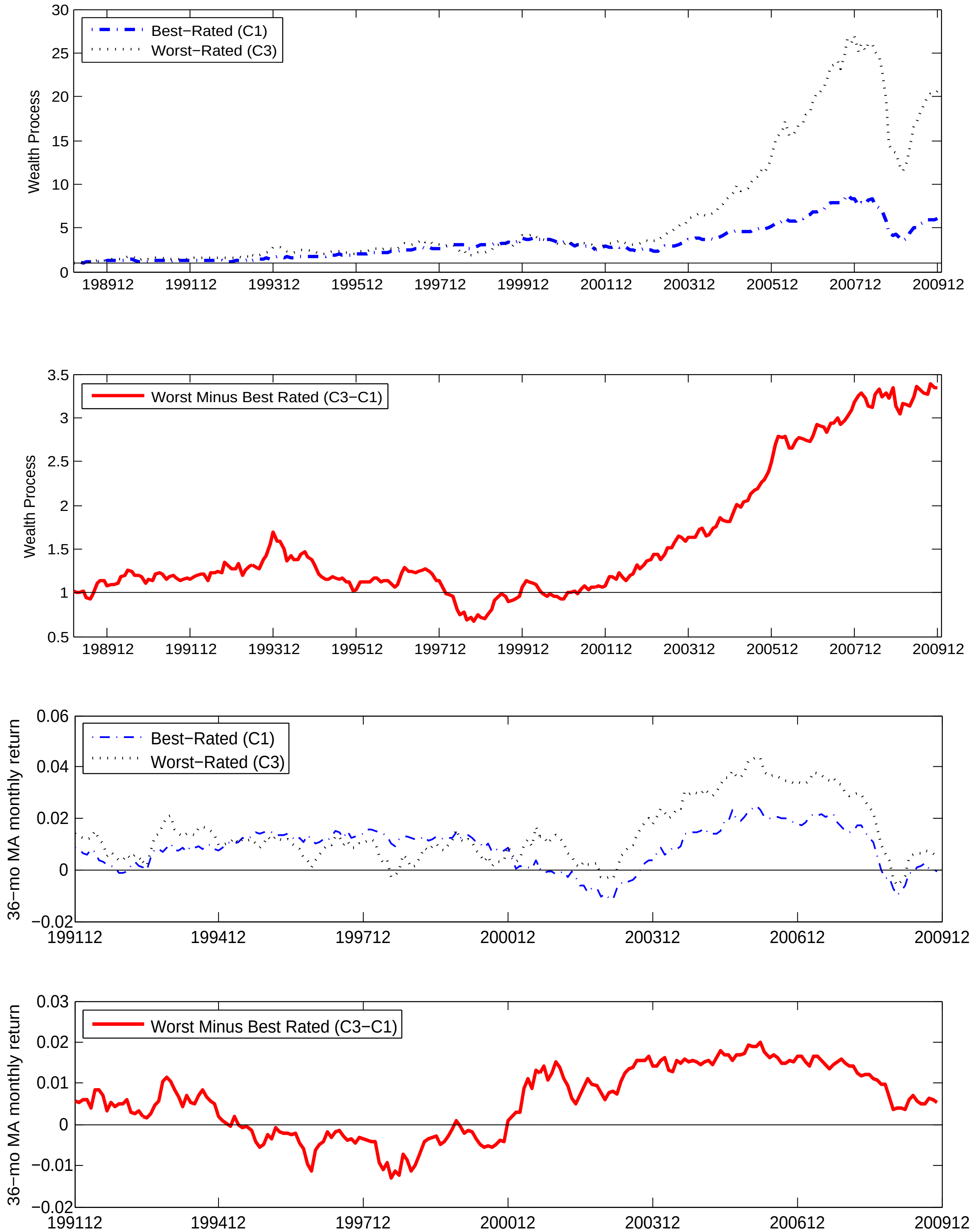

Figure 3. Wealth process from investing in Worst versus Best rated Country Equity Indices. Each month, $t-1$, all countries rated by Standard & Poor's and with available equity market index returns are divided into terciles based on credit rating. Within each tercile. The figure presents the wealth process starting with \$1 in January 1989 and investing in the worst or best-rated tercile (top plot) or being shot the best rated tercile and long the worst rated. Returns are based on equally-weighting all countries in a month. The lower two panels display the 36-month moving average (MA) monthly returns of $C1$ and $C3$ countries and their return differential $C3-C1$.

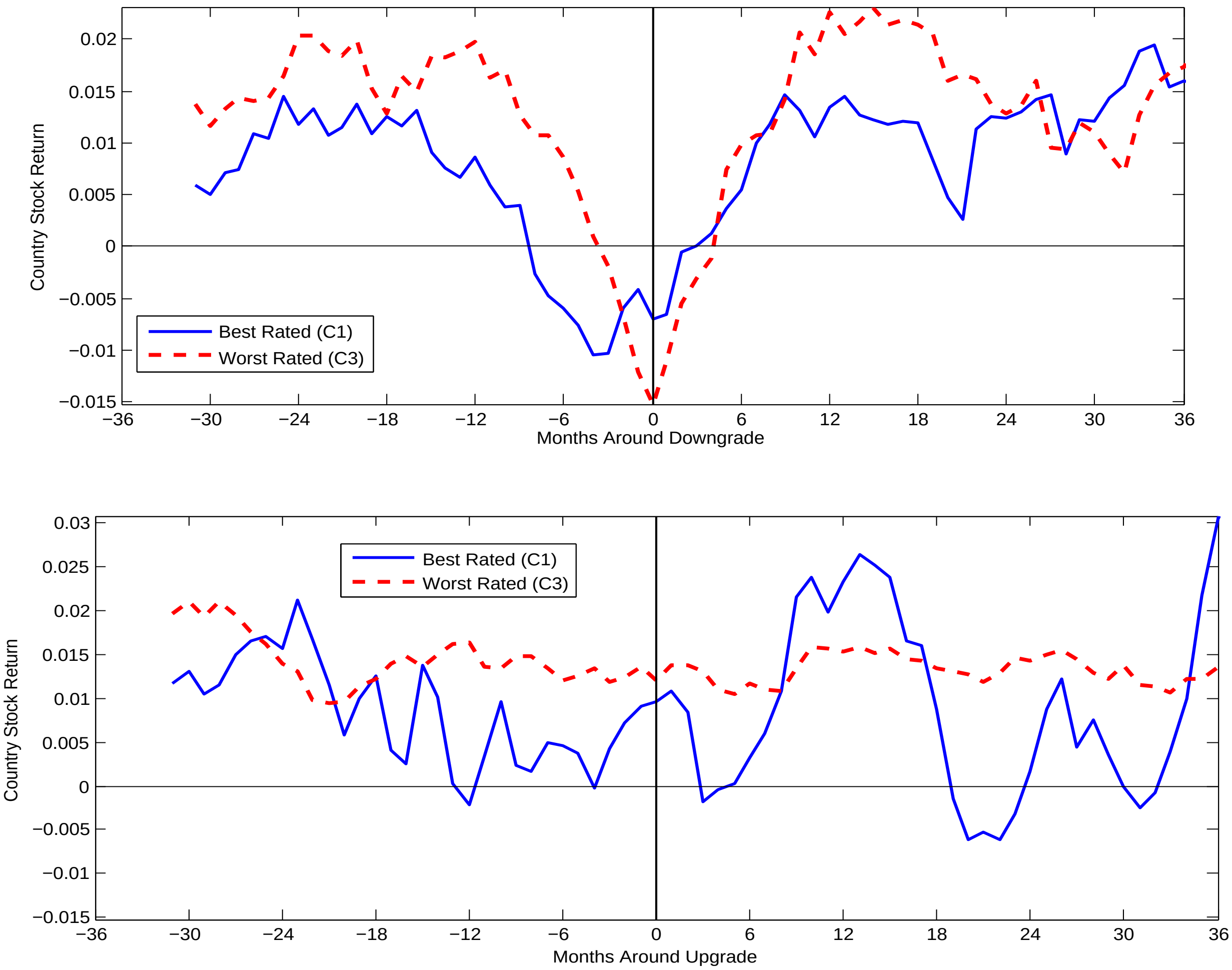

Figure 4. Country Equity Returns around Rating Changes (6-month moving average). Each month, $t-1$, all countries rated by Standard & Poor's and with available equity market index returns are divided into terciles based on credit rating. Within each tercile, we find countries that have been downgraded (upgraded) in month t and compute their equally weighted average returns over each month from $t-36$ to $t+36$. We repeat this every month. The figure presents the 6-month moving average of these average monthly portfolio returns for the best (C_1) and worst (C_3) rated tercile portfolios around periods of rating downgrades. Month $t=0$ is the month of downgrade (upgrade). The sample periods is from January 1989 to December 2009.