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The Asian Flu and Russian Virus: The International Transmission of Crises in Firm-Level Data*

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Abstract: This paper examines how the Asian and Russian crises affected different types of firms around the world. It constructs a new data set of financial statistics, industry information, geographic data, and stock returns for over 10,000 companies in 46 countries. Results show that firms competing with exports from the crisis countries, or with direct sales exposure to the crisis countries, had significantly lower abnormal stock returns. Firms with higher debt ratios, however, did not experience lower abnormal returns. Country-specific effects, although important determinants of company stock returns, are generally less important than firm-specific characteristics. These results suggest that trade channels are important factors determining how crises are transmitted internationally.

JEL Codes: F30, F40, G15

Keywords: Asian crisis, Russian crisis, contagion, trade, interdependence

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I. Introduction

The Asian flu. The Russian virus. The Tequila effect. Contagion. Interdependence. Numerous terms have been invented to explain the same basic phenomenon; a crisis in one country (or region) can affect markets of very different sizes and structures around the globe. Over the past few years, an extensive literature has used macroeconomic data to explore why country-specific crises can have such widespread global effects.[1] Initial work in this area attempted to simply document whether a crisis generated "contagion". More recent work has attempted to document the specific channels by which a crisis in one country spreads to other countries. These papers have reached a variety of (often conflicting) conclusions, and despite the range of approaches used in this literature, little is known about the microeconomic properties of the international transmission of crises. This paper attempts to fill this gap by using firm-level information to examine how companies around the world were affected by two of the most severe financial crises of the 1990's: the Asian crisis in 1997 and the Russian crisis in 1998.

The earliest papers attempting to document how crises spread internationally argued that trade linkages (either through bilateral trade or competition in third markets) were important transmission channels.[2] More recent work—and especially papers examining crises in the later half of the 1990's—has argued that financial linkages through bank lending or portfolio investment are more important than trade channels.[3] An additional series of empirical papers has emphasized the importance of country similarity and wake-up call effects, basically that a crisis in one country causes investors to wakeup and reassess the risks in "similar" countries.[4] Despite this extensive body of work examining the international transmission of crises, there is little empirical consensus on the relative importance of various propagation channels. For example, some authors claim that trade was not a significant transmission mechanism during recent crises, because trade linkages between the crisis countries and affected countries tend to be small.[5] Others argue that any effect from investors selling assets was fairly unimportant, since net redemptions and capital outflows during most crises were small.[6] Most authors admit that it is difficult to isolate the independent effects of different transmission channels at the macroeconomic level, since most trade and financial linkages between countries are highly correlated.

These analyses based on macroeconomic data, however, ignore a tremendous wealth of information that is lost in the aggregation used to create the key variables. Within each country there is a large variation in how different companies are affected by financial crises. For example, if a devaluation in one country increases the competitiveness of its exports, firms in other countries should only be directly affected by the devaluation if they sell products which compete with those exports. Companies that produce non-traded goods should be less affected by the devaluation. Empirical studies that simply look at a country's aggregate trade statistics, balance of payments, or total market returns,

will ignore these important differential effects across firms. Therefore, this paper attempts to use this firm-level variation within countries to identify which types of companies are most affected by crises that originate elsewhere.[7] These results thereby provide a set of microeconomic evidence to complement the existing, extensive macroeconomic evidence on the international transmission of crises.

In order to perform this firm-level analysis, this paper constructs a new data set of financial statistics, industry information, geographic data, and stock returns for over 10,000 companies in 46 countries. It uses this information to test how individual company's stock market returns during the East Asian and Russian crises are affected by factors such as: industry, international exposure, debt quantity and structure, trading liquidity, and/or geographic location. The paper presents preliminary graphical results, that show which portfolios of companies were most affected by these two crises, as well as more informative regression results, which estimate how different company characteristics simultaneously affect firm vulnerability to a crisis.

Results show that firms that compete with exports from the crisis country, or that have direct sales exposure in the crisis country, are negatively and significantly affected by these events. For example, if a firm's main product line was in the same industry as a major East Asian export, its abnormal stock return was 8 percent lower, on average, between October and December of the Asian crisis. During the two-week Russian crisis, firms that competed with Russian exports had abnormal stock returns 3 percent lower. If a firm had direct sales exposure to East Asia or Russia, its abnormal stock return was 15 percent lower during the Asian crisis, or 10 percent lower during the Russian crisis. These results suggest that trade channels, through both competition in export markets and direct exposure to the crisis country, were important mechanisms transmitting the Asian and Russian crises to firms around the world.

Results also indicate that firms located outside of the crisis regions that had higher short-term debt or total debt ratios did not have significantly different abnormal stock returns during either crisis. Although debt ratios are only rough proxies for generalized credit crunches, these results suggest that following the Asian and Russian crises, firms more heavily reliant on borrowing were not more adversely affected than other firms. Another empirical result is that during the later part of the Asian crisis, more liquid stocks had significantly lower returns than the rest of the sample. This supports anecdotal evidence that the Asian crisis caused a forced-portfolio recomposition for global investors (i.e., large cash withdrawals and margin calls forced investors to sell assets in markets not directly affected by the crisis). A final empirical result from both the Asian and Russian crises is that country-specific effects can be large, although they are difficult to explain with a variety of macroeconomic and corporate governance variables. Moreover, in most cases the magnitude of these country-specific effects is smaller than the firm-specific characteristics discussed above.

The remainder of this paper is divided into five sections. Section II describes the extensive firm-level data set compiled for this paper. Section III uses an event-study methodology for a graphical analysis of stock returns for various portfolios after the Asian and Russian crises. It also discusses the theoretical literature on why different portfolios could be adversely affected by crises in other countries. Section IV uses an estimation technique developed by Sefcik and Thompson to more accurately measure how different types of firms were affected by these crises. This section closes by taking a closer look at the large country-specific effects and if these effects can be explained by macroeconomic and corporate governance variables. Section V summarizes an extensive set of robustness tests and Section VI concludes.

II. The Firm-Level Data Set

To construct a firm-level data set with which to examine the international transmission of crises at the firm level, I began by compiling balance sheet, income statement, cash flow, and general company information from the Worldscope database.[8] Worldscope contains information on approximately 16,000 companies from 51 countries, representing about 90 percent of global market capitalization. I compiled Worldscope information on all available companies for the one-year preceding the 1997 East Asian crisis and the 1998 Russian crisis. Then I matched this information with data on daily stock returns from Datastream and excluded the five countries that had information for fewer than 10 firms.[9] Finally, since this paper utilizes stock returns to evaluate how companies are affected by various crises, I exclude any firm whose stock is not actively traded.[10]

The resulting data set includes information for 46 countries, with 11,422 companies for the East Asian crisis and 10,235 companies for the Russian crisis. Table 1 lists the number of companies in each country and region for each of the periods. As the table shows, there is extensive coverage of companies in the Americas, Asia, Australasia, and Europe, but there is limited coverage of Africa and the Middle East.[11] Appendix A lists the statistics available for each firm and includes detailed information on how each variable is defined and/or calculated.

This firm-level data set has detailed information on a wide range of companies from around the world. There are, however, several limitations with this data. First, most of the Worldscope database is publicly-traded companies, so that smaller firms and state-owned firms are underrepresented. Second, although Worldscope attempts to correct for major differences in cross-country accounting standards, discrepancies may still exist across countries. Therefore, the following analysis uses a number of different statistics to test each hypothesis and controls for country-specific effects. Third, there are a number of extreme outliers that undoubtedly represent reporting errors. Therefore, the following

analysis utilizes estimation techniques that minimize outliers and performs an extensive set of sensitivity tests. Finally, Worldscope coverage of non-US companies before 1995 is more limited and much less comprehensive. Therefore, it is difficult to extend this analysis to earlier crises.

III. Graphical Analysis

This section uses this firm-level data set to construct a series of graphs showing preliminary evidence of how different types of companies were affected by the Asian and Russian crises. The first part of the section explains the basic event-study methodology. The second part provides a short theoretical motivation and examines how different portfolios were affected by the two crises.

III.A. Methodology

In order to construct these graphs, I follow the standard event-study methodology outlined in MacKinlay (1997). To calculate normal returns for the sample of firms discussed in Section II, I utilize a market model. More specifically, for the pre-crisis period of length *P*, I use OLS to estimate the model,

$$\begin{aligned} &R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \\ &E(\varepsilon_{it}) = 0 \qquad Var(\varepsilon_{it}) = \sigma^2_{\varepsilon_i} \\ &i = 1,2,...N \qquad t = 1,2,...P \end{aligned} \tag{1}$$

where R_{it} is the period-*t* return (based on local currency prices) for stock *i;* R_{mt} is the global market return[12]; ε_{it} is the disturbance term*;* and the model is calculated for *N* firms and *P* periods.

To estimate equation 1, I define the pre-crisis period (of length *P*) as the one-year before the "events" of the Russian and East Asian crises. I define the Russian crisis as starting on August 17, 1998, which is the date the government devalued the ruble and imposed a forced restructuring of its government debt.[13] I define the earliest stage of the Asian crisis as starting on June 25 1997, which is the date that the Thai government reported that its stock of international reserves was grossly overstated and removed support from a major finance company.[14] These events prompted a massive speculative attack that forced the government to float the baht on July 2nd. Admittedly, the Asian crisis had several different phases, which are examined separately below. For each phase, however, I continue to use the same one-year window ending on June 24th to estimate normal returns, so that estimates are not contaminated by unusual stock movements in earlier phases of the crisis.

Next, I utilize the parameter estimates from equation 1 during the pre-crisis period to calculate abnormal returns for each stock after the crisis. I define the Russian crisis as lasting for two weeks (ending on August 31, 1998) and I define two phases of the Asian crisis. The first phase is the period when lower-income East Asian economies (Indonesia, Malaysia, Philippines, and Thailand) were subject to speculative attacks and forced to float their currencies. I define this period as lasting for 12 weeks (ending on September 16, 1997) and call this period "Asia-Phase 1". The second phase is the period when the higher-income Asian economies (Hong Kong, Korea, Singapore, and Taiwan) also were subject to speculative attacks and experienced significant declines in the values of their currencies (except Hong Kong). I define this period as starting on October 1 and lasting for 12 weeks (ending on December 24, 1997). This period is "Asia-Phase 2". These crisis periods are long for an event window, especially if markets are efficient and immediately reflect any new information. I utilize these longer windows, however, since new information on the extent and severity of the crisis was continually being provided as the crisis spread across countries. The sensitivity analysis also performs a detailed analysis of the impact of modifying these period definitions.

Using these definitions, the abnormal return ($\hat{\varepsilon}_{i\tau}$) for firm *i* during time τ of the crisis period (i.e. event window) of length *C* is therefore:

$$\hat{\varepsilon}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \qquad \text{with } \tau = 1,2,\ldots C, \tag{2}$$

where each of the fitted parameters is estimated by equation (1) during the pre-crisis period. I continue to exclude any stocks that are not actively traded. Finally, I add the abnormal returns for each stock over any period *L* (with $L \leq C$) to calculate the cumulative abnormal returns (CARs):

$$CAR_{i,L} = \sum_{\tau=1}^{L} \hat{\varepsilon}_{i\tau} \ . \tag{3}$$

III.B. Graphical Results

After calculating the CARs for each stock, it is possible to compare abnormal returns for different stock portfolios to see which firms were more vulnerable to the Asian and Russian crises. Existing theories on the international transmission of crises provide guidelines for identifying the firm-level variables that determine the spread of crises at the micro level. This literature focuses on five different channels by which a crisis can be transmitted to firms in other countries: product competitiveness, an income effect, a credit crunch, a forced-portfolio recomposition, or a wake-up call effect.

The first channel by which a crisis in one country could be transmitted to firms in other countries is product competitiveness.[15] If one country devalues its currency, then that country's exports will be relatively cheaper in international markets. Similar products from firms in other countries that are sold in the same markets will be relatively less competitive. Moreover, if exports from the initial country are a large enough share of global production in a given industry, then industry prices could fall worldwide. Therefore, even if a company does not directly compete with firms from the crisis country in any specific market, a product's competitiveness could be damaged by the currency crisis.[16] If this product-competitiveness effect is important, then after the crisis, firms that compete with major exports from the crisis country should experience lower returns than companies that do not compete in those sectors.

To see if this effect is important at the firm level, I define "major exports" from the crisis zone as the four-digit SITC groups for which total exports from countries in the crisis zone are 25 percent or more of total exports in the entire world.[17] By focusing on total exports from the crisis zone (instead of total production), I implicitly exclude goods that would not be expected to experience competitiveness effects because they are non-traded, have high transport costs, and/or are subject to any sort of trade restrictions. Table 2 lists the SITC groups and the corresponding SIC categories that are "major exports" for each crisis zone.[18]

Next, I use the four-digit SIC codes listed in Table 2 to divide the sample of firms into two portfolios for each crisis: companies whose primary output competes with exports from the crisis zone (i.e. is in the same 4-digit SIC group) and companies whose primary output does not compete.[19] Figures I through III graph the CARs of each portfolio for each crisis period, as well as the one-week before each crisis. The horizontal axes are labeled in event time, with the dashed line at zero indicating the crisis start date. Figure I shows that during the first phase of the Asian crisis, firms which produced in the same four-digit SIC groups as the major exports from the low-income Asian economies did not experience significantly lower returns than other firms. On the other hand, Figure II shows that during the second phase of the Asian crisis, firms that competed with major Asian exports had average abnormal returns over 11 percent lower than in the rest of the sample (for the entire 60-day period). This effect was particularly strong during November and December when the Korean won was under attack. Figure III shows that during the later part of the Russian crisis, firms that competed with major Russian exports had average abnormal returns about 3 percent lower (for the entire 10-day period). These results suggest that product-competitiveness effects helped transmit the Asian crisis (in its later phase) and Russian crisis to firms in other countries.

A second mechanism by which a crisis in one country could be transmitted internationally is through an income effect that lowers demand for a firm's product. When a country undergoes a financial crisis or negative shock of

any type, economic growth generally slows and aggregate demand contracts. Firms that export to that country will generally face reduced demand. This income effect could be magnified if the country's currency is devalued, further reducing purchasing power and real incomes. To examine if this effect is important at the firm level, I calculate the direct trade exposure each firm has in Russia and the relevant Asian-crisis countries during the one year preceding the relevant crisis. A country is defined as having direct trade exposure to the crisis region if at least 5 percent of its sales, income, or assets are located in the crisis zone.[20] Then I use this variable to divide the sample into two portfolios: firms with and without direct exposure to the crisis zone. I continue to exclude firms that are based in the relevant crisis zone.

The CARs for each portfolio are graphed in Figures IV through VI. Figure IV shows that returns for firms with direct trade exposure to the low-income Asian economies were slightly lower than for the rest of the sample. Figure V, however, shows that firms with direct exposure to the Phase-2, Asian-crisis countries experienced abnormal returns about 18 percent lower than for the rest of this sample. Figure VI shows that firms with direct trade exposure to Russia had abnormal returns about 16 percent lower. These results suggest that income effects helped transmit the Asian crisis (during its later phase) and Russian crisis to firms internationally.

A third channel through which firms can be affected by crises in other countries is a credit crunch. There are several different variants of this theory, but underlying most of them is the idea that a crisis in one country leads to a sharp reduction in the supply of credit, reducing financial liquidity and raising the cost of credit to firms in other countries.[21] For example, a shock to one country could cause investors to withdraw their bank deposits, reducing the liquidity of financial intermediaries and forcing them to liquidate loans to firms in other countries and/or be unable to renew any future financing. An implication of these theories is that companies more reliant on short-term debt to finance inventories and provide working capital would be more affected by a crisis.

To see if these effects occurred during the Asian and Russian crises, I use each firm's ratio of net short-term debt to equity to divide the sample of firms into two portfolios: those more and less highly dependent on short-term financing.[22] Figures VII through IX graph the resulting CARs. These figures show no evidence that firms more reliant on short-term debt were differentially affected by the Asian or Russian crises. In fact, during the second phase of the Asian crisis and the Russian crisis, firms more dependent on short-term debt had slightly higher—instead of lower—abnormal returns than the rest of the sample. Results are identical if the sample is divided into portfolios using other measures of short-term debt dependence or overall leverage (such as total debt/equity or total debt/assets).[23]

A fourth channel by which crises could be transmitted internationally is through a forced-portfolio recomposition.[24] A shock to one market could reduce the liquidity of individual investors and forces them to sell assets

in order to satisfy margin calls, raise cash to fulfill investor redemptions, and/or meet regulatory requirements. Rather then sell assets whose prices have already collapsed (i.e. assets in the crisis country), investors will sell other assets in their portfolio, such as investments in other countries. It is impossible to test this effect directly using this paper's firm-level data set. One implication of these models, however, is that a company is more vulnerable to a forced sell-off if a larger percent of its shares is held by institutions (such as mutual funds) that could be subject to the regulatory requirements or cash redemptions that drive this type of portfolio recomposition. Moreover, Falkenstein (1996) shows that mutual funds tend to bias their investment toward more liquid stocks. Therefore, since more liquid stocks tend to have a higher share of institutional ownership, they may be more susceptible to a forced-portfolio recomposition.[25]

To examine if this effect was important during the Asian and Russian crises, I calculate each stock's liquidity as the percent of trading days for which stock returns are non-zero. Then, I define highly-liquid stocks as those for which returns are non-zero in at least 75 percent of the pre-crisis trading days.[26] All other stocks are classified as less liquid (but due to the requirements discussed in Section II, are still "actively traded"). Figures X through XII graph the CARs for portfolios of highly-liquid and less-liquid stocks for each crisis. During the first phase of the Asian crisis and the Russian crisis, there is little difference between the two portfolios. During the second phase of the Asian crisis, however, highly liquid stocks have average returns about 6 percent lower than less-liquid stocks. Although stock liquidity is a very rough proxy for capturing any portfolio-recomposition effect, these results support anecdotal evidence that this may have been important during the later part of the Asian crisis.

A fifth channel by which a country-specific crisis can be transmitted to firms in other countries is through a wake-up call effect.[27] A crisis in one country (or investor behavior in one country) can provide information about other countries (or how investors will behave in other countries). One subgroup of these theories focuses on the reassessment of macroeconomic fundamentals and corporate-governance systems. If a country with certain characteristics is discovered to be susceptible to a crisis, then investors will reassess the risk of other countries with similar characteristics. Another subgroup is based on investor's expectations of how international institutions will respond to a crisis. If a crisis occurs and a country is not bailed out, then investors may use this information to reassess the probability of other countries being bailed out. Even if the country is bailed out, this could deplete an international institution's supply of funds and reduce its ability to respond to the next crisis. A final subgroup of wake-up call theories focuses on informational asymmetries, herding, coordination problems and/or informational cascades.

Each of these mechanisms for a wake-up call effect occur at the country level, instead of the firm level, and would therefore cause substantial differences in abnormal stock returns across different countries during a crisis. Graphs

of stock portfolios for each country (and region) show striking differences during the Asian and Russian crises. These differences, however, could be caused by a number of factors. Section IV.C. explores these country effects in more detail and formally tests for the existence of wake-up call effects.

IV. Multivariate Regression Analysis

One problem with the univariate, graphical analysis discussed above is that if two (or more) firm characteristics are highly correlated, then it is difficult to isolate the impact of a specific characteristic on stock returns. For example, larger firms are more likely to have direct sales exposure to a given crisis region and may also be less vulnerable to global crises (if investors switch to larger, more stable companies after a shock). In this case, a portfolio of firms with direct exposure to a crisis region may outperform firms with no exposure, although this difference in performance has no direct relationship to the variable under consideration (exposure to the region).

Moreover, there are a number of econometric problems with the simple model estimated in Section III. This section addresses both of these issues and utilizes a methodology developed by Sefcik and Thompson (1986) to estimate how the Asian and Russian crises affected different types of firms around the world. The first part of this section discusses the estimation methodology and the second part reports a central set of multivariate regression results. The section closes by focusing on one result—the highly significant country-specific effects.

IV.A. Methodology

The standard methodology for estimating the effect of different firm characteristics on stock market returns during an event is to regress the abnormal returns or cumulative abnormal returns (calculated in equations 1-3) on the firm characteristics of interest. For example, if $\hat{\boldsymbol{\varepsilon}}_\tau$ is the (*N x 1)* vector of average abnormal returns (for *N* stocks) during the portion of the crisis period τ, and ***F*** is an (*N x K*) matrix of firm characteristics (with the first column a vector of ones), the standard technique is to estimate:

$$\hat{\boldsymbol{\varepsilon}}_\tau = \mathbf{F}\boldsymbol{\theta} + \mathbf{v}_\tau \quad , \tag{4}$$

where $\boldsymbol{\theta}$ is the (*K x 1*) vector of coefficients and $\mathbf{v}_\tau$ is an (*N x 1*) vector of disturbances.

Under several mild regularity conditions, this three-step approach is equivalent to the two-step methodology described in Sefcik and Thompson (1986). They rewrite equations 1-4 as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \delta_t + \mu_{it} \quad (5)$$

$$\hat{\gamma}_i = \mathbf{F}_i \boldsymbol{\Psi} + \eta_i \quad (6)$$

$$E(\mu_{it}) = 0, \qquad \mathrm{Var}(\mu_{\mathrm{it}}) = \sigma^2_{\mu_i}, \qquad E(\eta_i) = 0, \qquad \mathrm{Var}(\eta_{\mathrm{i}}) = \sigma^2_{\eta_i}, \quad (7)$$

$$i = 1,2,...,N, \qquad t = 1,2,...,P,P+1,...,P+C\,. \quad (8)$$

The *t* is now defined as an index for the entire period (both the pre-crisis period *P* and crisis period *C*); δ_t is a dummy variable equal to 1 during the crisis; $\hat{\gamma}_i$ is a parameter estimated in equation 5; $\mathbf{F}_i$ is the (*1 x K)* row vector of firm *i*'s characteristics; $\boldsymbol{\Psi}$ is a (*K x 1*) parameter vector corresponding to the *K* firm characteristics; and all other variables are defined above. When the crisis period (*C*) is equivalent to τ in equation 4, then the vector created by stacking the $\hat{\gamma}_i$'s for all *N* firms in equation 6 corresponds to $\hat{\boldsymbol{\varepsilon}}_\tau$ in equation 4, and $\boldsymbol{\Psi}$ in equation 6 corresponds to $\boldsymbol{\theta}$ in equation 4.

OLS estimates using either model are only consistent and efficient, however, if the disturbances are i.i.d. in the cross-section. The data set described in Section II violates this assumption for two reasons. First, the disturbances are not homoscedastic across firms. For two firms *i* and *j* during any period *t* either: $E(\varepsilon'_{it}\varepsilon_{it}) \neq E(\varepsilon'_{jt}\varepsilon_{jt})$ for all *i* and *j* in equation 1, or $E(\mu'_{it}\mu_{it}) \neq E(\mu'_{jt}\mu_{jt})$ in equation 5. As a result, standard errors are biased and coefficient estimates are inefficient. It is straightforward to adjust for this problem using any heteroscedastic-consistent estimator.

Second, and more problematic, is that the disturbances are not independent across firms. For two firms *i* and *j* during any period *t* either: $E(\varepsilon'_{it}\varepsilon_{jt}) \neq 0$ for all *i* and *j* in equation 1, or $E(\mu'_{it}\mu_{jt}) \neq 0$ for all *i* and *j* in equation 5. This problem occurs because all firms in the sample are affected by the crisis at the same time, as opposed to most event studies where the event (such as a stock split) occurs for different firms on different dates. The resulting cross-correlation in disturbances across firms causes standard errors to be biased and inconsistent. To solve this problem, I use an estimator developed by Sefcik and Thompson (1986).[28] Basically, Sefcik and Thompson propose dividing the sample of firms into different portfolios and then using these portfolios to estimate the impact of firm characteristics on returns during a specific event. By dividing the sample into a smaller dimension (*K* portfolios instead of *N* companies), it is possible to simultaneously correct for heteroscedasticity and the cross-correlation in returns. Coefficient estimates and standard errors are unbiased and consistent.[29] Appendix B describes this procedure in more detail.

One final estimation issue is that the Worldscope data contains a number of extreme outliers. Therefore, I estimate the relevant model for each specification and then remove outliers defined as having standard errors greater than three times the standard deviation from the sample mean. After dropping the outliers, I reestimate the model.[30]

IV.B. Central Results

Next, I estimate the model in equations 5 through 8, using the same definitions for the pre-crisis and crisis periods as in the graphical analysis of Section III. For the matrix of explanatory variables (***F***), I include the same firm characteristics examined in Section III.B. More specifically, the four explanatory variables (export competition, direct trade exposure, debt outstanding, and stock liquidity) are meant to correspond as closely as possible to four channels by which a crisis could affect firms in other countries (product competitiveness, an income effect, a credit crunch, and a forced-portfolio recomposition).[31] I also control for country-fixed effects in each regression (with Germany as the omitted country), which are examined below for the existence of wake-up call effects.

Table 3 reports the base estimates for the two phases of the Asian crisis and the Russian crisis. Countries from the crisis zone continue to be excluded from the relevant analysis. Columns (1), (3) and (5) present the problematic OLS estimates. Columns (2), (4) and (6) report unbiased and consistent coefficient estimates and standard errors, obtained using Sefcik and Thompson's methodology. In each case, extreme outliers are removed (between 5 and 30 firms, depending on the specification). Many of the coefficient estimates and standard errors change significantly across methodologies, suggesting that the bias resulting from the cross-correlation in returns is important. As a result, in the discussion that follows, I focus on the Sefcik and Thompson estimates reported in the even-numbered columns.

Most of the results reported in Table 3 support the preliminary graphical evidence reported above. During the first phase of the Asian crisis none of the four central coefficients are significant (and half do not even have the predicted signs). During the second phase of the Asian crisis, the *export competition*, *direct trade exposure*, and *stock liquidity* coefficients are all highly significant (at the 1 percent level) and the *debt outstanding* coefficient is insignificant. Moreover, the coefficient estimates suggest that the magnitude of these effects could be large. For example, the *export competition* coefficient indicates that firms which produced in the same industries as "major exports" from the crisis economies had average daily returns 13 basis points lower than firms that did not produce in these sectors. Although 13 basis points appears to be small, when this daily impact is aggregated over the entire 60-day crisis period, this translates into an abnormal return 8 percentage points lower over the entire crisis. The *direct trade exposure* coefficient suggests that companies with sales, income or assets in the Asian-crisis region experienced average daily abnormal returns 25 basis points lower, and average aggregate returns over 15 percentage points lower (over the entire crisis). Finally, the *stock liquidity* coefficient indicates that more liquid stocks had average daily returns 7 basis points lower than less liquid stocks, for a total average abnormal return 4 percentage points lower over the entire crisis.

During the Russian crisis, the coefficients on *export competition* and *direct trade exposure* continue to be highly significant. More specifically, the *export competition* coefficient indicates that firms which produced in the same industries as "major exports" from Russia had average daily returns 32 basis points lower than firms that did not produce in these industries. Over the entire 10-day crisis period, this translates into an average abnormal return about 3 percentage points lower than companies that did not compete with Russian exports. The *direct trade exposure* coefficient suggests that companies with sales, income or assets in Russia experienced average daily returns 101 basis points lower, and an average abnormal return 10 percentage points lower over the entire crisis. Finally, the *debt outstanding* and *stock liquidity* coefficients are not significant during the Russian crisis.

One key result that emerges from this series of regressions is that the impact on firms around the world varies across each phase of the Asian crisis and the Russian crisis. This is not surprising. How each crisis spreads should be highly dependent on the specific characteristics of the country where the crisis originates and how that country is related to the rest of the world. For example, the *export competition* coefficient was large and significant during the second stage of the Asian crisis and the Russian crisis, and insignificant during the first stage of the Asian crisis. This is because the "major exports" from the lower-income Asian countries listed in Table 2 constituted a smaller share of global exports than during either of the other crisis periods.[32] These different patterns across crises, and especially the stronger effects during the later phase of the Asian crisis (when the larger countries were under speculative attack), could also indicate non-linearities in the transmission of crises.

To summarize the key results of this section, estimates show that during the second phase of the Asian crisis and the Russian crisis, firms that competed with exports from the crisis countries, or that had direct trade exposure to the crisis countries, had significantly lower stock returns. This suggests that product-competitiveness and income effects were both important transmission mechanisms during these periods. Results also show that firms located outside the crisis countries with higher short-term debt or total debt ratios did not have significantly lower stock returns during any of the crisis periods. Although debt ratios are a weak proxy for generalized credit crunches, these results suggest that the Asian and Russian crises did not spread to other countries by disproportionately affecting firms more heavily reliant on borrowing.[33] More liquid stocks had significantly lower returns than the rest of the sample during the second phase of the Asian crisis, supporting anecdotal evidence that a forced portfolio-recomposition effect may have been important. A final result from this series of tests is that the impact of financial crises on firms around the world varies across episodes and depends on the characteristics of the country (or countries) where the crisis originates.

IV.C. A Closer Look at the Country-Specific Effects

An additional important result from the analysis in Section IV.B is the significance and magnitude of the country-specific effects. Table 4 reports the corresponding estimates of the country dummy variables.[34] For each crisis, several country-specific effects are individually significant (with Germany as the omitted country) and an F-test indicates that the coefficients are jointly, highly significant. Many of the coefficient values are large in magnitude. For example, the -3.0 for Venezuela during the Russian crisis indicates that over the entire 10-day crisis, firms in Venezuela had abnormal returns 30 percent lower than firms located in Germany. Given the wide range of factors that could determine the large country-specific effects, it is extremely difficult to account for these effects empirically. Moreover, since this paper focuses on how recent financial crises have affected individual *companies*, instead of *countries*, a thorough investigation of this topic is beyond this paper's scope. Nonetheless, since the country-specific effects are so large, the remainder of this section provides a preliminary analysis of which types of variables might drive these effects.

One explanation for these large country effects is that the Asian or Russian crisis prompted a "wake-up call" that changed investor's beliefs about individual countries.[35] For example, either crisis could have forced investors to reassess the risks in countries with weak banking systems or widespread corruption, causing asset sales in other countries with these characteristics. To test for this effect, I estimate if the country-specific effects can be explained by four macroeconomic variables (current account deficit, government budget deficit, low level of international reserves, and level of per capita income) and four corporate governance variables (weaker shareholder rights, a higher prevalence of corruption, a higher risk that assets will be expropriated, and a weaker rule of law). The macroeconomic variables are from World Bank (2000) and the corporate governance variables are from La Porta et al. (1998).[36]

Table 5 reports estimates for each crisis from a regression of the country-specific effects reported in Table 4 on the series of eight macroeconomic and corporate governance variables. The bottom of the table reports F-tests for the joint significance of the two groups of variables. Although some of the coefficients are significant, many have an unexpected sign (such as the negative coefficients on the budget balance, corruption, and rule of law during the Asian crisis). Adding a variety of other control variables yields the same pattern of mixed signs and significance. None of the variables except per capita income during the second phase of the Asian crisis is consistently significant.[37]

These results suggest that after controlling for firm-level characteristics that are predicted to affect country vulnerability to crises (i.e. export competition, direct trade exposure, etc.), most country-level macroeconomic and corporate governance variables do not explain a significant portion of the country-fixed effects. Moreover, these results also indicate that the Asian and Russian crises did not prompt any sort of countrywide reassessment based on the

macroeconomic and corporate governance variables included in these regressions. These results, however, should be interpreted cautiously because many of these macroeconomic and corporate governance variables are so highly correlated that it is difficult to assess accurately the relative importance of any individual variable.

Another explanation for the large country-specific effects is that they are driven by domestic events that are unique to each country and unrelated to the Asian or Russian crises, such as election results or domestic economic news. Although this explanation is impossible to test formally with this paper's data set, an examination of the country effects in Table 4 suggests that this explanation could be important. During the second phase of the Asian crisis, two of the largest country effects were for Ireland and South Africa—countries that elected new presidents during this period. One of the largest negative effects was for Brazil, which announced a new economic plan of higher interest rates, tax increases and spending cuts that would undoubtedly slow economic growth. During the Russian crisis, the largest country effect was for Venezuela, which was in the midst of controversial elections including Hugo Chavez. These examples suggest that domestic events within any country could be important determinants of aggregate stock market movements, and in some cases, even more important than events in the rest of the world.

This does not mean, however, that country-level events (whatever their causes) overshadow the firm-level effects. For most of the sample, the country-level effects are not even significant. In cases when the country effects are significant, they are usually smaller in magnitude than the firm effects (such as the coefficient on *direct trade exposure*). For example, consider a company that sells color television receivers (i.e. its main product line is SITC code 3651), sells at least five percent of its output to the Asian crisis countries, and is based in Colombia.[38] This firm's abnormal daily stock return would be 39 basis points lower due to its industry and Asian sales exposure, but only 7 basis points higher due to its geographic location (the country effect).[39] Therefore, over the entire 60-day period, the company's abnormal stock return would be 23 percentage points lower due to its product line and geographic sales exposure, but only about 4 percentage points higher due to its geographic location (for a total abnormal return of -19 percent). In most cases, a firm's industry and sales exposure had a greater impact on its returns than its geographic location.

V. Sensitivity Tests and Model Extensions

The estimates reported above are based on a number of assumptions. Therefore, this section performs an extensive sensitivity analysis. It examines the impact of: reclassifying period definitions, redefining key variables, and modifying model specification. Due to space constraints, I do not show the univariate graphs or report all of the multivariate regression results. Any results that differ significantly from the base estimates, however, are discussed in detail.

V.A. Sensitivity Tests I: Reclassifying Period Definitions

As a first set of sensitivity tests, I reclassify the period definitions. These tests are useful for several reasons. First, there is no clear end date for the Asian or Russian crisis. Second, some of the effects could vary over different time horizons. For example, since any portfolio-recomposition effect is driven by liquidity constraints, it would only have a short-term impact on returns, while any product-competitiveness effect would continue to have an impact over the longer term. Third, there is evidence that markets tend to under-react to individual news and over-react to a long series of related news.[40] Therefore, the short time periods used to analyze these crises might not capture the longer-term, market-equilibrium impact. Finally, even though the time periods are longer than for a typical event study, they still might not be long enough to incorporate all relevant information impacting stock returns. For example, during the Russian crisis it was unclear if the country's payment system would collapse or the country would erupt into violence. Until these issues were resolved, the full impact of these crises may not have been reflected in stock returns around the world.

To test if any of these factors affect the central results, I modify the period definitions used for the base analysis. For each crisis, I estimate the same model and use the same start date, but define the crisis period as lasting one, two, four, eight, twelve, or twenty-four weeks. Table 6 reports results and in each case the base case from Section IV is highlighted. For the first phase of the Asian crisis, none of the coefficients (except the country dummy variables) are significant for any of the time periods. This is even true over the 24-week period that includes the second phase of the Asian crisis. This suggests that most of the impact on firms around the world of the second phase of the Asian crisis is driven by events in the higher-income Asian economies which are not included in the first phase.

For the second phase of the Asian crisis, none of the coefficients (except the country dummy variables) are significant when the crisis is defined as lasting one or two weeks. This is not surprising given that the main "crisis events" for the high-income Asian economies occurred after this period. After two weeks, however, the *export competition* coefficient becomes significant, and after eight weeks the *stock liquidity* coefficient becomes significant. Over the longest time horizon (24 weeks), the *export competition* and *direct trade exposure* coefficients remain significant, although the *stock liquidity* coefficient becomes insignificant. These results support the hypothesis that the different effects of crises vary across different time horizons, and in particular, that any portfolio-recomposition effect captured by the stock liquidity variable is a shorter-term propagation channel.

Results for the Russian crisis also fluctuate based on the time period. The *export competition* coefficient is only significant when the crisis is defined as lasting two weeks or longer than twelve weeks (and the coefficient even

becomes positive over the four and eight-week periods). This could indicate that several weeks into the Russian crisis, investors believed that domestic turmoil and problems with the payments mechanism would disrupt production, counteracting any competitive advantage from the ruble devaluation. Over the longer time period, however, when Russian production did not collapse, the export competition variable has the predicted effect. Similarly, when the Russian economy did not collapse, the earnings loss from operating in Russia may have been less than predicted, rendering the *direct trade exposure* coefficient insignificant. As a whole, it is difficult to draw any strong conclusions from the longer period definitions for the Russian crisis because the collapse of Long-Term Capital Management occurred in mid-September and may have had its own spillover effects on firms around the world.

As a final test for the impact of varying period definitions, I start each crisis one and two weeks earlier than defined above. Coefficient estimates do not change significantly.

V.B. Sensitivity Tests II: Redefining Key Variables

As a next series of sensitivity tests, I examine the impact of redefining each of the variables in the base analysis. The first variable, *export competition*, measures whether a firm produced in the same industry as a "major export" from the crisis zone. Instead, I use sample information (instead of world export information) to define "major industries" for the crisis zone. This classification is even more imprecise than that used above. Regression results are reported in columns (2) and (7) of Table 7.[41] Despite the substantial changes in this variable, coefficient estimates are remarkably stable for both phases of the Asian crisis. During the Russian crisis, however, the *export competition* coefficient becomes insignificant. This is not surprising as Russia's only major industry, according to this new variable, is "metal mining."

The second variable in the base specification, *direct trade exposure*, is a dummy variable equal to one if a company has over five percent of sales, assets, or income in the crisis region. I change this definition by using ten or twenty percent as the cutoff. The number of companies with direct exposure to the crisis zone falls substantially, but the coefficient remains large and significant during the second phase of the Asian crisis and the Russian crisis.

The third variable in the base specification, *debt outstanding*, is measured by the ratio of net short-term debt to equity. I try eight different variable definitions to capture a firm's dependence on short-term financing or bank financing and its potential vulnerability to a credit crunch.[42] The resulting coefficients are never significant for the first phase of the Asian crisis or the Russian crisis, and often have an unexpected sign. During the second phase of the Asian crisis, most of the *debt outstanding* coefficients continue to be insignificant, and their signs fluctuate. In every case, redefining the *debt outstanding* variable has no significant impact on any of the other coefficient estimates.

Finally, I redefine the fourth variable in the base regression, *stock liquidity*, as the percent of shares traded to shares outstanding. Since this measure is not available for a majority of firms, the sample size shrinks significantly. Nonetheless, columns (3) and (8) of Table 7 show that most coefficient estimates do not change significantly. Moreover, the *stock liquidity* coefficient remains highly significant during the second phase of the Asian crisis and becomes highly significant during the Russian crisis.

V.C. Sensitivity Tests III: Modifying the Model Specification

As a final series of sensitivity tests, I estimate a number of modifications to the base model. First, I estimate a constant-mean-return instead of a market model by no longer controlling for the market index in equation 5:

$$R_{it} = \alpha_i + \gamma_i \delta_t + \mu_{it} \,. \tag{9}$$

Columns (4) and (9) of Table 7 show that coefficient estimates are virtually identical to those from the market model.

Next I add a number of additional explanatory variables to the base specification. First, I control for firm size by adding: total market capitalization, total equity, total assets, total sales, or net income (all expressed in US$). Next, I add a variety of controls for total leverage, profitability and/or company valuation (many of which could indicate problems with over-borrowing and/or crony capitalism), such as: total debt to equity, net long-term debt to equity, total debt to total capital, total debt to assets, return on equity, return on assets, return on invested capital, or book to market value. I also add a set of industry dummy variables. Columns (5) and (10) of Table 7 report results with an additional control for firm size. In many cases, these additional explanatory variables are individually significant (such as market capitalization, total equity, net income, return on assets, and return on invested capital) or jointly significant (such as the industry dummy variables). In each case, however, adding any of these additional variables has no impact on the significance of the coefficient estimates that are central to this paper.

VI. Summary, Caveats and Conclusions

There is an extensive literature using macroeconomic data to examine how crises are transmitted internationally. This paper, however, takes a microeconomic approach and examines how different companies located around the world are affected by financial crises that originate elsewhere. In order to perform this analysis, it uses a new firm-level data set of financial statistics, industry information, geographic data, and stock returns for over 10,000 companies in 46 countries. Then it uses an event-study methodology to test if firm vulnerability to the Asian and Russian crises was affected by factors such as: industry, international exposure, debt ratios, trading liquidity, and/or geographic location.

Estimates indicate that firms producing in the same industry as a major export from the crisis region had average abnormal stock returns 8 percentage points lower during the later part of the Asian crisis, or 3 percentage points lower during the Russian crisis. Estimates also show that firms with direct sales exposure to the crisis regions had average abnormal stock returns 15 percentage points lower during the later part of the Asian crisis, or 10 percentage points lower during the Russian crisis. These results suggest that trade channels, such as product competitiveness and income effects, were important mechanisms by which these crises were transmitted internationally. During the later part of the Asian crisis, more liquid stocks also had significantly lower returns than the rest of the sample. This could be interpreted as evidence that investors caused these crises to spread through a forced-portfolio recomposition effect. Estimates also indicate that firms with higher short-term or total debt ratios were not differentially affected by the Asian or Russian crises. Although leverage ratios are a very imprecise indicator of lending contractions, this does not support the widespread belief that these two crises generated a global credit crunch.

These results are highly robust to a number of extensions, although the significance of several coefficient estimates depends on the definition of the crisis period. The relative importance of the various firm characteristics varies across crises, which is not surprising because how a crisis is transmitted internationally should depend on the characteristics of the country (or region) where the crisis originates. Therefore, it is unlikely that a single model can capture how shocks are propagated during all crises. A final result from these regressions is that country-specific effects are jointly significant and can be large in magnitude. It is difficult to explain these country-specific effects, however, using a range of macroeconomic and corporate governance variables.

Therefore, this paper provides strong evidence that two types of trade linkages, product competitiveness and income effects, were important determinants of how the Asian and Russian crises were transmitted internationally. It shows that what industry a firm produces in, and where the firm has sales exposure, can have large and economically important effects on firm stock returns during crises. Although a firm's geographic location can also affect its vulnerability to a crisis, the magnitude of this effect is generally much smaller than that from other firm-specific characteristics. Finally, the paper shows that firm-level analysis can be a useful complement to the more traditional macroeconomic approach in understanding important international relationships.

APPENDIX A - Variable Definitions[1]

Book to Market	Ratio of book value per share to market price. Calculated at company's fiscal year end.
Common Equity	Common shareholder's investment in a company. Includes common stock value, retained earnings, capital surplus, capital stock premium, cumulative gain or loss of foreign currency translations, discretionary reserves, and negative goodwill.
Coverage Ratio*	The ratio of earnings before interest and taxes to interest expense on debt.
Common Shares Traded to Common Shares Outstanding*	Common shares outstanding are the number of shares outstanding at the company's year-end and is the difference between issued shares and treasury shares. For companies with more than one type of common/ordinary shares, common shares outstanding represents the combined shares adjusted to reflect the par value of the share type. Common shares traded is the number of shares of the company traded during the year.
Current Assets	Cash and other assets that are reasonably expected to be realized in cash, sold or consumer within one year or one operating cycle.
Current Liabilities	Debt or other obligations that the company expects to satisfy within one year.
Current Ratio	The percent of current assets to current liabilities.
Days Return is Non-Zero*	Dummy variable equal to one if the stock return is not equal to zero in at least three-quarters of the non-weekend days in the pre-crisis period.
Market Capitalization	Product of shares outstanding and market price at fiscal year end. For companies >1 type of common/ordinary shares, market capitalization represents company's total market value.
Net Income	Income after all operating and non-operating income, expenses, reserves, income taxes, minority interest, and extraordinary items. Represents income before preferred dividends.
Net Long-Term Debt*	Any interest bearing financial obligations (excluding amounts due within one year and net of premium or discount) minus cash and cash equivalents.
Net Sales	Gross sales and other operating revenue less discounts, returns and allowances. For financial companies, sales represents total operating revenue.
Net Short-Term Debt*	Any debt payable within one-year (including the current portion of long-term debt and sinking fund requirements of preferred stock or debentures) minus cash and cash equivalents.
Percent Assets by Region*	Ratio of assets in a given region to total assets.
Percent Operating Income by Region*	Ratio of operating income in a given region to total operating income, where operating income is the difference between sales and total operating expenses.
Percent Sales by Region*	Ratio of sales in a region to net sales.
Quick Ratio	The ratio of (cash and equivalents + net receivables) to current liabilities.
Return on Assets	100* (Net income before preferred dividends + ((interest expense on debt - interest capitalized) * (1 - Tax Rate))) / Last year's total assets. Calculated differently for financial companies.
Return on Equity	100* (Net income before preferred dividends - preferred dividend requirements) / Last year's common equity
Return on Invested Capital	100*Net income before preferred dividends + ((Interest expense on debt - interest capitalized) * (1 - Tax Rate))) / (Last year's total capital + last year's short-term debt & current portion of long-term debt)
Share of Short-term Debt in Total Debt*	The ratio of net short-term debt to total debt.
Total Assets	For industrials: the sum of total current assets, long-term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets. For banks: the sum of cash and due from banks, total investments, net loans, customer liability on acceptances, investment in unconsolidated subsidiaries, real estate assets, net property, plant and equipment and other assets. For insurance companies: sum of cash, total investments, premium balance receivables, investments in unconsolidated subsidiaries, net property, plant, and equipment and other assets.
Total Capital	The total investment in the company. The sum of common equity, preferred stock, minority interest, long-term debt, non-equity reserves and deferred tax liability in untaxed reserves.
Working Capital	The difference between current assets and current liabilities.

(1) Variables are either taken directly from the Worldscope database or calculated based on information provided by Worldscope and/or price information from Datastream. Statistics marked with a * are not directly available from Worldscope and are calculated as stated. For more information on specific statistics, see Worldscope database.

APPENDIX B - Sefcik and Thompson's Estimation Methodology

The estimation strategy utilized in Sefcik and Thompson (1986) can be summarized in five steps:

1) Use OLS to estimate equation *5* for the full sample of *N* firms over the entire time period of length *T* (including both the pre-crisis and crisis periods). Obtain the parameter values: $\hat{\boldsymbol{\alpha}}, \hat{\boldsymbol{\beta}}$ and $\hat{\boldsymbol{\gamma}}$ which are each *(N x 1)* vectors of α_i's, β_i's and γ_i's, respectively.

2) Rewrite equation *6* in vector form: $\hat{\boldsymbol{\gamma}} = \mathbf{F}\,\boldsymbol{\Psi} + \boldsymbol{\eta}$,

with: $\hat{\boldsymbol{\gamma}} = \begin{bmatrix} \hat{\gamma}_1 \\ . \\ . \\ . \\ \hat{\gamma}_N \end{bmatrix}$, $\mathbf{F} = \begin{bmatrix} f_{11} & . & . & . & f_{K1} \\ . & . & & & . \\ . & & . & & . \\ . & & & . & . \\ f_{1N} & . & . & . & f_{KN} \end{bmatrix}$ and $\boldsymbol{\eta} = \begin{bmatrix} \eta_1 \\ . \\ . \\ . \\ \eta_N \end{bmatrix}$.

K continues to be the number of firm characteristics of interest. Then use the $\hat{\boldsymbol{\gamma}}$ estimated in step 1 and OLS to estimate: $\hat{\boldsymbol{\Psi}} = (\mathbf{F}'\mathbf{F})^{-1}\mathbf{F}'\hat{\boldsymbol{\gamma}} = \mathbf{X}\hat{\boldsymbol{\gamma}}$, where $\mathbf{X}$ is a *(K x N)* matrix for which each row can be interpreted as an estimated weight of the impact of the firm characteristic *k*.

3) Use the weights implied in $\mathbf{X}$ to form *K* portfolios from the original *N* firms. The crisis should impact each portfolio only through the one characteristic shared by each portfolio. In other words: $\mathbf{XF} = \mathbf{I}$ where $\mathbf{I}$ is a *(K x K)* identity matrix. Each portfolio (i.e. each row in $\mathbf{X}$) has a zero net value for each characteristic in $\mathbf{X}$, except the one characteristic *k* (which is the row number.) Use these weights to calculate returns for each portfolio: $\hat{\mathbf{R}}_K = \mathbf{X}\mathbf{R}_N$,

with: $\hat{\mathbf{R}}_K = \begin{bmatrix} \hat{R}_{11} & . & . & . & \hat{R}_{1T} \\ . & . & & & . \\ . & & . & & . \\ . & & & . & . \\ \hat{R}_{K1} & . & . & . & \hat{R}_{KT} \end{bmatrix}$ and $\mathbf{R}_N = \begin{bmatrix} R_{11} & . & . & . & R_{1T} \\ . & . & & & . \\ . & & . & & . \\ . & & & . & . \\ R_{N1} & . & . & . & R_{NT} \end{bmatrix}$.

4) Insert the estimated returns $\hat{\mathbf{R}}_K$ into equation *5* to calculate parameter values $\hat{\hat{\boldsymbol{\alpha}}}, \hat{\hat{\boldsymbol{\beta}}}$ and $\hat{\hat{\boldsymbol{\gamma}}}$ which are each *(K x 1)* vectors of α_k's, β_k's and γ_k's. The parameters estimated in $\hat{\hat{\boldsymbol{\gamma}}}$ provide unbiased and consistent estimates of the impact of the *K* firm characteristics on abnormal returns.

5) Use the disturbances from equation *5* to calculate the variance-covariance matrix, which is unbiased and consistent. This estimation technique does not require that the disturbance terms of equation *5* are i.i.d. Sefcik and Thompson show how the estimated variance-covariance matrix is related to the biased covariance estimates obtained through the two- or three-step estimation techniques that do not account for the cross-correlation in disturbances across firms.

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Table 1 - Number of Companies by Country and Region

	Asian crisis	Russian crisis
Asia	**3,855**	**3,146**
China	68	18
Hong Kong	326	251
India	187	161
Indonesia	68	46
Japan	1,919	1,782
Korea	256	224
Malaysia	413	295
Pakistan	13	5
Philippines	77	65
Singapore	152	128
Taiwan	204	64
Thailand	172	107
Australasia	**223**	**180**
Australia	182	140
New Zealand	41	40
Europe	**2,634**	**2,570**
Austria	49	52
Belgium	89	79
Czech Republic	50	44
Denmark	97	91
Finland	57	56
France	413	388
Germany	319	306
Greece	100	65
Hungary	20	19
Ireland	16	20
Italy	126	142
Luxembourg	10	8
Netherlands	147	140
Norway	82	70
Poland	46	20
Portugal	46	45
Spain	110	106
Sweden	152	142
Switzerland	114	125
U.K.	591	652
Latin America	**195**	**169**
Argentina	29	26
Brazil	55	47
Chile	35	25
Colombia	3	5
Mexico	51	49
Peru	11	8
Venezuela	11	9
North America	**4,321**	**3,993**
Canada	445	402
U.S.	3,876	3,591
Other	**194**	**177**
Israel	20	19
South Africa	113	104
Turkey	61	54
Total Sample	**11,422**	**10,235**

Table 2 - Major Exports from the Crisis Zone[a]

Asian crisis: phase 1 & 2			Asian crisis: phase 2 only			Russian crisis		
SITC	**Product**	**SIC**	**SITC**	**Product**	**SIC**	**SITC**	**Product**	**SIC**
0361	Crustaceans, frozen	913	0371	Fish, prepared, preserved, nes	2091,2092	3432	Natural gas, gaseous	1311
0372	Crustaceans, mollusks, prepared	2091, 2092	0471	Other cereal flours	2041	6727	Semi-fin. iron, etc.25%+c	3316
0423	Rice, milled, semi-milled	112, 2044	0731	Cocoa powder, sweetened	2066	6831	Nickel, nickel alloy, unwrought	3339
0548	Vegetable products, roots, tubers	139	0751	Pepper, dry, crushed, ground	2099	7187	Nuclear reactors, parts nes	3621
0721	Cocoa beans	179	2313	Other natural gums	831			
2231	Copra	2079	2450	Fuel wood, wood charcoal	831			
2311	Natural rubber latex	831	2923	Vegetable material, for plaiting	NA			
2312	Natural rubber exc. latex	831	5792	Waste, styrene polymers	2821			
2475	Wood, non-conif. ,rough	831	6113	Whole bovine skin leather	3111			
2484	Wood, non-conif, sawn	2435	6118	Leather, special finish	3111			
2485	Wood, non-conif. worked, shaped	2435	6132	Heads, tails, paws etc.	279			
2655	Abaca, Manila hemp, waste	179	6531	Fabric, synthetic filament yarn	2221			
2657	Coconut fiber and waste	179	6532	Fabric, 85%+syn.stpl.fiber	2221			
2831	Copper ores, concentrates	1021	6533	Fabric<85% syn.stpl fiber+ctn	2221			
2841	Nickel ores, concentrates	1099	6551	Pile fabric, knit, crochet	2259			
2862	Thorium ores, concentrates	1099	6552	Other knit crochet fabrics	2259			
3431	Natural gas, liquefied	1321	6562	Labels, badge etc ex embroidered	2396			
4222	Palm oil, fractions	2076	6565	Embroidery	2396			
4223	Coconut oil, fractions	2076	6673	Precious, semiprecious stones	5094			
4224	Palm kernel oil, fractions	2076	6944	Nails, tacks, etc. aluminum	3363			
4312	Fat, oil, any veg. partly processed	2076	7161	Electric motors<=37.5w	3621			
4313	Fatty acid etc. from wax	2079	7468	Other ball, roller bearing	3562			
6129	Other leather articles, nes	3199	7512	Calculating, accounting machines	3578			
6343	Plywood, solely of wood	2436, 2435	7526	Input or output units	3575			
6344	Other plywood, veneered panels	2435, 2436	7527	Storage units, data processing	3572			
6354	Wood, domestic use ex. furniture	NA	7529	Data processing equipment, nes	3577			
6871	Tin, tin alloys, unwrought	3321	7599	Parts, data processors etc.	3679			
7131	Aircraft piston engines	3724	7611	Color television receiver	3651			
7622	Portable radio receivers	3663	7638	Sound, video recording etc	3651			
7628	Other radio receivers	3669	7722	Printed circuits	3672			
7633	Turntables, record player	3651	7761	TV picture tubes, CRT, etc	3671			
8437	Shirts, mens boys, knit	2321	7762	Other electronic valves, tubes	3679			
8482	Plastic, rubber, apparel, etc	2385	7763	Diodes, transistors etc.	3674			
8512	Sports footwear	3131	7764	Electronic microcircuits	3674			
			7768	Electronic comp parts, crystals	3679			
			7863	Transport containers	3799			
			7917	Rail, tram. coach, etc	3743			
			7932	Ships, boats, other vessels	3731, 3732			
			7937	Tugs and pusher craft	3731, 3732			
			8447	Blouses, shirt-blouses, etc	2331, 2361			
			8451	Babies' garments, clothes	2361, 2369			
			8469	Made-up clothing. Accessories	2381, 2384			
			8811	Cameras, flash equipment	3861			
			8831	Cine film,35mm+,developed	2671			
			8859	Time measuring equipment	3873			
			8972	Imitation jewelry	3961			

(a) Major exports defined as four-digit SITC groups for which total exports from countries in the crisis zone are 25 percent or more of total world exports. Export statistics taken from the full year prior to the defined start of the crisis.
(b) Asian crisis-Phase 1 countries defined as: Indonesia, Malaysia, Philippines, and Thailand.
(c) Asian crisis-Phase 2 countries defined as: Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

Table 3 – Base Regression Results[a]

	Asian crisis - phase 1		Asian crisis - phase 2		Russian crisis	
	Standard[b] (1)	S-T[b] (2)	Standard[b] (3)	S-T[b] (4)	Standard[b] (5)	S-T[b] (6)
Constant	0.025**	-0.002	-0.216**	-0.085	-0.830**	-0.618**
	(0.003)	(0.046)	(0.006)	(0.064)	(0.021)	(0.191)
Export Competition[c]	0.027	0.013	-0.382**	-0.134**	-1.235**	-0.321**
	(0.019)	(0.029)	(0.024)	(0.032)	(0.172)	(0.112)
Direct Trade Exposure[d]	0.017	0.012	-0.461**	-0.254**	-2.008**	-1.011**
	(0.037)	(0.042)	(0.099)	(0.094)	(0.579)	(0.277)
Debt Outstanding[e]	-0.006**	-0.004	-0.003	0.000	-0.304	0.007
	(0.002)	(0.004)	(0.004)	(0.005)	(0.240)	(0.184)
Stock Liquidity[f]	0.024**	-0.002	-0.240**	-0.068**	-0.857**	-0.094
	(0.003)	(0.016)	(0.008)	(0.019)	(0.023)	(0.087)
Country dummies[g]	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**
# Observations	***8035***	***8035***	***7177***	***7177***	***7682***	***7682***
Crisis days	***60***	***60***	***60***	***60***	***10***	***10***
Total days	***321***	***321***	***321***	***321***	***270***	***270***

(a) Standard errors in parentheses. * is significant at the 5 percent level; ** is significant at the 1 percent level.
(b) Standard is the traditional OLS estimates which do not adjust for the cross-correlation in returns or heteroscedasticity. S-T is Sefcik and Thompson's (1986) methodology.
(c) Dummy variable equal to 1 if firm's main product is in the same four-digit SIC group as a "major export" from the crisis zone. (See Table 2 for "major exports".)
(d) Dummy variable equal to 1 if firm has over 5 percent of sales, assets or net income in the crisis zone.
(e) Ratio of net short-term debt to common equity.
(f) Dummy variable equal to 1 if stock had non-zero returns in at least 3/4 of the trading days in the year prior to the crisis.
(g) Country dummies included in regression and reported in Table 4. Stars indicate the joint significance of dummy variables. Germany is the excluded country.

Table 4 - Country-Specific Effects[a]

		Asian crisis-phase 1		Asian crisis-phase 2		Russian crisis	
		Coefficient	St. error	Coefficient	St. error	Coefficient	St. error
Asia	China	0.003	(0.256)	-0.190	(0.238)	0.183	(0.560)
	Hong Kong	0.125	(0.137)	---	---	-0.115	(0.725)
	India	-0.071	(0.154)	-0.096	(0.155)	0.589	(0.503)
	Indonesia	---	---	---	---	-1.886	(1.046)
	Japan	-0.267**	(0.101)	-0.348**	(0.125)	0.092	(0.431)
	Korea	-0.068	(0.160)	---	---	0.621	(0.869)
	Malaysia	---	---	---	---	1.095	(0.977)
	Pakistan	0.091	(0.187)	-0.099	(0.179)	0.704	(0.816)
	Philippines	---	---	---	---	0.025	(0.593)
	Singapore	-0.119	(0.096)	---	---	-0.140	(0.565)
	Taiwan	-0.027	(0.125)	---	---	0.068	(0.423)
	Thailand	---	---	---	---	-0.038	(0.762)
Australasia	Australia	-0.027	(0.066)	-0.074	(0.081)	0.436	(0.238)
	New Zealand	0.113	(0.070)	-0.143	(0.099)	0.524	(0.282)
Europe	Austria	0.056	(0.049)	0.030	(0.049)	-0.050	(0.164)
	Belgium	0.030	(0.044)	0.132**	(0.050)	0.304*	(0.151)
	Czech Republic	0.081	(0.088)	-0.004	(0.103)	-0.866**	(0.284)
	Denmark	0.015	(0.049)	0.034	(0.048)	0.255*	(0.127)
	Finland	0.058	(0.066)	0.034	(0.066)	-0.423*	(0.174)
	France	0.037	(0.043)	0.033	(0.045)	0.183	(0.133)
	Germany	---	---	---	---	---	---
	Greece	-0.006	(0.132)	0.049	(0.171)	-0.500	(0.532)
	Hungary	0.333*	(0.135)	-0.028	(0.214)	-2.066**	(0.628)
	Ireland	0.127	(0.066)	0.161*	(0.074)	-0.597*	(0.250)
	Italy	0.193*	(0.077)	0.145	(0.081)	-0.183	(0.281)
	Luxembourg	0.071	(0.140)	0.143	(0.126)	0.505	(0.389)
	Nether.	0.044	(0.059)	-0.017	(0.060)	0.152	(0.134)
	Norway	0.169*	(0.071)	0.021	(0.079)	-0.718**	(0.221)
	Poland	0.176	(0.164)	-0.219	(0.169)	-1.180*	(0.469)
	Portugal	0.128	(0.068)	0.021	(0.064)	-0.130	(0.239)
	Spain	0.078	(0.069)	0.085	(0.074)	-0.298	(0.222)
	Sweden	0.126*	(0.064)	-0.035	(0.065)	-0.157	(0.159)
	Switzerland	0.052	(0.044)	0.046	(0.042)	-0.476**	(0.131)
	UK	0.093	(0.049)	0.037	(0.046)	-0.239	(0.144)
Latin America	Argentina	-0.013	(0.136)	-0.122	(0.181)	-2.027**	(0.509)
	Brazil	-0.013	(0.124)	-0.500**	(0.154)	-1.327**	(0.511)
	Chile	-0.003	(0.089)	-0.167	(0.099)	-1.092**	(0.303)
	Colombia	0.309*	(0.153)	0.071	(0.167)	-1.042	(0.666)
	Mexico	0.180	(0.112)	0.011	(0.148)	-0.999*	(0.461)
	Peru	-0.164	(0.141)	-0.022	(0.141)	-1.443**	(0.368)
	Venezuela	0.177	(0.176)	-0.217	(0.166)	-3.009**	(0.832)
North America	Canada	0.116*	(0.055)	-0.020	(0.081)	-0.351	(0.245)
	US	0.182**	(0.066)	0.022	(0.088)	-0.355	(0.266)
Other	Israel	-0.036	(0.269)	0.063	(0.270)	-0.150	(0.348)
	South Africa	-0.005	(0.071)	-0.274**	(0.092)	-1.093**	(0.286)
	Turkey	0.516*	(0.240)	0.319	(0.260)	-1.402*	(0.634)

(a) Results based on regressions estimated with Sefcik-Thompson methodology . See Table 3 for variable definitions and regression specification. * is significant at the 5 percent level; ** is significant at the 1 percent level.

Table 5 - Regression Results: Explaining the Country-Specific Effects[a]

	Asian crisis: phase 1	Asian crisis: phase 2	Russian crisis
Constant	-0.056	-0.265	-4.310*
	(0.246)	(0.144)	(1.978)
Macroeconomic variables			
Current account balance	0.003	-0.003	-0.036
	(0.005)	(0.004)	(0.032)
Government budget balance	-0.014	-0.016*	-0.012
	(0.009)	(0.007)	(0.053)
International reserve ratio	-0.002	-0.004*	0.004
	(0.002)	(0.002)	(0.016)
Per capita income	-0.005	0.010*	-0.014
	(0.009)	(0.005)	(0.053)
Corporate governance variables			
Anti-director rights	-0.003	-0.017	0.132
	(0.019)	(0.015)	(0.144)
Corruption	-0.017	-0.026*	-0.011
	(0.018)	(0.011)	(0.141)
Expropriation risk	0.028	0.068*	0.525
	(0.050)	(0.026)	(0.337)
Rule of law	0.012	-0.031*	-0.086
	(0.027)	(0.015)	(0.152)
R^2	0.22	0.60	0.29
Macroeconomic variables: F-statistic[b]	0.8	6.2**	0.6
Corporate governance variables: F-statistic[b]	0.8	4.5**	1.0
Observations	31	29	33

(a) Dependent variables are the country-specific effects reported in Table 4 and obtained from the regressions reported in Table 3. Standard errors are in parentheses and are White-adjusted for heteroscedasticity. * is significant at the 5 percent level; and ** is significant at the 1 percent level.

(b) Statistic from a test of the null hypothesis that the group of macroeconomic or corporate governance variables are jointly zero.

Table 6 - Sensitivity Tests: Varying Crisis Period Length[a]

	Export Competition	Direct Trade Exposure	Debt Outstanding	Stock Liquidity	Country Effects[b]
Asian crisis – phase 1[c]					
1 week	-0.0107	-0.1352	0.0001	-0.0132	Yes
	(0.0996)	(0.1481)	(0.0154)	(0.0611)	
2 weeks	-0.0912	-0.1504	-0.0020	0.0189	Yes
	(0.0722)	(0.1115)	(0.0108)	(0.0421)	
4 weeks	0.0250	-0.0612	-0.0098	0.0249	Yes
	(0.0506)	(0.0782)	(0.0076)	(0.0293)	
8 weeks	0.0237	-0.0338	-0.0029	0.0061	Yes
	(0.0358)	(0.0518)	(0.0054)	(0.0200)	
12 weeks	0.0130	0.0122	-0.0044	-0.0024	Yes
	(0.0286)	(0.0421)	(0.0043)	(0.0160)	
24 weeks	-0.0332	-0.0505	-0.0029	-0.0183	Yes
	(0.0207)	(0.0337)	(0.0035)	(0.0123)	
Asian crisis - phase 2[d]					
1 week	-0.0460	-0.0124	0.4045	0.0704	Yes
	(0.1113)	(0.2991)	(0.3897)	(0.0632)	
2 weeks	-0.0166	0.0264	0.0046	-0.0001	Yes
	(0.0789)	(0.2155)	(0.0107)	(0.0418)	
4 weeks	-0.1279*	-0.2778	0.0138	-0.0351	Yes
	(0.0556)	(0.1582)	(0.0077)	(0.0315)	
8 weeks	-0.0936*	-0.1613	0.0053	-0.0469*	Yes
	(0.0387)	(0.1137)	(0.0055)	(0.0221)	
12 weeks	-0.1338**	-0.2542**	0.0003	-0.0679**	Yes
	(0.0321)	(0.0939)	(0.0051)	(0.0193)	
24 weeks	-0.0769**	-0.1790**	0.0034	0.0037	Yes
	(0.0227)	(0.0672)	(0.0036)	(0.0142)	
Russian crisis[e]					
1 week	-0.0313	-1.0347**	0.1078	0.0038	Yes
	(0.1551)	(0.3607)	(0.2292)	(0.1191)	
2 weeks	-0.3214**	-1.0111**	0.0072	-0.0942	Yes
	(0.1120)	(0.2769)	(0.1841)	(0.0867)	
4 weeks	0.0162	-0.6590**	-0.2033	-0.0586	Yes
	(0.0775)	(0.1988)	(0.1317)	(0.0627)	
8 weeks	0.0580	-0.4043**	-0.1215	-0.0230	Yes
	(0.0552)	(0.1447)	(0.0807)	(0.0440)	
12 weeks	-0.0355	-0.1296	-0.0938	0.0422	Yes
	(0.0461)	(0.1244)	(0.0762)	(0.0356)	
24 weeks	-0.1339**	-0.0440	-0.0400	0.0202	Yes
	(0.0419)	(0.1092)	(0.0662)	(0.0318)	

(a) Standard errors in parentheses. * is significant at the 5 percent level; ** is significant at the 1 percent level.
(b) Base regressions from Section IV for each crisis are shaded.
(c) "Yes" indicates that I am unable to reject an F-test of the joint significance of the country dummy variables.
(d) The first phase of the Asian crisis is defined as beginning on June 25, 1997. Crisis countries are: Indonesia, Malaysia, Philippines, and Thailand.
(e) The second phase of the Asian crisis is defined as beginning on October 1, 1997. Crisis countries are: Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.
(f) The Russian crisis is defined as beginning on August 17, 1998. The only crisis country is Russia.

Table 7 - Sensitivity Tests: Changing Variable Definitions and Model Specification[a]

	Asian Crisis-Phase 2					Russian Crisis				
	Base results (1)	**Redefine export competition[b] (2)**	**Redefine stock liquidity[c] (3)**	**Constant-mean return[d] (4)**	**Add control for firm size[e] (5)**	**Base results (6)**	**Redefine export competition[b] (7)**	**Redefine stock liquidity[c] (8)**	**Constant-mean return[d] (9)**	**Add control for firm size[e] (10)**
Constant	-0.085	-0.063	0.057	-0.085	-0.087	-0.618**	-0.623**	-0.389*	-0.618**	-0.630**
	(0.064)	(0.064)	(0.058)	(0.067)	(0.065)	(0.191)	(0.191)	(0.158)	(0.200)	(0.192)
Export Competition	-0.134**	-0.120**	-0.184**	-0.134**	-0.131**	-0.321**	-0.235	-0.299*	-0.321**	-0.342**
	(0.032)	(0.016)	(0.045)	(0.034)	(0.032)	(0.112)	(0.180)	(0.151)	(0.113)	(0.113)
Direct Trade Exposure	-0.254**	-0.271**	-0.259**	-0.254**	-0.264**	-1.011**	-0.965**	-0.980**	-1.011**	-0.996**
	(0.094)	(0.096)	(0.101)	(0.095)	(0.094)	(0.277)	(0.274)	(0.378)	(0.278)	(0.277)
Debt Outstanding	0.000	0.000	0.264	0.000	0.000	0.007	0.003	-0.111	0.007	-0.001
	(0.005)	(0.005)	(0.591)	(0.005)	(0.005)	(0.184)	(0.184)	(0.938)	(0.184)	(0.184)
Stock Liquidity	-0.068**	-0.071**	-0.094**	-0.068*	-0.076**	-0.094	-0.089	-0.293**	-0.094	-0.119
	(0.019)	(0.019)	(0.030)	(0.034)	(0.020)	(0.087)	(0.087)	(0.070)	(0.130)	(0.089)
Country dummies	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**	Yes**
# Observations	7177	7179	2962	7177	7178	7682	7682	2985	7682	7666
Crisis days	60	60	60	60	60	10	10	10	10	10
Total days	321	321	321	321	321	270	270	270	270	270

(a) Standard errors in parentheses. All variables defined in Table 3 except as noted. * is significant at the 5 percent level; ** is significant at the 1 percent level
(b) Export competition is redefined using sample statistics (instead of world export statistics) and two-digit SIC codes.
(c) Stock liquidity is redefined using the ratio of shares traded to shares outstanding.
(d) Specification is a constant-mean-return model (equation 9) instead of a market model.
(e) Firm size measured by total market capitalization (in US$).

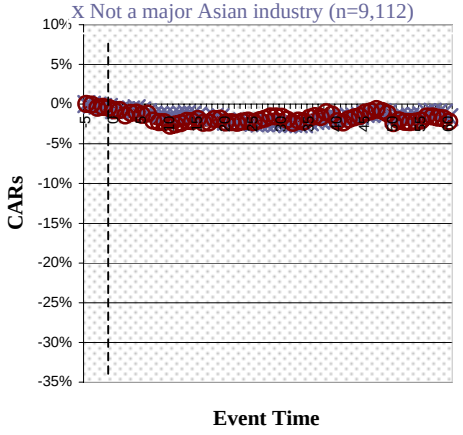
Figures I through VI

Asian Crisis-Phase 1

Figure I: Export Competition

o Major Asian (1) industries (n=199)

x Not a major Asian industry (n=9,112)

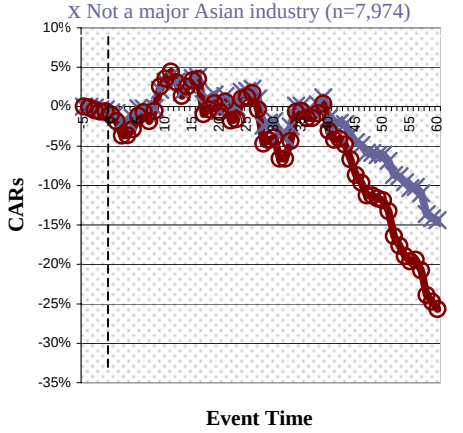


Asian Crisis-Phase 2

Figure II: Export Competition

o Major Asian (2) industries (n=575)

x Not a major Asian industry (n=7,974)



Russian Crisis

Figure III: Export Competition

o Major Russian industry (n=167)

x Not a major Russian industry (n=9,113)

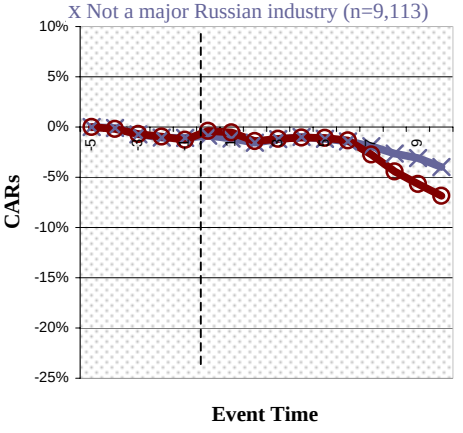


Figure IV: Direct Trade Exposure

o Direct exposure to Asia (1) (n=50)

x No direct exposure (n=9,261)

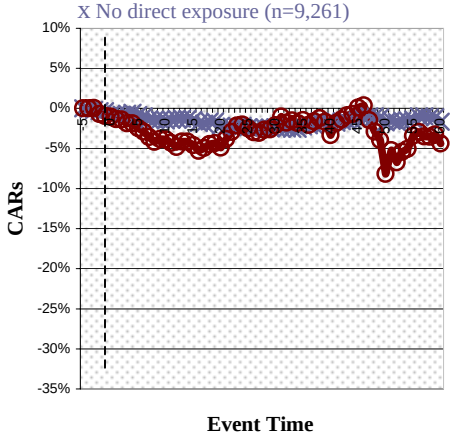


Figure V: Direct Trade Exposure

o Direct exposure to Asia (2) (n=37)

x No direct exposure (n=8,512)

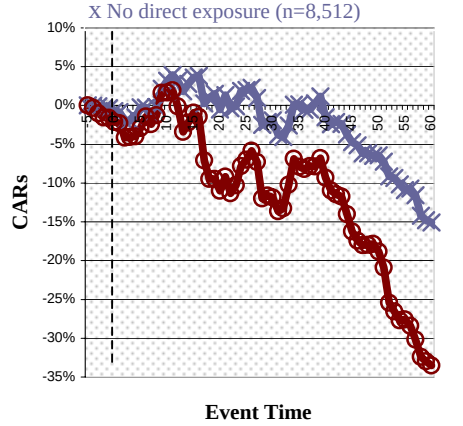
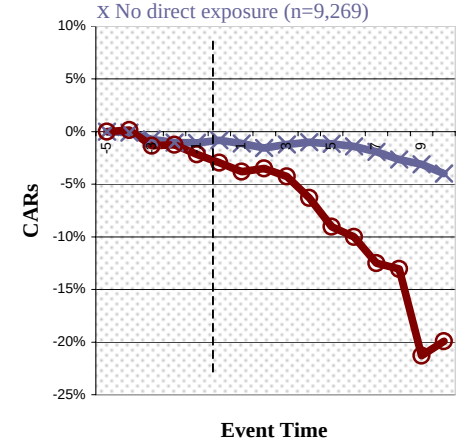


Figure VI: Direct Trade Exposure

o Direct exposure to Russia (n=11)

x No direct exposure (n=9,269)



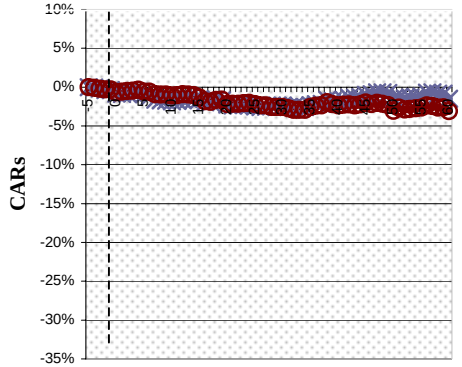
Figures VII through XII

Asian Crisis-Phase 1

Figure VII: Debt Outstanding

o More dependent on short-term debt (n=3,951)

x Less dependent on short-term debt (n=4,044)

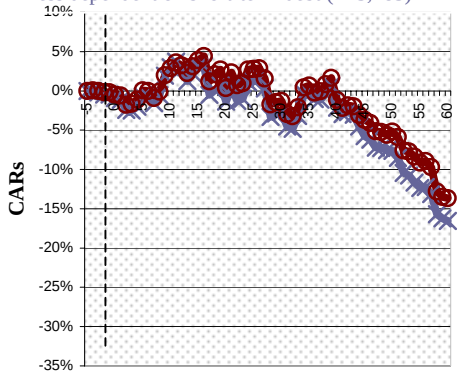


Asian Crisis-Phase 2

Figure VIII: Debt Outstanding

o More dependent on short-term debt (n=3,478)

x Less dependent on short-term debt (n=3,785)



Russian Crisis

Figure IX: Debt Outstanding

o More dependent on short-term debt (n=3,971)

x Less dependent on short-term debt (n=4,001)

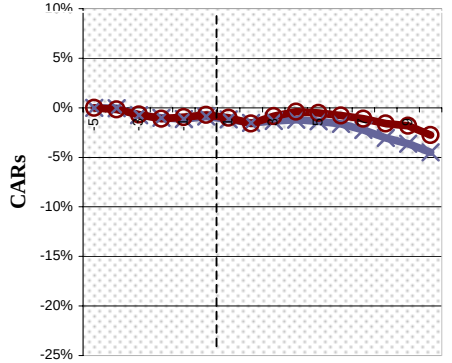


Figure X: Stock Liquidity

o Highly-liquid stocks (n=6,365)

x Less-liquid stocks (n=2,946)

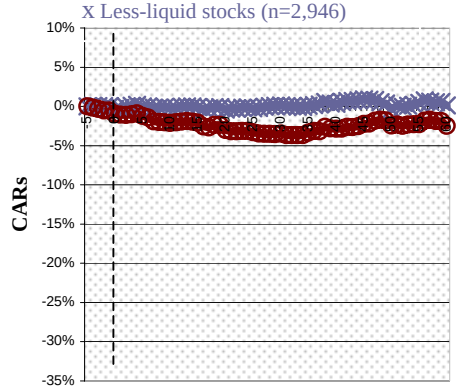


Figure XI: Stock Liquidity

o Highly-liquid stocks (n=5,860)

x Less-liquid stocks (n=2,689)

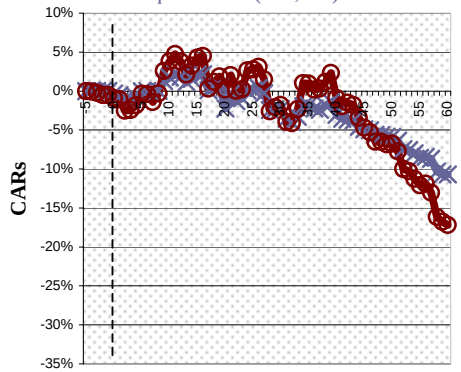
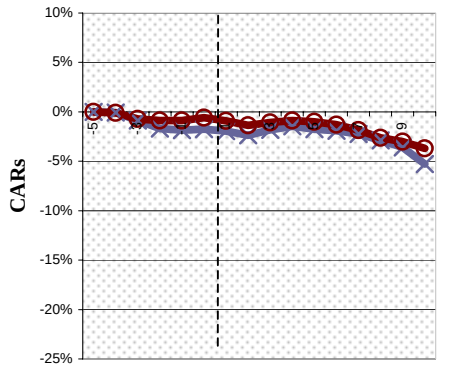


Figure XII: Stock Liquidity

o Highly-liquid stocks (n=7,355)



Endnotes

[1] For a collection of these papers, see Claessens and Forbes (2001). Claessens et al. (2001) is an excellent survey. See Forbes and Rigobon (2001) and (2002) for a discussion of different definitions of contagion and a critical assessment of tests for contagion based on correlation coefficients.

[2] Eichengreen et al. (1996) and Glick and Rose (1999) were the earliest papers to make this argument. Forbes (2002a) provides evidence on the role of trade at the industry level.

[3] Van Rijckeghem and Weder (2001) provide evidence on the role of common bank creditors. Kaminsky et al. (2001) find evidence on the role of mutual fund investors.

[4] Baig and Goldfajn (1999) find evidence of country reevaluation based on macroeconomic characteristics while Johnson et al. (2000) and Mitton (2002) emphasize the role of corporate governance variables.

[5] For example, see Masson (1998) or Baig and Goldfajn (1999).

[6] For example, see Froot et al. (2001).

[7] Forbes (2002b) and Forbes (2002c) complement this analysis by examining firm performance within crisis countries.

[8] For further information on this database, see the website: http://www.primark.com.

[9] Returns are calculated as log differences and are adjusted for weekends. The 5 excluded countries are: Liechtenstein, Russian Federation, Slovakia, Sri Lanka, and Zimbabwe.

[10] Actively-traded stocks are defined as stocks with non-zero returns for at least 50 percent of the trading days during the given period. I also exclude any that are delisted (due to bankruptcy, merger, or any other reason) during the given period. Reasonable modifications to this definition have no significant impact on results. This "actively traded" criterion eliminates 2,732 firms from the Asian crisis sample and 2,335 firms from the Russian crisis sample.

[11] See Table 2 in Forbes (2000) for additional sample information.

[12] The global market return is calculated using daily, local currency prices reported by Datastream for each country's market index. Weights are based on total market capitalization at the end of the year before the crisis, as reported in International Finance Corporation (1999).

[13] More specifically, on August 17th the Russian government expanded the band for the exchange rate, defaulted on its treasury bills, and declared a moratorium on foreign debt payments. The currency officially floated on August 27th.

[14] As recently as May 1997, the Thai government had pledged public commitment to support this finance company. Reneging on this promise threatened the extensive system of implicit and explicit government backing. See Radelet and Sachs (1998) or Corsetti et al. (1999) for a detailed accounting of key events in the Asian crisis.

[15] Gerlach and Smets (1995) develop the first formal model of these effects. Corsetti et al. (2000) extend these ideas using micro-foundations. Forbes (2002a) discusses different channels by which trade spreads currency crises.

[16] There could be secondary product-competitiveness effects that improve the competitiveness of certain products if exports from the country that devalued are used as inputs in the production of goods in other countries.

[17] The crisis zone for Asia-Phase 1 is: Indonesia, Malaysia, Philippines, and Thailand. The crisis zone for Asia-Phase 2 is: Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand. The Russian crisis zone is Russia. Information on exports by SITC group is taken from International Trade Centre/UN Statistics Division (1999). Export information is for the full year preceding the relevant crisis.

[18] Some potential problems with this competitiveness indicator are: different countries could produce goods of varying quality within the same 4-digit category; all firm sales are included under the firm's primary SIC code; some of the SIC codes available for each company do not directly correspond to the SITC codes available for each country; and SITC export information is not available for Taiwan.

[19] I exclude firms from the relevant crisis zone for two reasons. First, these firms are not relevant to this paper's investigation of how a crisis in one country affects firms in other countries. Second, crises could affect local firms differently, such as increasing the competitiveness of their exports instead of decreasing it.

[20] This classification procedure is not precise since many companies report foreign exposure by region instead of by country. To be conservative, I only include exposure that is specifically linked to the relevant country.

[21] Goldfajn and Valdés (1997) develop a formal model of these effects. Also see Chang and Velasco (2001).

[22] For each crisis, I use the sample median as the division between more and less dependent firms.

[23] These comparisons are rough tests of a credit crunch, since firms more reliant on short-term debt (or total debt) could experience lower returns during the crisis for other reasons. For example, firms more dependent on debt financing could be smaller and/or riskier. Since these types of firms could be more vulnerable to a crisis for reasons other than a credit crunch, it is surprising that there are not greater differences between stock portfolios in Figures VII through IX.

[24] See Valdés (1996) for a formal model of this channel.

[25] Claessens et al. (2001) also make this point.

[26] I focus on this measure of stock liquidity since it is the only measure available for most of the companies in the sample. As shown in the sensitivity analysis, using other measures does not affect the central results.

[27] The literature on these various theories is extensive and is well summarized in Claessens et al. (2001).

[28] An alternative solution to this problem is a GLS estimator that utilizes the covariance matrix of returns for firms in the pre-crisis period. This technique is not feasible, however, for a large number of firms and generally requires that $T>N$, which is clearly not satisfied in the data set described in Section II. See Collins and Dent (1984).

[29] GLS coefficient estimates are efficient, but as discussed in the footnote above, are not feasible for this sample.

[30] Results do not change significantly if I use other tests for outliers, such as Cook's distance statistic or simply plotting residuals and removing observations that appear to be extreme outliers.

[31] For information on variable definitions, see Section III, Appendix A, and/or the footnotes to Table 3.

[32] Although the list of "major exports" from Russia is short, Russia exports a large share of global exports for the few goods listed in Table 2. For example, Russia exported nearly 50 percent of total global exports of natural gas (gaseous) in 1997 and nearly 30 percent of global exports of unwrought nickel and nickel alloy.

[33] It is worth noting, however, that since the sample only includes actively-traded stocks, many smaller firms that would be more likely to experience a contraction in lending after a crisis are not included in the analysis.

[34] I focus on coefficient estimates based on the Sefcik-Thompson estimates in columns (2), (4) and (6) of Table 3.

[35] Work analyzing the role of macroeconomic variables in the transmission of financial crises includes: Eichengreen et al. (1996), Sachs et al. (1996), Glick and Rose (1999), and Kaminsky and Reinhart (1999). Mitton (2002) analyzes the role of corporate governance in the Asian crisis. Johnson et al. (2000) simultaneously analyzes the role of both macroeconomic and corporate governance variables.

[36] For detailed definitions on each of these variables, see Appendix C in Forbes (2000). A lower value for each of the corporate governance variables indicates worse corporate governance. Also see the body of literature listed in the previous footnote for information on why any of these variables might affect a country's vulnerability to a crisis.

[37] For example, I included additional macroeconomic variables from World Bank (2000) such as: banking system strength, money supply growth, GDP per capita growth, ratio of total debt to GDP, ratio of short-term debt to total debt, inflation, extent of any recent lending boom, openness, and exchange rate overvaluation. I also included additional corporate governance variables from La Porta et al. (1998) such as: accounting standards, the risk of contract repudiation, creditor rights, and judicial efficiency. Finally, I added the corruption perceptions index published by Transparency International as well as regional dummy variables.

[38] Colombia has the median estimate of the absolute values for all the country-specific effects during this period.

[39] These comparisons are versus a company: (a) whose main product line is not a major export from the Asian crisis zone; (b) which has less than 5 percent of sales, assets or income in the Asian crisis zone; and (c) which is based in Germany (the country excluded from the regression).

[40] For a literature survey and model explaining these patterns of investor behavior, see Barberis et al. (1998).

[41] For the remainder of this section I do not report results for the Asian crisis-Phase 1 because these estimates were insignificant (except for the country effects) in the base case and do not change significantly in any sensitivity tests.

[42] These eight definitions are: net short-term debt to working capital, net short-term debt to total assets, net short-term debt to total capital, coverage ratio, current ratio, quick ratio, share of short-term debt to total debt, and the ratio of working capital to assets. I also use changes in the various debt to equity ratios, instead of simply levels. Each variable is defined in detail in Appendix A.