Emerging Market Crises and US Equity Market Returns

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Emerging Market Crises and US Equity Market Returns[*]

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We find contagion effects are present in US small size portfolios during emerging market crises due to risk and liquidity concerns. Investors display flight from risk during emerging market crises, and as a result, safer larger stocks exhibit positive abnormal returns. We find little evidence of contagion in aggregate excess US market returns, indicating studies that focus on national aggregates may miss important within market dynamics during emerging market crises. The international dynamics that we document have important implications for investors, even when they may have limited global exposure.

JEL Classification Codes: G12, E32

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1. Introduction

We examine the impact of emerging market crises on US portfolio returns to measure the international spillover of financial crises. Recent emerging market crises make the topic of contagion especially pertinent. Carrieri, Errunza and Hogan (2007) demonstrate that world integration tends to increase through time. Bekiros and Georgoutsos (2008) discuss a dramatic increase in private capital flows into emerging markets in recent years. As developing nations become increasingly integrated in the world market, the role of financial crises may become more important. For example, Broner, Gelos and Reinhart (2006) argue that contagion results from investors scaling back areas that were overweighted, and Bayoumi, Fazio, Kumar and MacDonald (2007) find that developed market investors herding into emerging markets may be an important precondition for a crisis. As we provide evidence that emerging market crises influence the US market, understanding the dynamics of these crises may be vital. Specifically, as international mechanisms influence worldwide capital markets, this will affect even a purely domestic investor.

Models and explanations for contagion often focus on portfolio rebalancing in response to financial shocks, illustrating how fundamental shocks within one market may spread globally (cf. Kodres and Pritsker (2002)). Existing research tends to focus on measuring the impact of a financial crisis in one country on national aggregates across the globe. However, in addition to predicting the transmission of shocks across the globe, when applied to a single market, many models also predict a response within domestic portfolios following an international shock. Our innovation is to focus on portfolios within the US market following international shocks. At an aggregate US market level of analysis, we find no impact due to emerging market shocks. However, when we disaggregate the US market, we find interesting dynamics across US portfolios related to both risk and liquidity.

Our focus on portfolios within the US market allows for a relatively clean test of contagion, relative to many existing studies. Researchers typically define contagion as an increase in the relation across assets during crises (cf. Forbes and Rigobon (2002)). Therefore, studies must disentangle fundamental shocks from pure contagion effects, and by construction, both contagion effects and fundamental valuation shifts tend to co-exist. For example, Yang and Bessler (2008) point out that analyzing contagion within a region, such as Latin America during the Argentine crisis, may be difficult, as all Latin American countries may share similar fundamentals or risk exposures with Argentina, the country of origin. Our study within the US market mitigates this concern. Finding contagion for some portfolios, flight to quality for others, and no effect at the aggregate market level, suggests our results are due to emerging market events, rather than weakened fundamentals across all securities.[*]

We examine US equity returns conditional on emerging market crises and define contagion as abnormal negative returns after controlling for developed market factors. In a similar fashion, flight to quality refers to abnormally strong performance during international crises, after controlling for systematic sources of risk. Our results support the flight from risk hypothesis. Namely, we find contagion within our riskier US portfolios during emerging market crises, as

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[*] Our hypotheses consider the impact of emerging market shocks on the US market. We assume that each crisis originates within the identified emerging market country. Further, each crisis centers around a currency event within the identified country. This interpretation is consistent with the findings of Conover et al (2002) who find high integration between monetary policy in developed markets, but weaker correlations between emerging and developed markets. Nonetheless, we cannot rule out the 'monsoon' hypothesis, in which changes in US fundamentals simultaneously impact US portfolios as well as emerging markets. We thank an anonymous referee for making this point.

well as positive return shocks to the safer portfolios. This indicates investors may optimally rebalance the risk exposure of their entire portfolio in response to a shock within one specific market.[†] Our results document important contagion dynamics missed by analyses of aggregate national markets.

2. Hypothesis development

A large body of literature discusses mechanisms by which a crisis can spread across assets. Further, many models describe how a shock can transmit across markets without underlying fundamental risk factors in common. Empirically, existing research estimates the propagation of shocks across national markets, comparing relations across crisis and calm periods. We argue that the models and explanations for contagion imply varying effects across portfolios within one country in response to a shock elsewhere. Thus, rather than test for contagion spreading from one country to multiple other countries during a specific crisis, we test for contagion effects across multiple US portfolios in response to many emerging market events. After reviewing the relevant models for contagion, we develop contagion related hypotheses for disaggregated domestic portfolios in response to emerging market shocks.

Explanations and models for financial contagion often focus on portfolio rebalancing strategies related to risk and liquidity. Kodres and Pritsker (2002) model contagion via investors optimally rebalancing their exposure to multiple risk factors and consequently transmitting shocks across markets. They also discuss that investors may choose to sell their most liquid assets

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[†] Unfortunately, we cannot offer guidance on whether the primary adjustment mechanism in the US equity market relates to international or domestic US investors. We acknowledge an anonymous referee for this question.

in response to a liquidity shock stemming from a crisis, regardless of the origin of the shock. Schinasi and Smith (2000) describe contagion based on portfolio management rules, suggesting that a shock causes leveraged investors to scale back their positions in all risky assets, and Fazio (2007) argues that flight from risk behavior could transmit shocks across markets. Specifically, discriminating contagion occurs if a shock in one market spreads to other markets that investors perceive as similar. Alternatively, flight from risk, or pure contagion, occurs if investors moving away from riskier assets in general serves to transmit a shock across countries. Finally, Kyle and Xiong (2001) model contagion as a wealth effect.

In addition to contagion effects naturally arising due to portfolio rebalancing, changes in risk appetite due to financial shocks may also lead to contagion. For example, Campbell and Cochrane (1999) present a model consistent with counter cyclical variation in risk aversion and Baek, Bandopadhyaya and Du (2005) argue a crisis in one country may alter the market's risk appetite. A negative shock in one market may lead to an increase in overall investor risk aversion. With higher levels of risk aversion, riskier assets must provide higher expected returns and current prices must fall. In this way, a crisis may quickly spread across risky assets without fundamentals or risk factors in common.

Extending existing contagion explanations (Fazio, 2007; Kodres & Pritsker, 2002) to the US market, we create our flight from risk hypothesis in which a crisis in one country causes investors to scale back all risky positions to maintain optimal levels of risk exposure. Under this hypothesis, we expect abnormal negative returns to riskier US portfolios, and positive returns to safer US stocks as investors place additional selling pressure on riskier assets following an international shock.

Alternatively, we consider the liquidity shock hypothesis in which an international shock to any asset generates a liquidity need that investors will satisfy through sales of other assets. Equal selling pressure across all assets will generate more price pressure on the most illiquid assets. Although investors may mitigate this impact by selling more liquid assets most heavily, the correlation between liquidity risk and other systematic risks suggests that we will observe greater negative price movements in the most illiquid stocks. The liquidity shock hypothesis is especially relevant in our study as US portfolios are typically considered more liquid, relative to their emerging market counterparts, and consequently we expect contagion to manifest in the domestic US market. We also note that under this hypothesis, investors will seek to minimize negative price impacts, by liquidity trading across all holdings.

We hypothesize that the impacts of emerging market crises on US portfolios will vary based on portfolio characteristics. Specifically, we expect greater price response to the most risky and illiquid US asset portfolios in response to an emerging market crisis. We argue that size is negatively related to risk and positively related to liquidity, and consequently we use size portfolios to proxy for both risk and liquidity. A large body of literature exists supporting this approach. As examples, considering the relation between size and risk, Fama and French (1992) argue that size proxies for an important risk factor. Further, Berk (1995) argues that size and risk are negatively related, as riskier stocks must have lower market-capitalizations.[‡] Brav, Lehavy and Michaely (2005) use analyst expectations to estimate ex ante expected returns and find a negative relation between size and expected returns, arguing that size is a risk factor. Considering liquidity and size, as examples Li, Mooradian and Zhang (2007) find that smaller stocks are relatively illiquid and Liu (2006) finds a negative correlation between size and illiquidity.

Models describing contagion cannot distinguish between risk and liquidity as the relevant portfolio characteristic determining the impact of emerging market crises on a US portfolio. Our

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[‡] The negative relation between size and risk is apparent in our later summary statistics, as return standard deviation and minimum monthly sample returns both decrease in magnitude monotonically with size.

hypotheses and the behavior of the large-cap portfolios in our tests may allow us to differentiate between the hypotheses. Under the liquidity shock hypothesis, we expect negative abnormal returns across all portfolios, while we expect positive returns to the large portfolios under the flight from risk hypothesis. Therefore, given the conflicting predictions of our hypotheses and the existing research discussed above, we hope to disentangle the more important of these two competing hypotheses.

3. Data and initial empirical analysis

We examine our hypotheses regarding crises and developed market portfolios with a focus on several recent emerging market crisis episodes. The propagation of crises depends on the level of world integration. Recent research documents a dramatic increase in net capital flows from developed to emerging markets and finds that world market integration has increased significantly over time. For example, Bekiros and Georgoutsos (2008) document that net private capital flows from developed to emerging markets increased from approximately $15 billion over 1983 to 1988 compared to over $105 billion between 1989 through 1995. Collins and Gavron (2004) identify seven recent emerging market crises, and the dates on which the crises began. The crises are as follows: the Czech Koruna crisis (May, 1997), the Asian Crisis (July, 1997), the Zimbabwean Dollar crisis (November, 1997), the South African Rand crisis (June, 1998), the Russian default crisis (August, 1998), the Brazilian Real crisis (January, 1999) and the Argentinean Peso crisis (July, 2001). We therefore choose a sample period from 1988 through 2007 that includes these seven emerging market crises and also reflects the recent international environment. A benefit of our multiple crisis approach is that we mitigate the noise present in any given event to increase the power of our research design.

We consider monthly returns to size quintiles obtained from Kenneth French.[§] From this data set, we construct a small minus big portfolio, *SMB*, by subtracting the big portfolio return from the small portfolio return. Summary statistics are presented in Table 1. A cursory inspection of the table reveals that our sample includes turbulent periods. The minimum monthly emerging market excess return is less than -30%. Further, the smallest three US stock quintiles all have minimum excess returns of less than -20%. We find that the small stock portfolios and the emerging market indices offer the largest expected excess returns, along with greater volatility. The mean emerging market index excess return is approximately 2.2% per month with a standard deviation of over 6.5%. Considering US size quintiles, we find a tendency for mean and median excess returns, and standard deviations to decrease with size.

Insert Table 1 about here

In our analysis of contagion, we compare returns across crisis and normal periods. For each crisis date, we consider a four-month crisis window that begins the month prior to the crisis month, includes the crisis month, as well as the following two months. Multiple potential alternative crisis window specifications exist. A relatively wide crisis window has the benefit of capturing much of the interesting run-up and follow-on behavior surrounding crises.[**] The crises within our sample typically correspond to a specific currency event, and this event may be anticipated by the market. For example, the devaluation of the Thai Baht is often used as the

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[§] We gratefully acknowledge Ken French for his provision of the data (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

[**] In unreported analyses, we consider a narrower crisis definition that includes the seven specific crisis months to define the crisis periods. As expected, these months have more dramatic return shocks, as well as more sampling variability.

crisis date for the East Asian crisis (July 1997), yet earlier newspaper reports from May and June suggest an earlier date of anticipated crisis. Therefore, defining the crisis window to start with the month of the crisis would miss any dynamics that occur during the run-up period in which the market may anticipate the crisis. Omitting the months following the crisis has the potential to miss important run-on impacts, long-run dynamics, or short run reversions.[††] Our approach should capture much of the variability around these seven crises, and also provide a reasonable number of crisis observations to provide good test power. Our approach of identifying crises based on relative event dates is common in contagion research and consistent with many existing studies (Forbes & Rigobon, 2002; Sriananthakumar & Silvapull, 2008).

Table 2 presents mean excess returns for US domestic portfolios across a variety of aggregate market return scenarios. From this analysis, we can compare mean excess returns of US portfolios across emerging market states to assess whether mean excess returns for a specific portfolio differ conditional upon emerging market behavior after controlling for the developed market. The first two columns of Table 2 report mean excess returns conditional on crisis and normal states, as well as a p-value for the test that these values differ. We observe negative conditional sample means in crisis states for all but the biggest size based portfolio. In addition, the crisis period returns monotonically increase across size portfolios. The normal period return for the small size portfolio of 1.1% is dramatically larger than the crisis period return of -1.27% (marginally significant at the 5.7% level). Similarly, the *SMB* portfolio has a normal period return

[††] Our crisis sample and crisis-window specification creates a small number of overlapping crisis observations in which one month falls within the crisis window for two crises. From our hypotheses, inclusion of these months within our sample is not problematic.

of 0.455% and a crisis period return of -1.97% (significant at the 1.7% level).[‡‡] We fail to reject the equality of means between normal and crisis periods for our remaining size portfolios. Therefore, conditional upon emerging market crises, we observe significantly lower excess returns for the small portfolio and the *SMB* portfolio, and no effect across the other portfolios, providing initial evidence of contagion within risky assets and supporting our flight from risk hypothesis.[§§]

Insert Table 2 about here

We control for world market performance and examine US portfolio performance conditional on emerging market returns, as an alternative measure of poor emerging market performance.[***] In particular, we consider states in which the world market excess return is positive and the emerging market excess return index is negative. Rejecting the equality of mean excess returns across emerging market states shows that the given portfolio performs differently

[‡‡] The *SMB* result is robust across multiple crisis window specifications. These include a narrow specification in which only the seven specific crisis months are included in the crisis sample, and multiple crisis specifications that start the crisis sample either the month of the crisis, or the month prior, and extend the crisis sample one, two, or three months after the crisis month.

[§§] To admit potential non-normalities in portfolio excess returns we also performed a test of differences in Wilcoxon scores. Our *SMB* portfolio results are qualitatively unchanged. However, the difference in Wilcoxon scores for the small portfolio is no longer significant.

[***] Peltomaki (2007) performs a similar analysis to consider mean hedge fund performance across market return and volatility regimes. Specifically, he compares mean returns for a given hedge fund across positive and negative S&P 500 return regimes.

conditional on emerging market states, for a given sign in the world market excess return. The final four columns of Table 2 report mean excess returns for US portfolios conditional on the sign of the world (R_w^+ and R_w^-) and emerging market returns (R_{em}^+ and R_{em}^-).[†††]

Columns three and four of Table 2 consider the situation where world market excess returns are positive. If the emerging market also increases, then the small and big stock portfolios increase 3.8% and 2.9%, respectively. In contrast, when the emerging market falls, the small and big portfolios earn -1.0% and 2.6%, respectively. The difference, 4.8% (=3.8% + 1.0%), in the small stock return across emerging market states is highly significant, while the large portfolio appears unaffected. The highly significant difference between the *SMB* portfolio when world returns increase and when emerging markets rise or fall is 4.5% (= 0.9% + 3.6%). These results provide evidence consistent with contagion from emerging markets to risky US stocks.

Defining contagion as increased comovement during crises, many researchers analyze contagion based on changing correlations around crises (cf. Forbes & Rigobon, 2002; Bradley & Taqqu, 2005). In Table 3, we report pairwise correlations between US portfolio returns and the emerging market index for our crisis window specification and for emerging market return quartiles. Estimated correlations suggest an increased dependency between US portfolios and emerging markets during periods of poor emerging market performance. Our correlation estimates range from 0.67 to 0.77 conditional on emerging market crises. These estimates compare to a range of 0.49 to 0.55 during our normal sample period. Considering emerging market return quartiles, we find significant correlation estimates ranging from 0.58 to 0.68 conditional on emerging market returns falling in their lowest quartile. We do not obtain

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[†††] Bekaert, Harvey and Ng (2005) also discuss how world market conditions will impact US returns.

significant correlation estimates for any portfolio within any of the three remaining emerging market return quartiles.[‡‡‡]

Insert Table 3 about here

To compare correlations between our normal and emerging market sample periods as well as across quartiles of emerging market performance, we perform Fisher's transformation and test the equality of correlations based on the transformed variables in Panel B of Table 3.[§§§, ****] Entries under the 'Normal' column in Panel B compare correlations across our normal and crisis sample periods. For example, the entry of 1.19 with the associated *p*-value of 0.058 marginally rejects equality of correlations between the emerging market index and the small size portfolio across normal and crisis periods. We also marginally reject equality for the fourth and fifth size quintiles. These results indicate some level of contagion from emerging markets to extreme size

[‡‡‡] The quartile based correlations temper concerns regarding unbalanced sample sizes. By construction, these correlations are based on equal sample sizes within each quartile column. Finding strong significance only when we observe left-tail emerging market behavior suggests a potentially different economic relationship between portfolios when emerging markets falter.

[§§§] Forbes and Rigobon (2002) show that heteroskedasticity across samples can bias correlation estimates and provide a correction for the bias. When appropriate, we present results based on the this correction.

[****] Our initial hypotheses considered both potential contagion (increasing correlation), and flight to quality (decreasing correlation) effects of a crisis. Consequently, we present results from two-sided tests.

quintile stocks, as these stocks exhibit a larger correlation with emerging markets during emerging market crises.

The remaining entries in Panel B of Table 3 compare correlations within the given emerging market return quartile to the correlation within the lowest emerging market return quartile, for a given domestic portfolio. In this analysis, we reject equality in all instances, indicating an increase in the correlations between domestic stock portfolios and emerging markets during periods of poor emerging market performance.

4. Controlling for international risk sources

Given that our focus is on US portfolios in relation to both US domestic and international risks, we next consider a variety of asset pricing specifications. We begin with a traditional CAPM and consider the resultant conditional alphas for various portfolios, as well as how these alphas change during emerging market crises. We extend the standard usage of alpha as a measure of abnormal performance, by linking alpha to our crisis period definitions. We also extend the asset pricing model to admit changes in risks related to emerging market crises. This allows us to address if potential abnormal performance is due to changes in risk during crises. We implement an empirical model in which structural breaks reveal changing returns and risk surrounding emerging market crises. Our empirical specification is as follows,

$$R_{j,t} = \alpha_j + \phi_{0,j} C_t + (\beta_{w,j} + \phi_{1,j} C_t) R_{w,t} + \varepsilon_{j,t} \tag{1}$$

where $j = 1,2 \ldots N$, and $t = 1,2,\ldots T$. We define $R_{j,t}$ as the excess return to portfolio j, $R_{w,t}$ as the excess return to the world portfolio, and C_t is a crisis indicator variable taking the value of one for the four month period beginning one month prior to, and ending two months after, each identified crisis month, and 0 otherwise.

Our empirical specification is similar to Maroney, Naka and Wansi (2004) who employ a benchmark ICAPM and find structural breaks for the relevant Asian markets during the 1997 Asian financial crisis. The coefficients, $\phi_{0,j}$ and $\phi_{1,j}$ for *j*=1,2…*N* represent structural breaks during the identified emerging market crises for portfolio *j*. In general, the conditional alpha for any given portfolio is given by $\alpha_j + \phi_{0,j} C_t$ where the normal period component is α_j, and $\phi_{0,j} C_t$ represents the change in alpha during a crisis. Significant estimates of $\phi_{0,j}$ indicate an expected excess return shock during crises. Significant estimates of $\phi_{1,j}$ represent a change in an asset's sensitivity (beta) to the world market during emerging market crises. Our initial results omit the $\phi_{1,j}$ term and estimate equation (1) for the US market portfolio and US size quintiles. We report parameter estimates of $\phi_{0,j}$ in Table 4.

Insert Table 4 about here

We initially present estimation results for the US market portfolio in Panel A. We fail to find evidence of a significant emerging market effect in the conditional alpha, $\phi_{0,Market}$, during crisis periods. However, considering results based on size portfolios in Panel B, we find evidence that emerging market crises do influence both small and big portfolios. We find a significant negative change in alpha during crises periods of 2.4% for the *SMB* portfolio (approximately equal to the difference in $\phi_{0,j}$ estimates across the small and big portfolios). We also find a comparable estimate of -1.6% for the small stock portfolio, which is marginally significant. The crisis period alpha for the large portfolio of 0.8% is also marginally significant and indicates strong performance conditional on emerging market shocks within this portfolio.[††††]

F-tests of the joint restrictions across all portfolios for α_j and $\phi_{0,j}$ are presented in the final two rows of the table. For arbitrary parameter Φ_j, we test the hypotheses that $\Phi_i = \Phi_j$ for all *i* and *j*; and $\Phi_i = \Phi_j = 0$, for all *i* and *j*. The rejection of the test that all α_j are jointly zero is a reflection of the general strong US portfolio relative to the world index during our sample. However, we fail to reject the equality of the α_j estimates across the size portfolios. We therefore conclude that the unconditional strong performance in US portfolios does not significantly differ across size portfolios. The final two rows of the third column of Table 4 reports F-test results for the hypotheses that all $\phi_{0,j}$ are equal, and all jointly equal zero, respectively. We strongly reject both hypotheses. Rejecting the hypothesis that the $\phi_{0,j}$ terms jointly equal zero indicates that emerging market crises do affect US portfolio performance. Rejecting equality of the $\phi_{0,j}$ terms across all assets indicates that the impact of emerging market crises varies across portfolios.

Table 4 presents evidence that emerging market crises do not influence the aggregate US market. However, we find evidence that emerging market crises do affect US size portfolios and

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[††††] Parameter estimates of $\phi_{0,j}$ are significant and negative for the small portfolio and the *SMB* portfolio, and significant and positive for the large stock portfolio across a broader crisis-window specification that extends our crisis window to include the three months that follow each crisis. Results for these portfolios are robust across multiple crisis window specifications in which the crisis window starts the month of the crisis, or one month prior, and extends up to three months after the crisis month.

the effect varies across portfolios with positive returns to safe portfolios and negative returns to the small stock portfolio. In the analysis of Table 4, we do not admit potential changes in the portfolio betas during emerging market crises through the coefficient $\phi_{1,j}$. We now consider an empirical specification that allows shifts in portfolio betas during emerging market crises. We continue to include potential changes in portfolio alpha during crises periods. This analysis tests for conditional abnormal performance while allowing shifts in risk or market sensitivities conditional on crises. We present results based on the general empirical model, given by equation (1), in Table 5.

*** Insert Table 5 about here ***

We report US market results in Panel A of Table 5 followed by portfolio results in Panel B. Consistent with our earlier results, we fail to find an impact on the US aggregate market alpha or beta during crises periods in Panel A. Panel B again demonstrates a significantly negative change in the conditional alpha during crisis periods for the small stock portfolio. The change in alpha during crises is estimated to be approximately -2.5% per month for the *SMB* portfolio. We also find significantly different $\phi_{0,j}$ estimates across all size portfolios based on our reported F-statistics. The final column of the table reports our estimates and tests related to changes in crisis betas, $\phi_{1,j}$. None of the reported risk change parameters are significant, and nor are any of the tests of differences across portfolios. That is, we find significant underperformance of small, relative to large stocks during emerging market crises after controlling for potential changes in risk.

Estimates of equation (1) based on individual size portfolios presented in Panel B provide further evidence supporting our flight from risk hypothesis. We find positive estimates of $\phi_{0,j}$ for the big portfolio. Our estimate of $\phi_{0,j}$ is 0.8% for the big portfolio and is significant at the 5% level. This indicates a large positive return during emerging market crises. Supporting the analysis in Table 4, we continue to observe a significant negative estimate of $\phi_{0,j}$ for the small portfolio, indicating that even after controlling for changes in market risk, we continue to observe negative returns to the small stock portfolio.[‡‡‡‡]

5. Conclusions

We find evidence that, despite having no impact on the aggregate US market, emerging market crises negatively affect small stocks, but have a positive impact on large stocks. The patterns of performance conditional on emerging market crises are consistent across a variety of research designs and suggest that we observe a flight from risk in small stocks (and a concomitant flight to quality in large stocks) during emerging market crises. Positive returns to large stocks during crises suggest that liquidity risk may be less important than risk related portfolio behaviors.

[‡‡‡‡] We obtain similar results in an analysis with a segmented international CAPM that includes developed and emerging market factors.

ENDNOTES

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Table 1
Summary Statistics

	Mean	*Median*	σ	*Min*	*Max*
World	0.247	0.906	3.861	-16.080	9.127
Developed	0.188	0.813	3.839	-15.419	9.006
Emerging	2.234	2.689	6.540	-31.818	20.428
US	0.664	1.065	3.979	-16.200	10.300
SMB	0.208	-0.135	4.745	-20.340	29.050
Small	0.866	1.135	5.797	-22.230	27.250
S_2	0.779	1.450	5.342	-20.720	17.220
S_3	0.778	1.315	4.837	-20.480	11.770
S_4	0.837	1.080	4.518	-18.110	12.870
Big	0.657	0.945	3.944	-14.920	11.290

We present summary statistics for returns to international stock indexes and US stock portfolios for our monthly sample from January 1988 through August 2007. The return on the world portfolio in excess of the US one month T-Bill of stock indexes is denoted as World. Excess returns for developed markets and emerging market indexes are denoted by Developed and Emerging, respectively. The US market excess return is denoted with US. We include excess returns to five size quintiles, represented by S, and indexed accordingly. The ‘small minus big’ portfolio is denoted as SMB.

Table 2
Conditional Means Across Crisis and Normal Periods

			World^{+}		*World*$^{-}$	
	Normal	*EM Crisis*	*Emerging*$^{+}$	*Emerging*$^{-}$	*Emerging*$^{+}$	*Emerging*$^{-}$
SMB	0.455	-1.970	0.916	-3.559	0.624	-0.593
	(0.017)		(0.002)		(0.135)	
Small	1.107	-1.267	3.847	-1.002	-0.657	-3.473
	(0.057)		(0.001)		(0.006)	
S_2	0.988	-1.067	3.754	-0.009	-1.128	-3.531
	(0.210)		(0.001)		(0.012)	
S_3	0.961	-0.841	3.596	0.574	-1.016	-3.438
	(0.239)		(0.001)		(0.007)	
S_4	1.007	-0.667	3.533	1.103	-1.110	-3.142
	(0.216)		(0.006)		(0.008)	
Big	0.652	0.703	2.931	2.557	-1.280	-2.880
	(0.952)		(0.621)		(0.011)	

We report mean excess monthly returns for size quintiles conditional on emerging market crises, and global stock indexes for our monthly sample period from January 1988 through August 2007. We consider seven emerging market crises and define Crisis months as the four month period beginning one month prior to, and ending two months after, the identified crisis month. We define the remaining months in our sample as Normal. The excess return to the MSCI world and emerging market indexes are denoted by World and Emerging, respectively. Superscripts '+' and '-' refer to positive or negative returns to these indexes, respectively. Reported p-values test the hypothesis that the given portfolio mean return is equal across normal and crisis periods, or across positive or negative emerging market regimes for a given world market return direction.

Table 3
Conditional Correlations

Panel A. Correlation Estimates

	Normal	*EM Crisis*	*x*<25%	25%<*x*<50%	50%<x<75%	75%<*x*
Small	0.490	0.669	0.623	0.091	0.049	0.026
	(0.000)	(0.000)	(0.000)	(0.491)	(0.714)	(0.845)
S_2	0.537	0.673	0.622	0.052	0.122	0.062
	(0.000)	(0.000)	(0.000)	(0.696)	(0.359)	(0.641)
S_3	0.551	0.731	0.677	0.082	0.121	0.056
	(0.000)	(0.000)	(0.000)	(0.535)	(0.360)	(0.673)
S_4	0.530	0.766	0.664	0.084	0.095	0.042
	(0.000)	(0.000)	(0.000)	(0.525)	(0.477)	(0.755)
Big	0.502	0.773	0.579	0.108	0.105	0.042
	(0.000)	(0.000)	(0.000)	(0.414)	(0.428)	(0.754)

Panel B. Test Statistics

	Normal	*EM Crisis*	*x*<25%	25%<*x*<50%	50%<x<75%	75%<*x*
Small	1.19			3.38	3.30	3.72
	(0.058)			(0.000)	(0.000)	(0.000)
S_2	0.41			3.58	2.12	3.53
	(0.170)			(0.000)	(0.008)	(0.000)
S_3	0.55			3.92	2.41	4.06
	(0.145)			(0.000)	(0.004)	(0.000)
S_4	0.85			3.79	2.83	4.01
	(0.099)			(0.000)	(0.001)	(0.000)
Big	0.88			1.87	1.95	3.28
	(0.095)			(0.015)	(0.013)	(0.000)

We consider sample correlations between the MSCI emerging market index (US Dollar) and US size portfolios. Panel A shows sample correlations and associated p-values conditional on our emerging market crises, as well as for given emerging market return quartiles. In column two of Panel B we present test statistics for differences in correlations between a given US portfolio and the emerging market index across normal and crisis periods. Columns five, six and seven report tests of differences in the correlation between a given portfolio and the lowest emerging market quartile versus the correlation within the remaining quartiles. We control for heteroskedasticity in Panel B (following Forbes and Rigobon (2002)).

Table 4
Alpha Conditional on Emerging Market Crises

	α_j	$\phi_{0,j}$	β_j
Panel A. Market Estimates			
US	0.409	0.283	0.917
	(0.001)	(0.475)	(0.000)
Panel B. Size Portfolios			
SMB	0.446	-2.402	0.028
	(0.171)	(0.019)	(0.725)
Small	0.802	-1.619	0.926
	(0.011)	(0.099)	(0.000)
S_2	0.665	-1.255	0.981
	(0.011)	(0.121)	(0.000)
S_3	0.644	-1.018	0.962
	(0.003)	(0.126)	(0.000)
S_4	0.692	-0.895	0.956
	(0.000)	(0.109)	(0.000)
Big	0.356	0.784	0.898
	(0.007)	(0.057)	(0.000)
$\phi_i = \phi_j$: for all *i* and *j*	1.93	3.49	-
	(0.106)	(0.009)	
$\phi_i = \phi_j = 0$: for all *i* and *j*	3.72	3.10	-
	(0.003)	(0.010)	

We report parameter estimates and p-values from the following model

$$R_{j,t} = \alpha_j + \phi_{0,j} C_t + \beta_{w,j} R_{w,t} + \varepsilon_{j,t}$$

where $R_{j,t}$ represents the excess return for portfolio *j* during time *t* and $R_{w,t}$ represents the excess return to the MSCI world index. We consider seven emerging market crises and define crisis months, C_t, as the four month period beginning one month prior to, and ending two months after, the identified crisis month. We consider *j*=7 assets representing the US market portfolio, five US size-based quintiles, and one zero-cost SMB portfolio, separately. In Panel A we report parameter estimates for the market portfolio. Panel B reports parameter estimates for the SMB portfolio, and the five size portfolios. The final two rows of the table present F-statistics and associated p-values in parentheses for the hypotheses that the given parameter is equal across the five size portfolios, and that the given parameter is jointly equal to zero across all five size portfolios, respectively.

Table 5

The International Capital Asset Pricing Model with Structural Breaks

	α_j	$\phi_{0,j}$	$\beta_{w,j}$	$\phi_{1,j}$
Panel A. Market Estimates				
US	0.414	0.307	0.902	0.073
	(0.001)	(0.440)	(0.000)	(0.341)
Panel B. Size Quintiles				
SMB	0.434	-2.456	0.062	-0.167
	(0.183)	(0.017)	(0.486)	(0.398)
Small	0.797	-1.639	0.939	-0.063
	(0.012)	(0.096)	(0.000)	(0.739)
S_2	0.665	-1.254	0.980	0.004
	(0.011)	(0.123)	(0.000)	(0.982)
S_3	0.649	-0.996	0.947	0.071
	(0.003)	(0.136)	(0.000)	(0.584)
S_4	0.693	-0.892	0.954	0.008
	(0.000)	(0.111)	(0.000)	(0.943)
Big	0.363	0.817	0.877	0.104
	(0.006)	(0.048)	(0.000)	(0.193)
$\phi_i = \phi_j$: for all *i* and *j*	1.87	3.60	-	1.06
	(0.117)	(0.007)		(0.379)
$\phi_i = \phi_j = 0$: for all *i* and *j*	3.69	3.22	-	1.05
	(0.003)	(0.008)		(0.387)

We report parameter estimates and p-values from the following model

$$R_{j,t} = \alpha_j + \phi_{0,j} C_t + (\beta_{w,j} + \phi_{1,j} C_t) R_{w,t} + \varepsilon_{j,t}$$

where $R_{j,t}$ represents the excess return of asset *j* during time *t* and $R_{w,t}$ represents the excess return to the MSCI world index. We consider seven emerging market crises and define crisis months, C_t, as the four month period beginning one month prior to, and ending two months after, the identified crisis month. We consider *j*=7 assets representing the US market portfolio, five US size-based quintiles, and one zero-cost SMB portfolio, separately. In Panel A we report parameter estimates for the US market portfolio. Panel B reports parameter estimates for individual size portfolios and the SMB portfolio. The final two rows of the table present F-statistics and associated p-values in parentheses for the hypotheses that the given parameter is equal across the five size portfolios, and that the given parameter is jointly equal to zero across all five size portfolios, respectively.