

Risk in Emerging Markets

Contagion and other factors must be taken into account.

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Over the past decade, we've learned a lot about investing in emerging markets. In the early 1990's, research indicated that, on average, emerging markets offered extraordinarily high returns compared to their developed markets.

This view was refined in the mid-1990s to focus on emerging markets' role in diversifying global portfolio risk. The main benefit to investing in emerging markets was determined to be the low correlation with developed market returns – a correlation that helped create a natural 'hedge' for the global investor.

But there is much more to correlation and its impact on global portfolios. In particular, correlation varies depending on both the state of economy and the state of the equity markets in each country. Specifically, when the U.S. economy is in recession, correlations between developed equity markets and the U.S. are higher. The asymmetry in correlations also holds in the other scenario – good times in the U.S. economy. That is, when the U.S. economy is booming, correlations are smaller than average. That is, U.S. investors in good U.S. economic climates would hope that their international investments ride the wave of favorable returns, however, in reality, the returns are lower than expected.

Our analysis shows the dangers of putting too much weight on the average correlation – the figure most usually cited to describe diversification benefits. Correlation is higher in recessions and lower in recoveries than the average. In both economic states, investors who had expected the average will be disappointed. This analysis also extends to bull and bear markets. The same asymmetry of correlation shows up. In bear markets, correlations are higher; in bull markets the correlations are lower.

Emerging markets, meanwhile, behave differently through time. While the correlations are very low both among the emerging markets and with developed markets, the pattern of asymmetric correlations is only found in a few of the countries – those that are most likely integrated with world capital

markets. An economy that is financially integrated with world capital markets is more likely to be affected by "world events". As a result, correlation increases.

However, there are two other aspects of emerging markets that complicate the diversification argument. The first is the non-normality of equity returns distributions. The second is a different aspect of comovement – contagion (regional markets responding to regional crises). In our sample, we have two substantial crises: the Mexican crisis in late 1994 and the Thailand crisis in 1997. This paper will explore the implications of the non-normality of the returns and the contagion phenomenon.

The Setting

Table 1 provides the setting for our analysis. We provide summary statistics for all emerging markets followed by the International Finance Corporation (IFC) from 1981, the region indices as well as a number of developed market benchmarks: the Morgan Stanley Capital International (MSCI) all countries world index, the MSCI Europe, the MSCI EAFE, MSCI Pacific (without Japan), MSCI Japan and the MSCI US index. We provide summary statistics over the entire period as well as specializing our analysis to the last five years.

Table 1 includes arithmetic average returns. We also examined a variety of risk measures: skewness (the chance of an unexpected large positive or negative movement in returns), kurtosis (the likelihood of big returns – positive or negative), standard deviation, as well as the correlation with the world, although only the latter two are included in the table for brevity's sake. Our sample ends in March 1998. In addition, we report the most recent (March 1998) Institutional Investor country credit rating.

First, consider the broad aggregates: the MSCI world and the IFC composite index. Over the entire sample, the world and the emerging markets composite index had roughly the same average returns. However, the risk profile is much different. The standard deviation of the world portfolio is 14 percent per annum compared to 22 percent for the emerging markets composite.

The most notable contrast is in the correlations. The correlation between EAFE and the world is 90 percent and the correlation between the U.S. portfolio and the world is 78 percent (note that the MSCI world is heavily weighted towards the U.S. and EAFE). The correlation between the world

and the IFC emerging markets composite is a more modest 42 percent.

Notice the substantial diversity when examining the individual markets. Over the entire sample, there is only one country with a lower standard deviation than the emerging markets composite (Jordan). There were nine countries that had more than double the volatility of the IFC composite. This is a demonstration of the low correlation of the intra-emerging market returns.

The last five years provides an interesting contrast. Notice that the correlation of the IFC composite with the world index is much higher, 61 percent. While the standard deviation of the returns is lower, the average returns are much lower, reflecting the impact of the two regional crises. Table 1 also provides some information on credit ratings of individual countries. The most recent ratings for the U.S. and Japan are 92.6 and 90.8, respectively. The highest possible rating is 100. The ratings of the emerging markets range from 15.2 (Nigeria) to 75.5 (Taiwan).

This analysis suggests that the average level of country risk is sharply higher in emerging markets.

Our research has shown that low credit ratings are often associated with non-normalities in returns. This is indeed the case. The range of estimates for skewness and kurtosis over the past five years for the emerging markets, contrast sharply with those obtained with the developed markets.

Non-Normal Distributions and Risk

In quantitative portfolio management, we usually think

Table 1 Historical Summary Statistics

| Index | Data Start | Credit Rating | Entire Period | | | Last Five Years | | |
|----------------------|------------|---------------|-------------------|--------------------|----------------------|-------------------|--------------------|----------------------|
| | | | Arithmetic Return | Standard Deviation | Correlation AC World | Arithmetic Return | Standard Deviation | Correlation AC World |
| MSCI AC World | Jan-81 | | 8.1 | 14.0 | 1.00 | 11.1 | 11.0 | 1.00 |
| MSCI EAFE | Jan-81 | | 8.0 | 17.5 | 0.90 | 7.9 | 13.5 | 0.91 |
| MSCI Europe | Jan-81 | | 10.3 | 16.2 | 0.83 | 16.6 | 11.8 | 0.83 |
| MSCI Pacific X-Japan | Jan-81 | | 4.6 | 22.6 | 0.62 | 5.2 | 22.8 | 0.72 |
| MSCI Japan | Jan-81 | 90.8 | 6.1 | 24.8 | 0.72 | -5.2 | 22.1 | 0.65 |
| MSCI USA | Jan-81 | 92.6 | 10.2 | 14.4 | 0.78 | 16.9 | 11.0 | 0.77 |
| IFCG Composite | Dec-84 | | 8.8 | 22.1 | 0.42 | 3.4 | 19.1 | 0.61 |
| IFCI Composite | Jan-89 | | 9.8 | 20.6 | 0.53 | 3.9 | 20.9 | 0.62 |
| IFCG Latin America | Jan-85 | | 19.8 | 34.0 | 0.32 | 11.9 | 26.0 | 0.50 |
| IFCG Asia | Jan-85 | | 6.5 | 24.5 | 0.38 | -2.8 | 23.0 | 0.55 |
| IFCG Argentina | Jan-81 | 41.6 | 33.8 | 86.4 | 0.03 | 15.7 | 30.7 | 0.58 |
| IFCG Brazil | Jan-81 | 38.7 | 28.9 | 60.0 | 0.15 | 29.9 | 37.4 | 0.33 |
| IFCG Chile | Jan-81 | 63.2 | 10.0 | 30.0 | 0.14 | 9.9 | 24.7 | 0.40 |
| IFCG Czech Republic* | Jan-94 | 60.7 | | | | -12.6 | 33.0 | 0.22 |
| IFCG China | Jan-93 | 57.6 | 16.8 | 61.4 | -0.02 | 12.6 | 60.0 | 0.02 |
| IFCG Colombia | Jan-85 | 46.9 | 24.5 | 29.7 | 0.04 | 9.6 | 24.6 | -0.03 |
| IFCG Egypt* | Jan-96 | 41.3 | | | | 24.3 | 28.4 | -0.13 |
| IFCG Greece | Jan-81 | 53.7 | 7.2 | 37.3 | 0.19 | 14.6 | 24.8 | 0.41 |
| IFCG Hungary | Jan-83 | 52.2 | 21.7 | 39.5 | 0.39 | 25.9 | 40.1 | 0.42 |
| IFCG India | Jan-81 | 46.5 | 7.0 | 30.1 | 0.00 | 4.4 | 28.7 | 0.27 |
| IFCG Indonesia | Jan-90 | 49.9 | -10.2 | 38.4 | 0.29 | -9.2 | 42.4 | 0.47 |
| IFCG Jordan | Jan-81 | 35.5 | 1.3 | 16.3 | 0.15 | 2.5 | 13.3 | 0.25 |
| IFCG Malaysia | Jan-85 | 64.5 | 3.8 | 32.1 | 0.42 | -2.2 | 40.5 | 0.47 |
| IFCG Mexico | Jan-81 | 45.2 | 16.9 | 45.2 | 0.28 | 4.1 | 36.9 | 0.45 |
| IFCG Morocco* | Jan-96 | 41.5 | | | | 30.9 | 16.2 | -0.31 |
| IFCG Nigeria | Jan-85 | 15.2 | 12.7 | 49.6 | 0.08 | 45.1 | 64.3 | 0.11 |
| IFCG Pakistan | Jan-85 | 27.5 | 8.3 | 26.1 | 0.09 | -0.4 | 30.6 | 0.25 |
| IFCG Peru | Jan-93 | 33.5 | 19.2 | 32.5 | 0.32 | 20.4 | 32.2 | 0.31 |
| IFCG Philippines | Jan-85 | 43.3 | 25.1 | 36.6 | 0.34 | 1.7 | 34.3 | 0.41 |
| IFCG Poland | Jan-93 | 51.9 | 55.5 | 70.1 | 0.36 | 54.4 | 71.6 | 0.35 |
| IFCG Portugal | Jan-86 | 72.7 | 27.2 | 39.5 | 0.42 | 25.4 | 18.8 | 0.57 |
| IFCG Russia* | Jan-96 | 31.2 | | | | 87.8 | 60.9 | 0.14 |
| IFCG Slovakia* | Jan-97 | 43.1 | | | | -29.2 | 23.7 | -0.32 |
| IFCG South Africa | Jan-93 | 46.5 | 15.2 | 22.2 | 0.39 | 12.7 | 22.4 | 0.40 |
| IFCG South Korea | Jan-81 | 64.4 | 6.4 | 35.2 | 0.21 | -12.5 | 44.2 | 0.23 |
| IFCG Sri Lanka | Jan-93 | 33.6 | 0.3 | 28.2 | 0.19 | 1.9 | 28.6 | 0.19 |
| IFCG Taiwan | Jan-85 | 75.5 | 23.5 | 47.4 | 0.28 | 9.9 | 36.2 | 0.39 |
| IFCG Thailand | Jan-81 | 52.3 | 7.5 | 32.3 | 0.31 | -14.0 | 43.9 | 0.48 |
| IFCG Turkey | Jan-87 | 37.8 | 35.8 | 67.5 | 0.07 | 35.9 | 59.3 | 0.09 |
| IFCG Venezuela | Jan-85 | 36.1 | 19.4 | 46.1 | -0.05 | 15.7 | 45.1 | 0.14 |
| IFCG Zimbabwe | Jan-81 | 33.6 | 5.4 | 36.1 | 0.10 | 30.2 | 38.2 | 0.14 |

Data through 1998:03. All returns converted to US dollar terms. Reported statistics based on excess returns which are calculated by subtracting the return on a one-month Treasury bill from Ibbotson Associates from the simple equity returns. Country credit rating from Institutional Investor. Arithmetic return and standard deviation in percent. Before 1987:01, MSCI AC World is MSCI World.
*Countries have less than five years of data.

of achieving the highest possible expected return for some level of risk. Risk is typically measured by the standard deviation or volatility of the portfolio returns. This analysis is appropriate as the portfolio returns can be completely characterized by the mean and standard deviation. However, we know that emerging market returns cannot be simply described by mean and variance.

An examination of Mexico shows returns that appear highly nonnormal. There are two many small returns (relative to a normal) and a large number of big negative returns.

Using the data from 1981, there are six months where returns of greater than -35 percent were realized. If the Mexican returns were generated from a normal distribution, we would expect perhaps one negative return of this magnitude.

Thailand is similar to Mexico with some extreme negative observations. There are five observations which have a return of -25 percent or less. On the positive side there are three months that delivered more than 28 percent return. All of these months deviate from what would be expected if these returns were described by a normal distribution. The graphical analysis for Korea and Malaysia reveal similar patterns. There are persistent deviations from what is expected with a normal distribution. In both countries, there are ex-

treme negative and extreme positive observations. Consistent with the other emerging markets; there are more extreme negative returns than positive returns.

For comparison, we also include, on the same scale the MSCI U.S. return distribution. In this analysis, there is a single observation, October 1987, which lies outside what we would expect from a normal distribution at the tails. This graph is also useful in demonstrating the difference in standard deviations in emerging and developed markets.

For the U.S. and assuming a normal distribution, one standard deviation below the mean to one standard deviation above the mean [-5.3 percent to 23.6 percent] covers 66 percent of all realizations [standard deviation is 14.4 percent].

For Mexico and assuming a normal distribution, one standard deviation below the mean to one standard deviation above the mean [-41.7 percent to 47.7 percent] also covers 66 percent of all realizations [standard deviation is 45.2 percent]. Even though the normal distribution does not completely characterize the returns in Mexico, it is useful in giving a sense of the greater volatility risk that one assumes by investing in this market.

The diversification effect

We explore in greater detail the diversification effect of emerging markets investments in Table 2. Portfolio statistics are calculated based on all the periods when U.S. returns are negative. Table 2 presents a different method. We classify markets as "bull" or "bear" markets based on the MSCI world. Examining cumulative returns, we identify periods of drawdown. The minimum length must be at least three months.

The results of our classification identify four periods of bear markets: May 1981-July 1982, April 1984-July 1984, September 1987-November 1987 and January 1990-September 1990, a total of 31 months. We classify all other periods as "bull" markets a total of 176 months. During the bull period, the average return on the world index is 16.4 percent with a standard deviation of 11.8 percent. During the bear market period, the average return on the world index is -38.9 percent with a standard deviation of 17.5 percent (note that this period

Table 2 World Bull and Bear Markets

| Index | Data Start | World Bull Markets | | | World Bear Markets | | |
|----------------------|------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| | | Arithmetic Return | Standard Deviation | Correlation with World | Arithmetic Return | Standard Deviation | Correlation with World |
| MSCI AC World | Jan-81 | 16.4 | 11.8 | 1.00 | -38.9 | 17.5 | 1.00 |
| MSCI EAFE | Jan-81 | 16.9 | 15.5 | 0.88 | -42.7 | 21.0 | 0.94 |
| MSCI Europe | Jan-81 | 17.9 | 14.1 | 0.77 | -32.5 | 21.2 | 0.87 |
| MSCI Pacific X-Japan | Jan-81 | 13.7 | 18.4 | 0.43 | -47.1 | 35.3 | 0.83 |
| MSCI Japan | Jan-81 | 15.9 | 23.8 | 0.70 | -49.3 | 24.8 | 0.79 |
| MSCI USA | Jan-81 | 17.7 | 12.5 | 0.70 | -32.1 | 18.3 | 0.83 |
| IFCG Composite | Dec-84 | 15.2 | 18.9 | 0.30 | -69.9 | 40.4 | 0.51 |
| IFCI Composite | Jan-89 | 11.0 | 20.0 | 0.48 | -3.6 | 27.8 | 0.87 |
| IFCG Latin America | Jan-85 | 26.3 | 31.7 | 0.20 | -60.0 | 51.2 | 0.56 |
| IFCG Asia | Jan-85 | 13.1 | 21.4 | 0.26 | -74.6 | 43.3 | 0.45 |
| IFCG Argentina | Jan-81 | 52.1 | 87.5 | -0.06 | -70.1 | 74.1 | 0.16 |
| IFCG Brazil | Jan-81 | 30.5 | 59.6 | 0.12 | 19.5 | 63.0 | 0.29 |
| IFCG Chile | Jan-81 | 19.7 | 28.7 | 0.09 | -45.0 | 32.8 | 0.22 |
| IFCG Czech Republic | Jan-94 | -12.6 | 33.0 | 0.22 | | | |
| IFCG China | Jan-93 | 16.8 | 61.4 | -0.02 | | | |
| IFCG Colombia | Jan-85 | 23.0 | 29.4 | 0.02 | 42.6 | 33.2 | 0.34 |
| IFCG Egypt | Jan-96 | 24.3 | 28.4 | -0.13 | | | |
| IFCG Greece | Jan-81 | 3.8 | 32.7 | 0.25 | 26.3 | 57.5 | 0.20 |
| IFCG Hungary | Jan-83 | 21.7 | 39.5 | 0.39 | | | |
| IFCG India | Jan-81 | 6.8 | 30.8 | -0.02 | 7.6 | 26.6 | 0.02 |
| IFCG Indonesia | Jan-90 | -12.3 | 38.4 | 0.36 | 10.5 | 40.0 | 0.13 |
| IFCG Jordan | Jan-81 | 1.0 | 15.5 | 0.15 | 3.3 | 20.6 | 0.22 |
| IFCG Malaysia | Jan-81 | 9.7 | 30.7 | 0.30 | -67.6 | 41.8 | 0.85 |
| IFCG Mexico | Jan-96 | 37.1 | 40.8 | 0.14 | -97.8 | 54.5 | 0.30 |
| IFCG Morocco | Jan-85 | 30.9 | 16.2 | -0.31 | | | |
| IFCG Nigeria | Jan-85 | 12.4 | 51.5 | 0.09 | 16.4 | 13.0 | 0.38 |
| IFCG Pakistan | Jan-93 | 8.7 | 27.1 | 0.11 | 2.9 | 8.1 | -0.03 |
| IFCG Peru | Jan-85 | 19.2 | 32.5 | 0.32 | | | |
| IFCG Philippines | Jan-93 | 36.0 | 34.7 | 0.27 | -108.2 | 39.6 | 0.25 |
| IFCG Poland | Jan-86 | 55.5 | 70.1 | 0.36 | | | |
| IFCG Portugal | Jan-96 | 30.7 | 33.2 | 0.47 | -11.4 | 84.1 | 0.30 |
| IFCG Russia | Jan-97 | 87.8 | 60.9 | 0.14 | | | |
| IFCG Slovakia | Jan-93 | -29.2 | 23.7 | -0.32 | | | |
| IFCG South Africa | Jan-81 | 15.2 | 22.2 | 0.39 | | | |
| IFCG South Korea | Jan-85 | 11.5 | 35.1 | 0.19 | -22.5 | 35.0 | 0.24 |
| IFCG Sri Lanka | Jan-93 | 0.3 | 28.2 | 0.19 | | | |
| IFCG Taiwan | Jan-85 | 31.6 | 41.2 | 0.21 | -74.9 | 93.4 | 0.31 |
| IFCG Thailand | Jan-81 | 12.7 | 31.6 | 0.21 | -22.1 | 35.4 | 0.69 |
| IFCG Turkey | Jan-87 | 34.2 | 68.1 | 0.03 | 52.2 | 64.5 | 0.50 |
| IFCG Venezuela | Jan-85 | 5.7 | 42.6 | 0.13 | 187.9 | 60.9 | -0.19 |
| IFCG Zimbabwe | Jan-81 | 9.5 | 34.4 | 0.15 | -17.7 | 44.4 | -0.06 |

Data through 1998:03. All returns converted to US dollar terms. Reported statistics based on excess returns which are calculated by return on a one-month Treasury bill from Ibbotson Associates from the simple equity returns. Country subtracting the credit rating from Institutional Investor. Arithmetic return and standard deviation in percent. Before 1987:01, MSCI AC World is MSCI World. Bear markets: (May 81-July 82; Apr 84-July 84; Sep 87-Nov 87, Jan 90-Sep 90)

includes the October 1987 market crash).

Notice that all of the developed markets move with the world index. The phenomena with asymmetric correlations also holds. The correlations with the world returns are always higher in the bear markets. International diversification does not work as well when markets are declining.

Now consider the emerging markets. First, focus attention on the markets that have data back to 1981. In bear markets, Argentina, Chile, and Mexico had returns worse than the -38.9 percent average return on the world index. Korea and Zimbabwe had strong negative returns but not as bad as the world return. Three countries: Brazil, Greece, Indonesia and Jordan had more favorable returns.

This analysis suggests that an investor should not expect investments in emerging markets to pay off when the world markets are declining. This is reinforced by the shorter sample countries, many of which are available since 1985. Unfortunately, since 1985, there are only 12 total months (two periods) that can be classified as bear world markets. During this period, the many of the IFC countries had negative returns. The IFC global composite experienced a decline of 69.9 percent. In contrast, the IFC investibles composite only lost -3.9 percent. The main conclusion is robust to looking at shorter time periods - emerging markets are an unreliable hedge for declining world markets.

Crisis returns

Implications for regional markets are the key in analyzing both the Latin American crisis and the Asian crisis. The Latin American crisis originated with Mexico in December 1994. In particular, the peso suffered surprise 34 percent devaluation in December. \$100 invested in Mexico at the beginning of December 1994 declined to about \$37 dollars by March 1995. All but one of the Latin American markets, Colombia, was dragged down with Mexico. Much of the decline in Mexico's equity value was attributed to the depreciation of the peso. Interestingly, it is also evident that the currencies of many Latin American countries.

Similar to the Latin American crisis, the Asian crisis was led by the devaluation of one country's currency, the Thai Baht. However, in contrast to the Latin American crisis, some countries fared more poorly than Thailand. Consider that \$100 invested in June of 1997 in Indonesia declined to a mere \$10 by January 1998. In contrast, the same investment fell to \$30 in Thailand. The only country that is relatively immune to the regional problems is China.

The Asian crisis had more widespread impacts on currency valuation. Many more countries' currencies severely declined in value. This is consistent with the Asian crisis

Table 3a
Contagion Effects, Latin America

| | Crisis returns (%) | Next 6 months |
|-----------|--------------------------|------------------|
| Argentina | -17.3 | 19.1 |
| Brazil | -27.5 | 0.2 |
| Chile | 16.1 | -15.2 |
| Colombia | 2.8 | -20.7 |
| Mexico | -47.8 | 1.9 |
| Peru | 0.4 | 3.3 |
| Venezuela | -13.3 | -15.5 |
| AC World | 8.4 | 9.3 |

Crisis period: 16/12/94 - 30/6/95
Next 6 months: 1/7/95 - 30/12/95
US\$ IFC Global Total Returns

being a truly regional crisis (many countries with similar problems). In contrast, the main problem country in Latin America was Mexico.

Table 3a presents the contagion effects of Latin American countries. In a quantitative analysis of the Latin American returns contrast the intra country correlations before the crisis period with during the crisis period, one might think that the regional correlations are much higher during the crisis than before. For example, the average correlation of Mexico with its neighbors was 28.8 percent three years before the crisis. This correlation is basically unchanged at 25.9 percent during the crisis. Interestingly, in the post crisis period, the correlations are much higher. The average correlation of Mexico with

its neighbors is 41.1 percent in the six months following the crisis period.

Table 3b presents a similar analysis of the Asian countries. Unfortunately we do not have a post crisis period in our data. However, there is quite a contrast between the pre-crisis correlations and the during crisis correlations. For example, in the three years prior to the crisis, the average correlation between Thailand and its neighbors was 24.1 percent. During the crisis the correlation rises to 43.1 percent. If we exclude China from the analysis, the average correlation is 53.0 percent during the crisis.

Country risk in crises

To analyze country risk during the crisis period, we examined six measures of country risk: Institutional Investor's semi-annual country credit rating, Euromoney's semi-annual country credit rating, and the International Country Risk Guide's (ICRG) monthly Political, Economic, Financial and Composite ratings. Looking at the country risk analysis for Latin American countries, the rating for Mexico drops sharply from 73.5 in December 1994 to 67.0 in January. Interestingly, only one other Latin American

Table 3b
Contagion Effects, Asia

| | Crisis returns (%) |
|-------------|--------------------------|
| China | -12.7 |
| Hong Kong | -39.5 |
| Indonesia | -83.9 |
| Malaysia | -70.4 |
| Philippines | -58.1 |
| Singapore | -36.9 |
| South Korea | -51.4 |
| Taiwan | -28.7 |
| Thailand | -53.1 |
| AC World | 0.1 |

Crisis Period: 27/6/97 - 30/1/98.
US\$ IFC Global and MSCI (HK, Singapore) Total Returns

country, Venezuela, experienced a decline in January 1995, and it was a minor decline. By March 1995, Mexico's rating had dropped to 66.0. The perceptions of increased risk had spread to four other Latin American countries by then. In a time series of risk measures for the Latin American countries, while there is a clear decline in Mexico, the other countries seem resilient.

In an examination of Asian countries, the rating for Thailand in August 1997 is 81.0. This sharply drops to 71.3 in September 1997. By January 1998, the rating had plummeted to 60.8. In contrast to the Latin American crisis, six other countries experienced declining ratings in September 1997 (only China and Singapore's ratings did not change). This also holds for January 1998. All countries, except China and Singapore experienced declining ratings.

The patterns in the country risk ratings are much different in the Asian crisis than the Latin American crisis. Evidence shows perceptions of risk fundamentally changed in a number of Asian countries after the start of the crisis.

Crises and risk premia

Table 4 presents the analysis of what the crises meant in terms of increased risk premia that investors demand for investing in Latin American and Asian countries. The expected premium is derived from regressing the average country returns in U.S. dollars in excess of a U.S. Treasury bill return on the natural logarithm of the Institutional Investor country credit rating. The change in the rating provides information about the change in the expected excess returns (or the risk premium). We also provide an analysis of the expected volatility and correlation with world market returns.

For the Latin American crisis, there is a sharp increase in the risk premium for Mexico, 140 basis points. However, there is little evidence of a major change in the risk premium for the other Latin American countries.

In contrast, the Asian crisis had a much more widespread impact on expected premiums. The risk premium for investing in Thailand increases by 230 basis points. Six other countries experience increased premiums.

Conclusions

We have explored three unique aspects of risk in emerging markets. First, returns are nonnormal. As a result, the standard tools of portfolio and risk management are not appropriate. For example, if a value at risk (VAR) analysis was calibrated assuming a normal distribution for an emerging equity return, it would miss important scenarios (large negative re-

turns) because the assumption of the normal distribution. The second aspect is the hedging ability of emerging markets for developed market investors. We argue that there does not appear to be a free lunch. Investors should not count on these markets to out perform developed markets when developed markets are in bear phases. Finally, we explored the idea of contagion - bad news in one country spreads to an entire region. Our results suggest that we should be careful in drawing generalization about one regional crisis and applying it to the next. The Mexican crisis was more a one-country crisis and the Asian crisis involved multiple countries with similar problems. While the crisis period led to increases intra-regional correlations in both regions, the increased correlation was more dramatic when the neighboring countries shared the same fundamental problems

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Table 4 Impact of Crisis on Risk Premia

| | Country credit rating ¹ | | Expected excess returns ² | | Expected volatility ² | | Expected correlation with world | |
|-------------|------------------------------------|--------|--------------------------------------|--------|----------------------------------|--------|---------------------------------|--------|
| | Dec-94 | Dec-95 | Dec-94 | Dec-95 | Dec-94 | Dec-95 | Dec-94 | Dec-95 |
| Argentina | 37.3 | 38.8 | 19.8 | 19.3 | 35.7 | 35.0 | 0.19 | 0.20 |
| Brazil | 30.3 | 34.9 | 23.0 | 20.8 | 39.3 | 36.8 | 0.10 | 0.16 |
| Chile | 54.9 | 57.4 | 14.1 | 13.4 | 29.0 | 28.2 | 0.35 | 0.36 |
| Colombia | 44.4 | 46.5 | 17.2 | 16.5 | 32.7 | 31.9 | 0.26 | 0.28 |
| Mexico | 46.1 | 41.8 | 16.7 | 18.1 | 32.0 | 33.7 | 0.27 | 0.23 |
| Peru | 21.0 | 25.8 | 28.4 | 25.4 | 45.6 | 42.0 | -0.05 | 0.03 |
| Venezuela | 36.0 | 31.4 | 20.4 | 22.4 | 36.3 | 38.6 | 0.17 | 0.11 |
| | Jun-97 | Mar-98 | Jun-97 | Mar-98 | Jun-97 | Mar-98 | Jun-97 | Mar-98 |
| China | 58.0 | 57.6 | 13.2 | 13.3 | 28.1 | 28.2 | 0.37 | 0.37 |
| Hong Kong | 64.9 | 62.9 | 11.6 | 12.0 | 26.1 | 26.7 | 0.41 | 0.40 |
| Indonesia | 51.6 | 49.9 | 15.0 | 15.5 | 30.1 | 30.7 | 0.32 | 0.31 |
| Malaysia | 67.5 | 64.5 | 11.0 | 11.6 | 25.5 | 26.2 | 0.43 | 0.41 |
| Philippines | 42.3 | 43.3 | 18.0 | 17.6 | 33.5 | 33.1 | 0.24 | 0.25 |
| Singapore | 83.9 | 82.9 | 7.7 | 7.9 | 21.7 | 21.9 | 0.52 | 0.52 |
| Korea | 71.4 | 64.4 | 10.1 | 11.7 | 24.5 | 26.3 | 0.45 | 0.41 |
| Taiwan | 77.1 | 75.5 | 9.0 | 9.3 | 23.2 | 23.5 | 0.49 | 0.48 |
| Thailand | 61.1 | 52.3 | 12.5 | 14.8 | 27.2 | 29.9 | 0.39 | 0.33 |

1. Taken from Institutional Investor

2. Percent.

Estimates derived from EHV Model: 1981:03-1998:03

| | Expected excess returns | Expected volatility | Expected correlation |
|--------------------|-------------------------|---------------------|----------------------|
| Intercept | 0.74 | 0.98 | -1.31 |
| Log(IICCR) | -0.15 | -0.17 | 0.41 |
| t-statistic | -2.70 | -6.93 | 15.02 |
| *Log(IICCR) | 0.83 | -0.58 | 0.67 |
| t-statistic | 2.16 | -3.55 | 4.00 |
| Adj R ² | 0.03 | 0.18 | 0.26 |