

**Financial Crises, Panic and Contagion: Evidence from a Cross-Country Comparison Using Two Time Frames**

Cinzia Balit Moussalli, Professor, Huntingdon College, cinziam@huntingdon.edu

**Abstract**

Rapid growth in Asian nations during the period 1994 to 1996 first attracted massive capital inflows, which were soon followed by a loss of confidence and even greater capital outflows. Most of the countries that operated under a fixed exchange rate system were unable to maintain their peg due to speculative attacks against their currencies, and ultimately lost much of their reserves. While the effect of contagion spread the crisis over a large number of developing nations, the question needs to be asked: Why were some countries less affected than others? This study will analyze the Asian currency crisis by looking into the extent to which it affected 32 nations in three different regions of the globe. The study is particularly important in light of the recent volatility of the stock market in the US and around the world. It will shed some light into the combination of factors that are likely to cause another financial crisis.

**Introduction**

Rapid growth in Asian nations during the period 1994 to 1996 first attracted massive capital inflows, which were soon followed by a loss of confidence and even greater capital outflows. Most of the countries that operated under a fixed exchange rate system were unable to maintain their peg due to speculative attacks against their currencies, and ultimately lost much of their reserves. While the effect of contagion spread the crisis over a large number of developing nations, the question needs to be asked: Why were some countries less affected than others? This study will analyze the Asian currency crisis by looking into the extent to which it affected 32 nations in three different regions of the globe.

Although the lack of economic fundamentals (macroeconomic policies, low stocks of foreign reserves, current account deficits, and budget deficits) was a major reason behind the crisis, this paper will argue that panic aggravated the situation and led to what is known as the Asian crisis. If panic explains contagion and the extent of the crisis, then what are the factors that led to the panic? This research attempts to answer this question by arguing that investor confidence, or lack of it, is a function of the institutional variables present in a country, such as rule of law and corruption of public officials. The lack of those institutional variables aggravates the severity of a financial crisis by affecting investor confidence and creating panic.

While taking into account factors such as weak macroeconomic fundamentals, this study will mainly look into the effect of three variables, namely institutional variables (rule of law and corruption), the extent of capital controls and the specific exchange rate regimes, and their effect on the severity of the crisis, as measured by stock market performance, and currency depreciation. The study argues that, given weak macroeconomic fundamentals, nations with weak institutions that had to deal with capital liberalization coupled with a fixed exchange rate system are the ones that suffered the most. They did so because of a decrease in investor confidence, which led to panic.

First, the study proposes to show that building strong institutions is crucial as it leads to an increase in investor's confidence. In a crisis situation, this confidence tends to decrease speculative attacks against the currency, which are usually accompanied by massive capital outflows. Strong institutions help to prevent governments from losing large amounts of reserves and from failing to defend their currency. Finally, strong institutions enable countries with fixed

exchange rates to maintain their peg, and those with floating rates to avoid heavy depreciations. This, in turn, helps to reduce the severity of a crisis. In other words, countries with strong institutions do not need to worry as much about capital controls or the choice of exchange rate regimes. The presence of strong institutions will not lead to as much panic and loss of investor confidence in the event a crisis emerges, and those countries will also be less affected by contagion.

Second, the study proposes to show that, although capital liberalization is by and large beneficial and believed to be the ultimate goal (Rajan & Zingales, 2003), developing nations must be cautious about attracting too much capital too quickly. The available evidence indicates that capital liberalization for developing nations needs to be a slow and gradual process until the right institutions are in place (Chakraborty, 1999; Rajan & Zingales, 2003; Wade & Veneroso, 1998). If capital is liberalized too quickly, before the establishment of strong institutions, a panic can lead to massive capital outflows and increase the pressure on the currency to devalue. Should that happen, no amount of government reserves will be able to defend the currency's exchange value.

Finally, the study proposes to show that a flexible exchange rate system is needed if capital liberalization is allowed before strong institutions are in place. Under a flexible exchange rate system a government is less likely to need to defend its currency, as the currency can adjust in response to market forces. These adjustments tend to reduce speculative attacks by investors and, hence, should reduce the amount of depreciation. In addition, the government may not have to raise interest rates as much as it otherwise would have to in order to prevent the outflow of capital and to avoid depreciation of the currency. Keeping interest rates low tends to benefit the country internally by encouraging GDP growth and employment, when there is no threat of inflation. Thus, a flexible exchange rate system helps a country avoid a financial panic. However, it should be noted that, countries with weak institutions and a fixed exchange rate regime, may be able to avoid the contagious effect of a currency crisis through some forms of capital controls.

The study will examine how institutional variables, the extent of capital controls and exchange rate regimes affected the severity of financial crises, measured in terms of percentage changes in each country's exchange rate, and stock market prices. This study is particularly important in light of the recent volatility of the stock market in the US and around the world. It looks into the combination of factors that are likely to cause another financial crisis.

## **Literature Review and Development of Hypotheses**

Many articles have been written on the 1997-98 Asian crisis that was quickly followed by the Russian, Brazilian and Argentinean crises. Most of these deal with the reasons behind the crisis and why it had not been predicted and avoided, especially after the world had just recovered from two major crises, namely the 1992-93 European Exchange Rate Mechanism crisis, and the 1994-95 Mexican and Latin American financial crisis. The following section will present a discussion of the main line of research this study is drawing on. It will be presented in four main groups, according to their content. The first group of studies summarizes the main ideas explaining the reasons behind financial crises, leading into the theory this study is based on. The second group of articles supports the part of this study related to the importance of institutions, leading to the first hypothesis. The third group of articles focuses on the importance of capital controls leading to the second hypothesis. The fourth group of articles focuses on the importance of exchange rates regimes leading into the third hypothesis.

### **The Importance of Macroeconomic Variables versus Panic.**

Woo (2000a) summarizes three main explanations for financial crises. The first generation model argues that the crisis is punishment for inappropriate macroeconomic policy (Krugman, 1979). The second-generation model argues that a panic or speculative mania, without deterioration in macroeconomic fundamentals, is a better explanation for financial crises. The third generation model argues that the relationship between government and businesses, often referred to as

“crony capitalism,” lies at the root of the crises (Krugman, 1998a). Woo calls the first and third models *soft rot* models, arguing that if crises were caused by soft rot models, economic recovery would occur only after enough time passes to allow the restructuring of the fundamental economic weaknesses (ie. a U shaped recovery). However, the Asian recovery was rapid, more like a V shaped recovery. A rapid recovery suggests that the economies did not have time to fix any weaknesses in fundamentals, thus contagion is a better explanation. In their study, Woo et al. (2000) showed that the fundamental based logit model of currency collapse was unable to predict the 1997 Asian crisis and concluded that financial contagion is a more plausible explanation than weak fundamentals. In another article, Woo (2000b) verified the existence of what he calls “irrational exuberance,” and concluded that investor panic must exist and that a market panic ends up validating itself by causing a collapse in the real economy.

Tornell (1999) studied the 1995 Mexican crisis and the 1997 Asian crisis and found that the between country variation in the severity of the crisis was largely determined by the strength of the banking system, the real appreciation, and the international liquidity of the country. Another study argued that a high share of non-performing loans, caused by weak cyclical performances, low foreign exchange reserves, and financial deficiencies, were at the core of the Asian crisis (Corsetti, Pesenti, & Roubini, 1998).

It is clear that the discussion on the causes behind the Asian Crisis is not over. However, Woo’s (2000a) argument about the fast V shaped recovery is convincing. If the recovery was so fast, then other factors besides weak fundamentals must have aggravated the crisis. This study will attempt to show that knowing that fundamental problems exist, panic and loss of confidence (due to the combination of weak institutions, rapid capital liberalization, and fixed exchange rates) increase the seriousness of the problem, and lead to a deeper crisis. The first question to be asked: Does the lack of strong institutions increase the severity of the crisis?

### **The Importance of Institutional Variable.**

In this section, studies that relate to the importance of institutional variables are presented. A working paper by Johnson, Boone, Breach, and Friedman (1999) looked at the effect of corporate governance, mainly in terms of the protection of minority shareholders, on the extent of depreciation and stock market decline. They used a sample of 25 emerging markets to show that institutions have a stronger explanatory power than macroeconomic measures.

The Asian Development Bank (ADB) launched “A study of corporate governance and financing in selected developing member countries” in 1998, focusing on Indonesia, Korea, Malaysia, Philippines, and Thailand. The findings support the view that poor governance was one of the major contributors to vulnerability, which led to the Asian crisis in 1997.

Chowdhury’s article (1999) stresses the importance of institutional change along with capital liberalization. He argued that institutional change should start from legal reform. Rodrik (1999), comparing Thailand and South Korea to the bad experiences of Indonesia, concluded mainly that international capital markets do a poor job of discriminating between good and bad risks, and that democratic institutions are critical in containing the consequences of an initial shock. LaPorta et al. (1998) confirmed the importance of institution building to financial market developments. Using data from 39 countries, Shackman (2003) also showed that greater institutional stability leads to higher stock market returns.

This study aims to show that the lack of those institutions (mainly Law & Order and Corruption) will increase the severity of a financial crisis and that in the absence of those institutions, any fundamental weakness in the economy will be aggravated by investors’ panic. In countries ruled by corruption and a weak rule of law, it is logical to expect greater panic by investors, and greater speculation against the currency, than in countries where those variables are strong. This leads to the first hypothesis:

*H1: Given weak macroeconomic fundamentals, countries with weak institutions experience a more severe crisis than those with stronger institutions.*

Woo (2000b) confirms that financial contagion in the 1990s cannot be in serious dispute, and adds the importance of two main insights: the right institutions as well as capital controls are needed. This leads to the following question: In addition to the importance of institutions, what role do capital controls play in affecting the severity of the crisis?

### **The Importance of Capital Controls.**

The third group of articles discusses the effect of capital controls in different developing nations. Zainal-Abidin (2000) analyzed Malaysia's decision in 1998 to implement selective capital controls to fix their exchange rate to the US dollar and restrict short-term capital flows. This enabled Malaysia to stabilize its currency's exchange rate and regain monetary independence. Once the uncertainty was removed, the loss of investor confidence was contained and the government could focus more on the domestic economy which raises the question: Can Malaysia's case be used as an example to contain panic for other developing nations?

Other studies (Nidhiprabha, 1998; Chakraborty, 1999; and Wade & Veneroso, 1998) argued that capital account liberalization allowed massive capital inflows and then torrential outflows, and that no nation with weak institutional structures or undergoing reforms can survive this.

This section on capital controls concludes with an interesting study by Rajan and Zingales (2003) that argues in favor of capital liberalization. They found that many countries were more financially developed in 1913 than in 1980 and go on to show that restrictions on capital movements after WWII can be used to explain why markets did not take off after WWII. Although Rajan and Zingales looked at both developed and developing countries, the importance of their research lies in showing the benefit of capital liberalization to market development.

By focusing on the severity of financial crises in developing nations, this study incorporates the existing research published in the literature on the advantages and disadvantages of capital controls. It also aims to show that the establishment of strong financial institutions is a prerequisite to the beneficial effect of capital liberalization (in avoiding the severity of the crisis), which leads to the following hypothesis:

*H2: Countries with weak institutions but with some capital controls experience a less severe crisis than those countries with weak institutions but no capital controls.*

While their study focused primarily on the importance of capital liberalization, Rajan and Zingales (2003) concluded that institutions also matter because they temper interest group activities, and that emphasis should be placed on establishing political pre-conditions for institutions. The discussion on the flow of capital cannot be complete without a discussion of exchange rates. Does the choice of the exchange rate regime in a world of capital liberalization affect the severity of the crisis?

### **The Importance of the Exchange Rate Regime.**

Tornell and Velasco (1995) concluded that flexible exchange rates, by allowing exchange rates to move, tend to show the effect of unsound fiscal policy quite rapidly. Flexible exchange rates also provide more fiscal discipline than fixed exchange rates. Park (2002) pointing out that the goals of exchange rate stability and capital mobility (the open economy trilemma) are simply incompatible. He discussed the importance of these two questions, namely choosing the appropriate exchange rate regime and liberalizing international capital flows.

Grier and Grier (2001) studied variations in the severity of the Asian crisis in a sample of 25 developing countries. They concluded that countries that started with an exchange rate peg

experienced a greater depreciation in the currency's value and lower stock market returns than would be predicted from the levels of various macroeconomic indicators. The argument is that countries that start with an exchange rate peg are more vulnerable to speculative attacks against their currencies, as they have to defend their currencies by depleting their foreign reserves, or by raising interest rates. Either response will tend to increase the severity of the crisis. On the other hand, countries with flexible exchange rates will not be prone to such speculative attacks, as the currency will depreciate according to market forces. This gradual loss of value will reduce panic and the severity of the crisis.

The above mentioned studies all concluded that the choice of the exchange rate regime does matter. This study adds the proposition that the choice is especially important when capital is free to flow, and when the institutions are weak.

Rochon and Vernengo (2000), in a study of exchange rate regimes and capital controls, argued again in favor of capital control when exchange rates are fixed based on the following argument. To be able to defend or maintain the fixed value of a currency in a world of free capital flows, countries need to be able to increase their interest rates to remain attractive to foreign investors and stop capital from flowing out. Higher interest rates increase the burden of government debt, and tend to deteriorate the economy domestically. The researchers argued that capital controls are needed when exchange rates are fixed. This study will use the same logic, but in reverse: Flexible exchange rates are needed when countries have no capital controls. Such a system allows the currency to adjust to inflows and outflows of capital by appreciating and depreciating, respectively. This helps to avoid the loss of reserves that occurs if countries try to defend their exchange rates while capital is flowing out. Thus, it should reduce panic, which leads to the following hypothesis:

*H3: For countries with weak institutions and no capital controls, a flexible exchange rate system will lead to a less severe crisis than a fixed exchange rate system.*

### Differences from Other Studies

As in the Grier and Grier (2001) study, this study will use the exchange rate regime as one of the Independent Variables (IVs), and the percentage depreciation and stock market performance as a measure of the severity of the crisis for the dependant variable (DV). However, while their study used the exchange rate regime as the only IV and looked only at how it affected depreciation and stock market returns, this study uses multiple and different IV, and multiple and different DV, applying a range of hypotheses to test their impact on the severity of the crisis. This study attempts to discover which of the IVs affected the severity of the crisis by affecting investor confidence.

Table 1  
*Dependant Variables*

Dependant Variables	Description	Sources
Depreciation	% currency depreciation	OANDA.com: FX History
Stock prices	% decrease in stock market prices	Morgan Stanley and <i>WSEF</i>

In addition to macroeconomic variables, the study will include institutional variables, the extent of capital controls, exchange rate regimes, dummy variables for regions of the world, and two interaction variables. While studies involving capital controls were not empirical, and most

other studies looked at the separate effects of those variables, this study looks at the combined effect of the above mentioned variables empirically.

Table 2

*Control Variables: Macroeconomic Variables*

Deficits, Money Growth, Current Accounts, Reserve Adequacy, Debt

Control Variables	Description	Sources*
		The ICRG
Deficits	Budget deficits as a % of GDP	Taiwanese data from the Central Bank of China (www.cbc.gov.tw)
Money Growth	% of Money growth per year.	IMF <i>International Financial Statistics Yearbook</i> , line 351
Current Accounts	Current Accounts as % of GDP	The ICRG. Laos data was available from the IMF <i>International Financial Statistics Yearbook</i>
Reserve Adequacy	The ratio of M2 (money +quasi money) divided by reserves	IMF <i>International Financial Statistics Yearbook</i> , line 351 divided by line 1lid
Debt	Foreign debt as a % of GDP	The ICRG

\*Taiwanese data was available from the Central Bank of China (www.cbc.tw)

Tables 1, 2 and 3 summarize the definition of the dependant, control, and independent variables respectively, as well as the sources for these variables. The interaction variables are also described below:

#### Interaction Variables

In order to test H2, the following interaction variable (ITV1) will be used:

$ITV1 = \text{Capital controls} / \text{Institutional strength}$ .

Capital controls are the average of the two measures discussed above. Institutional strength is the average of the two institutional variables described above. This variable tends to give more weight to capital controls in countries where institutional variables are weak. The variable is higher when institutional factors are weak, which shows the importance of capital controls in this case. On the other hand, the variable is lower when institutions are stronger, which shows that capital controls decrease in importance.

To test H3, this study uses a different interaction variable (ITV2) that incorporates the exchange rate regime. Assigning "1" to indicate countries with flexible exchange rate regimes, the interaction variable is:

$ITV2 = "1" / (\text{Institutional strength} + \text{Capital controls})$

This variable has a high value when both institutions and capital controls are weak. This result demonstrates the importance of flexible exchange rates when countries lack both institutions and protection from capital controls.

Grier and Grier (2001), Tornell and Velasco (1995), Tornell (1999), Corsetti et. al. (1998), and Johnson et. al. (1999) used samples of from 22 to 25 countries, and included remote countries such as Turkey, Israel, Greece, South Africa, and Portugal in their studies. This study uses a larger, more focused sample of 32 countries that are in close geographic proximity to the major

currency crises. Since the objective of the study is to show that the severity of the crisis can be attributed to panic and contagion effects, knowing that weak fundamentals were present, it makes more sense to choose nations that are close to one another in the three areas studied: Asia (China, Hong Kong, Japan, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, Taiwan, and Vietnam), Latin America (Argentina, Brazil, Chile, Columbia, Mexico, Venezuela, Peru, Bolivia, Paraguay, and Uruguay), and Eastern Europe (Russia, Hungary, Poland, the Czech Republic, Estonia, Latvia, Lithuania, Ukraine, Romania, and Slovenia). Consequently, the more remote countries, such as Turkey, Israel, Greece, South Africa, and Portugal, have been excluded from this study. One of the most important contribution of this study is the two time frames studied which is explained in the following section.

Table 3

*Independent Variables*

Institutional Variables: Corruption and Law & Order

Other Variables: Capital controls, exchange rate regimes, regions, ITV1&ITV2

Independent Variables:	Description	Sources:
Corruption	Measured on a scale of 0-6. Low numbers indicate weak institutions	The <i>ICRG</i>
Law & Order	Measured on a scale of 0-6. Low numbers indicate weak institutions	The <i>ICRG</i>
Capital Controls	Measured on a scale of 0-10. Low numbers indicate less capital control	<i>Cato Institute's Report on Economic Freedom of the World</i>
Fixed exchange rate dummy	Dummy variable, where "1" is assigned to flexible exchange rates, "0" to fixed exchange rates	<i>IMF International Financial Statistics Yearbook</i>
Asia dummy variable	"1" is assigned to Asian countries and "0" to all the others	
ITV1	Capital controls divided by (corruption + Law and order)	
ITV2	1/(capital controls + law and order + corruption) and "0" for countries with fixed exchange rates	

**The Time Frames Studied**

This study differs from all previous studies of the severity of the Asian crisis in the choice of the time frame studied. While previous studies used 1996 and 1997 as before the crisis years and crisis years, respectively, for all the countries included in the sample, this study uses two different approaches to measuring the severity of the crisis. The first method uses the same time frame as the previous studies, primarily looking at the Asian crisis year 1997 for the dependant variables, for all the countries in the sample. In order to be consistent with the other studies, the independent variables will be measured the years before the Asian crisis.

While previous studies have examined the severity of the crises by measuring changes in the exchange rates and stock market prices from the year before the crisis to the crisis year, this

study looks at a tighter time frame. This choice better reflects the impact of the crisis on exchange rates, and stock market prices, as it isolates the change due to the crisis from other events that occurred the same year that might have impacted exchange rates and stock market prices.

The second way to measure the severity of financial crises is to focus on different periods of time for different regions of the world. This method looks at different crisis years for different countries, depending on which region of the world they belong to. To better capture the effect of financial crises on different countries, the data are based on the years in which the particular regions were affected. The Asian countries were affected by the 1997 Asian crisis. Thus, the years 1996 and 1997 are used to measure the percentage change in the DV for the Asian countries. The effect of the Asian crisis spread to Eastern Europe via the 1998 Russian Crisis. Thus, 1997 to 1998 data is used to measure the percentage change in the DV for the Eastern European countries. The crisis spread further to Latin America through the 1999 Brazilian crisis. Thus, the 1998 to 1999 data is used to measure the percentage change in the DV for the Latin American countries.

The independent variables in the second approach will then be measured over different periods for the different regions of the world. The year prior to the regional crisis is used as the baseline. Thus, to measure the independent variables, 1996 is used for Asian countries, 1997 for Eastern European countries, and 1998 for Latin American countries. This second time frame will enable the study of the Russian and Brazilian crises, in addition to the Asian crisis. Thus, the results of the study could apply to financial crises in general, and not just the Asian financial crisis. The differences between the two time frames are summarized in Tables 4 and 5.

Table 4  
*Dependant Variables Time Frame Differences*

Dependant Variables	Time Frame 1: <i>The Asian Crisis</i>	Time Frame 2: <i>The Asian, Russian, and Brazilian Crises</i>
Depreciation	June 1997- Jan 1998 For all countries	June 1997-Jan 1998 for Asian countries July 1998-Feb 1999 for Eastern European countries Nov.1998-May1999 for Latin American countries
Stock Prices	June 1997-Jan 1998 For all countries	June 1997-Jan 1998 for Asian countries July 1998-Feb 1999 for Eastern European countries Nov.1998-May1999 for Latin American countries

Table 5  
*Independent Variables Time Frame Differences*

Independent Variables	Time Frame 1: <i>The Asian Crisis</i>	Time Frame 2: <i>The Asian, Russian, and Brazilian Crises</i>
Macroeconomic variables	1996 for all countries	1996 for Asian countries 1997 for Eastern European countries 1998 for Latin American countries
Institutional Variables	1996 for all countries	1996 for Asian countries 1997 for Eastern European countries 1998 for Latin American countries
Capital Controls	1995 for all countries	2000 for all countries
Exchange Rate Regime	IMF specification as of June of 1995	IMF specification as of March of 1998

## **The Methodology**

This study uses cross-country regression analysis to test the relationship between the independent variables and the dependant variables explained above. Using several different regression models to test different measures of the dependant and independent variables, it is expected that the following relationships between the variables will be found:

First, countries with weak institutions will be associated with greater depreciation of the exchange rate, and a greater decrease in stock market prices (H1).

Second, weak institutions, when coupled with some capital controls will be associated with less depreciation of the exchange rate, a lower decrease in stock market prices. Thus, there will be a positive relationship between the interaction variable explained above (ITV1), and the severity of the crisis (H2).

Third, flexible exchange rates in countries with weak institutions and less capital controls will be associated with lower depreciation of the exchange rate, lower decrease in stock market prices. Thus, this study is testing for a positive relationship between the interaction variable (ITV2) described above and the severity of the crisis (H3).

Several regression equations are used to test the three hypotheses summarized above. To test H1, two different regressions for each measure of institutional strength (Rule of Law and Corruption) are used, as these variables overlap and have strong correlations with each other. In each of the two regressions, the macroeconomic control variables (budget deficit as a percentage of GDP, money growth as a percentage per year, current accounts as a percentage of GDP, reserve adequacy, and foreign debt as a percentage of GDP) and the Asia dummy variable are included. Also, two different regression equations are used for each one of the two different DV (percentage depreciation and percentage change in stock market prices). To test H2, the ITV1 variable is added to all the macroeconomic variables, as well as the Asia dummy variable, and tested two times for the two dependant variables. To test H3, ITV2 is added to all the macroeconomic variables, as well as the Asia dummy, two times for each dependant variable. Each of the above described regressions will be repeated twice for each different time frame involved.

### **The Bootstrap Method.**

The small sample size in the study leads to uncertainties in the estimation of the results. In addition, regression analysis assumes that the samples are normally distributed. To address the issue of small sample size without having to deal with OLS regression assumptions such as homoscedasticity, normality, and independence of the error terms, the bootstrap method will also be used. This method will be used to check for the robustness of the standard errors of the regression coefficients.

The bootstrap technique was invented by Bradley Efron (1979, 1981, 1982), and was further developed by Efron and Tibshirani (1993). While some studies such as Grier and Grier (2001) have continued to use the Jackknife method as their-sampling technique to confirm the robustness of their results, Mooney and Duval (1993) suggest that the Jackknife method is of largely historical interest today. The bootstrap method is believed to overshadow all the other re-sampling techniques, and has been used by many other studies in international finance, such as Davis and Kanago (1998), Cumby and Glen (1990), and Pynnonen, S. and Vataja (2002). Because it draws many more sub-samples than the other techniques, it is believed to be a more thorough procedure. Fan and Wang (1996) also reported that the method provides less biased and more consistent results than the Jackknife method.

In addition to running many OLS regressions for each hypothesis, as described above, and for the two time periods, the bootstrap method will be used for each of the OLS regressions. The bias-corrected confidence interval for determining statistical significance will be used in this study, as this bias-corrected method has been found to be more reliable (Efron, 1997). The results of

the OLS regressions will be compared to those of the Bootstrap method to confirm the robustness of the results.

### **Discussion of Statistical and Economic Significance.**

Two economists, Stephen Ziliak and Deirdre McCloskey, undertook a study in 1996 showing that a majority of the economic research that gets published relies on results that are statistically significant, as opposed to economically significant. Mainly, they report that 70% of the studies published in the 1980s, mistook statistical significance for economic significance. In addition, 70% of those studies, did not even report the magnitudes of influence between the economic variables, or the size of the coefficient (McCloskey & Ziliak, 1996).

In a more recent study, forthcoming in the *Journal of Socio-Economics*, the same authors report a worsening result for studies published in the 1990s. Now, 81% of the papers studied do not differentiate between statistical findings and economically significant findings. The authors conclude that this confusion between statistical fit and economic reasoning is causing false hypotheses to be accepted and true hypotheses to be rejected. The data analysis in this paper goes beyond a simple reporting of statistical significance. It will also look at the importance of economic reasoning and economic significance, as reported by the size of the coefficients.

### **Multicollinearity and Heteroscedasticity.**

A correlation analysis was performed to verify that none of the variables included in the regressions were highly correlated. The results clearly showed that none of the independent variables were highly correlated. In addition, the VIF test was used to check for multicollinearity. Usually, VIF numbers less than 20, or a tolerance of 0.05 or more, indicates no significant multicollinearity problem. The highest VIF numbers on those variables went only up to 2.5, a very good indication that there are no highly correlated variables in the study.

To test for any heteroscedasticity problem, both the Cook-Weisberg test and the White test were used. The Cook-Weisberg test results indicated that stock prices in both time periods as well as capital flows in time frame 2, showed no heteroscedasticity problems at all, with p-values much greater than 0.1. However, depreciation and capital flows in time frame 1 had some heteroscedasticity problems. When the White test was used, the p-values were above 0.1 for most of the independent variables used, indicating no major problem.

### **Conclusion**

Taking into account the two dependant variables Depreciation, and Stock Prices, which are used to measure the severity of the crisis, and the two time frames studied, the following is an analysis and discussion of the results as they relate to each of the three hypotheses, looking at both their statistical and economic significance. (Tables 6, 7 & 8 show the effects on Stock Prices).

One variable in particular stands out in this study, with a very high level of statistical significance of 1% in time frame 1, but not in time frame 2, and with high regression coefficients in both time frames: the Asia dummy variable. What also stands out is the statistical significance of some macroeconomic variables, coupled with their low coefficients in predicting the severity of the crisis. On the other hand, other variables, such as Law and Order, Corruption, the fixed exchange rate dummy, capital controls, ITV1, and ITV2, all have high coefficients that indicate their impact on the severity of crises; however, those variables are not statistically significant. One explanation for the low statistical significance might very well be the nature of the study, which unavoidably constrains a small sample. However, as mentioned earlier, this study will not ignore the importance of economic significance.

Taking both statistical and economic significance into account, the above mentioned results show very clearly that panic is a better explanation for the crisis than macroeconomic variables, which is consistent with Woo's (2000a) findings. The high level of statistical and economic significance of the Asia dummy variable indicates that the simple fact of belonging to a region, more than any of the macroeconomic variables included in the study, explains the severity of the crisis.

Table 6  
*Hypotheses 1: Stock Prices Predicted By Institutional Variables*

	TIME FRAME 1				TIME FRAME 2			
	<i>Law &amp; Order</i>		<i>Corruption</i>		<i>Law &amp; Order</i>		<i>Corruption</i>	
	OLS	Bootstrap	OLS	Bootstrap	OLS	Bootstrap	OLS	Bootstrap
Debt	0.14 (0.26)	0.14 (0.33)	0.13 (0.26)	0.13 (0.39)	-1.20*** (0.25)	-1.20*** (0.33)	-1.22*** (0.33)	-1.22*** (0.36)
Current Account	1.78 (0.88)	1.78 (1.04)	1.73* (0.90)	1.73* (1.22)	-2.08** (0.92)	-2.08 (1.35)	-2.27** (0.97)	-2.27 (1.54)
Money Growth	-0.67** (0.29)	-0.67* (0.38)	-0.64** (0.30)	-0.64* (0.38)	-0.29 (0.20)	-0.29 (0.28)	-0.33 (0.21)	-0.33 (0.25)
Reserve Adequacy	2.94 (1.89)	2.94 (2.25)	3.02 (2.08)	3.02 (2.64)	-0.17 (1.66)	-0.17 (1.68)	-0.59 (1.74)	-0.59 (1.85)
Deficit	-0.04 (1.23)	-0.04 (1.80)	-0.16 (1.20)	-0.16 (1.58)	2.24** (1.01)	2.24 (1.61)	2.01 (1.05)	2.01 (1.73)
Asia Dummy Variable	-39.4*** (10.40)	-39.4*** (13.2)	-40.4*** (10.43)	-40.4*** (13.86)	-41.0*** (9.12)	-41.0*** (10.69)	-42.7*** (9.33)	-42.7*** (11.44)
Law & Order	-2.33 (4.71)	-2.33 (5.05)			-4.90 (3.92)	-4.90 (4.19)		
Corruption			-1.90 (5.18)	-1.90 (6.14)			-0.97 (3.73)	-0.97 (3.88)
Constant	-12.11 (23.60)	-12.11 (29.56)	-16.47 (19.88)	-16.47 (34.17)	47.54 (20.22)	47.54 (23.50)	31.75 (18.30)	31.75 (22.80)
Adjusted R2	0.323**	0.323**	0.319**	0.319**	0.625	0.625	0.599	0.599

\*Significant at 10%; \*\*Significant at 5%; \*\*\*Significant at 1%.

In addition, although institutional variables, capital controls, the fixed exchange rate dummy, ITV1 and ITV2 are not statistically significant for any of the two measures used, the high coefficients for the two measures of the severity of the crisis and in both time frames, make them very important in explaining not only the severity of the Asian crisis (time frame 1), but also the severity of financial crises in general (time frame 2).

From the signs of the coefficients, we can also conclude that countries with weak institutions are associated with a more severe crisis, as predicted in Hypothesis 1. Countries with more capital

controls, when institutions are weak, are also associated with a more severe crisis, contrary to what was predicted in Hypothesis 2. Finally, countries with flexible exchange rates, when institutions are weak and capital controls are low, are also associated with a less severe crisis, as predicted in Hypothesis 3. Those results are a strong indication that weak institutional variables, high capital controls and fixed exchange rates all work together to increase the panic effect, and thus lead to contagion and an increase in the severity of financial crises.

Table 7

*Hypothesis 2: Stock Prices Predicted By Capital Controls Given Weak Institutions*

Independent variables	TIME FRAME 1		TIME FRAME 2	
	OLS Standard Errors	Bootstrap Standard Errors	OLS Standard Errors	Bootstrap Standard Errors
Debt	0.17 (0.26)	0.17 (0.29)	-1.16*** (0.26)	-1.16*** (0.308)
Current Account	1.86** (0.88)	1.86** (0.97)	-2.01** (0.95)	-2.01 (1.37)
Money Growth	-0.62* (0.3)	-0.62* (0.36)	-0.31 (0.2)	-0.31 (0.32)
Reserve Adequacy	2.49 (1.79)	2.49 (2.37)	-0.93 (1.64)	-0.93 (1.85)
Deficit	-0.7 (1.38)	-0.7 (1.57)	1.26 (1.2)	1.26 (1.65)
Asia Dummy Variable	-37.8*** (10.69)	-37.8*** (12.78)	-41.5*** (9.2)	-41.5*** (11.47)
ITV1 <sup>1</sup>	-4.64 (6.33)	-4.64 (7.8)	-4.98 (4.99)	-4.98 (5.69)
Constant	-18.66 (14.33)	-18.66 (17.96)	33.34** (14.44)	33.34** (16.04)
Adjusted R2	0.33**	0.33**	0.62***	0.62***

\*Significant at 10%; \*\*Significant at 5%; \*\*\*Significant at 1%.

<sup>1</sup> Capital controls given weak institutions

**Robustness of Results: The Bootstrap Method.**

The nature of the study unavoidably constrains a small sample. Because a small sample size leads to uncertainties in the estimation of the results, the bootstrap regression method was used in addition to the Ordinary Least Squares regression method to add to the robustness of the results. For all three measures of the crises and under both time frames, the bootstrap method confirmed the results of the study summarized above.

Mainly, the Asia dummy variable was found to be 5% and 1% significant in explaining the severity of the crisis in time frame 1, even when the bootstrap method was used, which confirms the importance of panic in explaining the Asian crisis. The current account and money growth variables were both significant at the 10% level, even when the bootstrap method was used.

Table 8

*Hypothesis 3: Stock Prices Predicted By Exchange Regimes Given Weak Institutions and Few Capital Controls*

Independent variables	TIME FRAME 1		TIME FRAME 2	
	OLS Standard Errors	Bootstrap Standard Errors	OLS Standard Errors	Bootstrap Standard Errors
Debt	0.18 (0.24)	0.18 (0.26)	-1.24*** (0.26)	-1.24*** (0.31)
Current Account	2.0** (0.82)	2.0** (0.87)	-2.15** (0.92)	-1.15 (1.38)
Money Growth	-0.73** (0.27)	-0.73 (0.33)	-0.29 (0.21)	-0.29 (0.31)
Reserve Adequacy	3.17 (1.68)	3.17* (2.08)	-0.71 (1.61)	-0.71 (1.72)
Deficit	-0.15 (1.11)	-0.15 (1.47)	2.18 (1.45)	2.18 (1.01)
Asia Dummy Variable	-42.42*** (9.65)	-42.42*** (12.33)	-44.7*** (9.25)	-44.7*** (10.09)
ITV2 <sup>1</sup>	162.53* (83.79)	162.53 (113.69)	91.71 (80.45)	91.71 (66.05)
Constant	-25.8* (12.97)	-25.8* (15.01)	-27.46 (13.61)	-27.46 (14.94)
Adjusted R2	0.42***	0.42***	0.62***	0.62***

\*Significant at 10%; \*\*Significant at 5%; \*\*\*Significant at 1%.

<sup>1</sup> exchange rate regime given low capital controls and weak institution

### Policy Implications

The results of this study show that the presence of strong legal institutions matters in reducing panic, and thus in reducing the severity and spread of financial crises. Thus, it is important for countries to build the right institutions that will increase law and order and decrease the level of corruption. Although the presence of strong institutions does not prevent a financial crisis, it will reduce the severity of crises and their contagious effect by reducing panic.

While many articles and studies questioned the safety of opening up capital markets before the establishment of strong institutions, this study shows that capital controls, with or without the institutions, increase the severity of financial crises. Capital controls indicate government restrictions and involvement in market forces. This will increase the panic effect of any financial crisis. The forces of competition, and opening up are as important as building the institutions. Both forces, building the institutions and opening up, acting simultaneously, will encourage the establishment of democracy, will reduce special interest groups, and thus will reduce the effect of panic during financial crises.

Building institutions, and opening up capital markets will work better when exchange rates are also free to float and adjust to market forces. Any artificial way of interfering with market forces puts an additional burden on governments by depleting foreign reserves, and sends the wrong signals to investors about the real price of a currency. Investors are in a better position to make decisions when they feel that prices reflect market reality, and when they know that in the event of a crisis, strong legal institutions are available and will be enforced to protect their interest.

### **Future Research**

The result of the regression analysis using the two dependant variables (depreciation and stock market prices), and different independent variables consistently gave the same result: *The puzzling change in sign of the Current Account from positive in time frame 1, to negative in time frame 2.* The hypothesis predicts that the relationship between the current account and the severity of crises should be positive. This is consistent with economic theory. A current account deficit (imports greater than exports) should lead to a decrease in the value of a currency, and a decrease in stock prices. While all the regressions under time frame 1 confirm the hypothesis predictions, all the regressions under time frame 2 show a negative relationship between current accounts and the severity of crises. *This result is puzzling.*

A closer look at the main changes that occurred in the second time period in Eastern Europe and Latin America is the first step needed in finding a solution to the puzzle. The Capital Account might be a possible explanation. If the capital account balance is greater than the current account balance, the surplus in the current account might be counter balanced by a deficit in the capital account, due to a greater outflow of capital. This would then lead to a decrease in the demand for the currency, and thus depreciation rather than an appreciation of the currency.

In this particular case, the capital account acts as an intervening variable and distorts the relationship between the current account and depreciation. Thus, although it looks as if the current account surplus might lead to a depreciation of the currency and a negative coefficient, this only occurs because of the negative effect of a greater capital account deficit on the relationship. Also, a current account deficit might seem to lead to an appreciation of the currency and a negative relationship, because of the intervening effect of a greater surplus in the capital account. So the negative sign of the current account coefficient might be only a reflection of the effect of the capital account. The positive relationship between the current account and depreciation holds only when other things are constant, especially the capital account, in this particular case. Future research might shed more light into the importance of the capital account as an explanation to the current account puzzle.

### **References:**

Aggarwal, R. (1999a). Causes of the recent Asian economic crises. *Thunderbird International Business Review*, 41, 721-728.

Aggarwal, R. (1999b). Role of financial system reforms in restoring growth in Asia. *Emerging Markets Quarterly*, 2, 15-23.

Asian Development Bank (1998). *Key indicators of developing Asian and Pacific*

- countries, 1998*, Vol. XXIX. Manila: Asian Development Bank.
- Banz, R. & Clough, S. (2002). Globalization reshaping world's financial markets. *Journal of Financial Planning*, 15, 72-80.
- Caramazza, F. Ricci, L., & Salgado, R. (2004). International financial contagion in currency crises. *Journal of International Money and Finance*, 23, 51.
- Cartapanis, A., Dropsy, V, & Mametz, S. (2002). The Asian currency crisis: Vulnerability, contagion, or unsustainability. *Review of International Economics*, 10, 79.
- Chakraborty, D. (1999). Macroeconomic conditions and opening up-Argentina, Chile and India: A comparative study. *International Journal of Social Economics*, 26, 298.
- Choi, S. J. (2002). Law, finance, and path dependence: Developing strong securities markets. *Texas Law Review*, 80, 1657-1727.
- Chowdhury, A. (1999). Political economy of macroeconomic management: The need for institutional change. *International Journal of Social Economics*, 26, 389-427.
- Corsetti, G. Pesenti, P. & Roubini, N. (1998). Paper tigers? A model of the Asian crisis. *European Economic Review*, 43, 1211-1236
- Cumby, R., & Glen J. (1990). Evaluating the performance of international mutual funds. *The Journal of Finance*, 45, 497-521.
- Davis, G., & Kanago, B. (1998). High and uncertain inflation: Results from a new data set. *Journal of Money, Credit, and Banking*, 30, 218-230.
- Efron, B. (1979). Bootstrap methods: Another look at the jackknife. *The Annals of Statistics*, 7, 1-26.
- Efron, B. (1981). Nonparametric estimates of standard error: The jackknife, the bootstrap and other methods. *Biometrika*, 63, 589-599.
- Efron, B. (1982). The jackknife, the bootstrap, and other resampling plans. *Society of Industrial and Applied Mathematics CBMS-NSF Monographs*, 38.
- Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap*. New York: Chapman & Hall.
- Eiteman D., Stonehill A., & Moffett M. (2001). *Multinational business finance*.(9 th ed.). New York: Pearson Addison Wesley.
- Fan, X., & Wang, L. (1996). Comparability of jackknife and bootstrap results: An investigation for a case of canonical correlation analysis. *Journal of Experimental Education*, 64, 173-189.
- Fratzscher, M. (2003). On currency crises and contagion. *International Journal of Finance & Economics*, 8, 109.
- Grier, K. B., & Grier, R. M. (2001). Exchange rate regimes and cross-country distribution of the 1997 financial crisis. *Economic Inquiry*, 39, 139-148.
- Hartwell, C. A. (2001). The case against capital controls: Financial flows, crises, and the flip side of the free-trade argument. *Cato Policy Analysis*, 403, 20.
- Jeong, J., & Maddala, G. S. (1993). A perspective on application of bootstrap method in econometrics. In G.S. Maddala, C. R. Rao & H.D. Vinod (eds.), *Handbook of statistics: Econometrics*, Vol 11 (pp. 573-610). Amsterdam: North-Holland.

- Johnson, S., Boone, P., Breach, A., & Friedman, E. (1999). *Corporate governance in the Asian financial crisis*. Unpublished manuscript.
- Krugman, P. (1979). A model of balance-of-payments crisis. *Journal of Money, Credit, & Banking*, 11, 311-325.
- Krugman P. (1998a). What happened to Asia? Retrieved from <http://web.mit.edu/Krugman/www/DISINTER.html>
- Krugman, P. (1998b). Will Asia bounce back? Retrieved from <http://web.mit.edu/Krugman/www/suisse.html>
- La Porta, R., Lopez-de-Silanes, F., Shieffer R., & Vishner R. (1997). Legal determinants of external finance. *The Journal of Finance*, 52, 1131-1151.
- La Porta, R., Lopez-de-Silanes, F., Shieffer R., & Vishner R. (1998). Law and finance. *Journal of Political Economy*, 2, 1113-1156.
- Lai, K.S., Lee, D., Loo, J. & Yi, J. (1998). Asian financial crisis shows globalization can promote risks as well as opportunities. *Business Forum*, 23, 5-13.
- MacKinnon, J. (2002). Bootstrap inference in econometrics. *Canadian Journal of Economics*, 35, 615-645.
- McCloskey, D. & Ziliak, S. (1996). The standard error of regression. *Journal of Economic Literature*, March 1996, 97-114.
- McCloskey, D. & Ziliak, S. (2004) Size matters: The standard error of regressions in the American Economic Review. *Journal of Socio-Economics*, September 2004;33,537Y546.
- Mooney, C. Z. & Duval, R. D. (1993). *Bootstrapping: A nonparametric approach to statistical inference*. Newbury Park, CA: Sage Publications.
- Nidhiprabha, B. (1998). Economic crises and the debt-deflation episode in Thailand. *Asian Economic Bulletin*, 15, 309-318.
- Park, J. (2002). Globalization of financial markets and the Asian crisis: Some lessons for Third World developing countries. *Journal of Third World Studies*, 19, 141-164.
- Pynnonen, S., & J. Vataja. (2002). Bootstrap testing for cointegration of international commodity prices. *Applied Economics*, 34, 637-647.
- Rajan, R., & Zingales, L. (2003). The great reversals: The politics of financial development in the 20<sup>th</sup> Century. *Journal of Financial Economics*, 69, 5-46.
- Rochon, L., & Vernengo, M. (2000). Exchange rate regimes and capital controls. *Challenge*, 43, 76-92.
- Rodrik, D. (1999). The Asian financial crisis and the virtues of democracy. *Challenge*, 42, 44-60.
- Shackman, J. (2003). *The equity premium: A global phenomena?* Unpublished manuscript.
- Shackman, J (2006). The equity premium and market segmentation: Evidence from international data. *Journal of International Financial Markets, Institutions and Markets*, 16, 155-179.

- Tornell, A. (1999). *Common fundamentals in the Tequila and Asian Crises*. Unpublished manuscript.
- Tornell, A., & Velasco, A. (1995) *Fixed versus flexible exchange rates: Which provides more fiscal discipline?* Unpublished manuscript.
- Wade, R., & Veneroso, F. (1998). The gathering support for capital controls. *Challenge*, 41, 14-26.
- William, G. C. & Kiser, S. (1999). Why Brazil devalued the real. Retrieved from <http://www.dallasfed.org/eyi/global/9907real.html>.
- Woo, W. T. (2000a). The Asian financial crisis: Hindsight, insight, foresight. *ASEAN Economic Bulletin*, 17, 113-119.
- Woo, W. T. (2000b). Coping with accelerated capital flows from the globalization of financial markets. *ASEAN Economic Bulletin*, 17, 193-204.
- Woo, W. T., Carleton, P. D., & Rosario, B. P. (2000). The unorthodox origins of the Asian Currency crisis: Evidence from logit estimation. *ASEAN Economic Bulletin*, 17, 120-134.
- Zainal-Abidin, M. (2000). Implications of the Malaysian experience on future international financial arrangements. *ASEAN Economic Bulletin*, 17, 135-147.