Understanding the Asian Financial Crisis: Now And Then

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Abstract

This thesis investigates the effects of sovereign credit default spreads and the national current account balance on the health of a country's banking sector as measured by the Bank Z-score. To this end, we use a cross-country panel dataset of five ASEAN (Association of South East Asian Nations) economies and implement regression analysis in order to study the effects of these two variables on the Bank Z-score. We hypothesize that that higher default spreads weakens a country's banking sector, whereas an improvement in the current account balance helps to increase the Bank Z-score. However, we find that only the effects of the default spreads are confirmed while the effects of the current account balance are only partially supported. These results suggest that the market-based measure, the default spreads, is indicative of a country's financial vulnerability while the accounting-based measure, the current account balance, is only partially so. We also briefly explore the initiatives that followed the Asian Financial Crisis in 1997, namely the Chiang Mai Initiative and the ASEAN Economic Community framework, and assess whether these will contribute towards strengthening regional banking sectors and thereby prevent financial crises in the future.

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I.   Introduction

In the summer of 1997, the currency of Thailand, the Thai Baht, was hit by speculative attacks as the creditworthiness and international perceptions of the Thai economy suddenly soured. The speculative attacks quickly and severely devalued the Thai currency, leaving the Baht with less than half of its value one year later. This severe devaluation of the Baht also caused the creditworthiness perceptions of the other Association of South East Asian Nations (ASEAN) economies and the values of their respective currencies to tumble as well.

The soured perceptions of the ASEAN economies and the severely devalued currencies around the region made the banking systems around the region insolvent, causing many banks in the region to file for bankruptcy. This chain of events adversely affected the business climate in the ASEAN as companies that operated in the region were left without vital lines of credit. Companies that heavily relied on these lines of credit were forced to halt operations and many of them subsequently went bankrupt as well.

The failures of both the regional banking sectors and the companies that heavily relied on financing stalled the regional economies and caused deep recessions. This chain of events came to be known as the Asian Financial Crisis or the AFC. Therefore, it is interesting to ask what factors affect the health of the regional banking sectors and to see which policies would effectively protect these sectors from similar crises in the future. In this thesis, we investigate the effects two such factors - the sovereign credit default spread (CDS), and the national current account balance (CA) on the health of a country's

banking system as measured by the Bank Z-score. Lower credit default spreads, which then merit higher sovereign credit ratings, are expected to strengthen a country's banking system. On the other hand, better current account balances are expected to strengthen national banking sectors as well. We gather time-series data for these three variables, along with a set of other control variables, for the countries of the ASEAN-5[1], the five most significant economies of the ASEAN region. We then compile these into a set of panel data and run the set through a regression analysis. We test the empirical model for robustness of results in terms of signs and the parameter stability, and then briefly explore the two main initiatives that sprung as a response to the AFC, namely the Chiang Mai Initiative (CMI) that aims to promote financial cooperation within the ASEAN region, and the ASEAN Economic Community (ASEAN-EC) which intends to promote regional trade.

1.1 History of the Asian Financial Crisis

The AFC was a crisis in that adversely affected the financial sectors of the major economies of Southeast Asia, namely Thailand, Indonesia, Malaysia, Singapore and the Philippines, the so-called ASEAN-5. The crisis was triggered in July of 1997 when the Thai Baht experienced severe, unexpected devaluations due to the sudden souring of creditworthiness perceptions of the Thai economy. It was seen as a negative, exogenous shock in the perception of creditworthiness of the regional economies[2].

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[1] ASEAN-5: The Philippines, Indonesia, Malaysia, Thailand, Singapore
[2] *The Asian Financial Crisis*, p. 13-17

During this time, Japanese banks were heavily invested in the Southeast Asian economies and were the major investors in the region. Following the devaluations of the Thai Baht, the Japanese banks withdrew the majority of their investments from Thailand[3]. Many other investors in the region followed the Japanese banks' lead and withdrew their investments from Thailand as well, resulting in a massive flight of foreign investors out of the Thai financial sector[4].

The capital outflow from Thailand, however, caused investor panic that spread throughout the region. The other ASEAN economies shared numerous similarities with the Thai economy. For example, many of the regional economies maintained negative current account balances (CA). Thailand, Malaysia, Indonesia and the Philippines all had CA deficits whereas Singapore held a CA surplus. These similarities helped Thailand's toxic credit risk perceptions to cross borders and to affect the creditworthiness of the ASEAN-5[5]. Before long, the Japanese banks and other investors withdrew their investments from those countries as well[6].

Throughout the region, as the ASEAN currencies sharply lost their value, many regional banks that held US-dollar denominated debt quickly became unable to service those debts and became insolvent[7]. Many major ASEAN companies, especially those involved in the export sector, relied heavily on vital lines of credit from those local banks and carried US-dollar denominated debt as well. These consequences prevented these

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[3] *Who Triggered the Asian Financial Crisis,* pp. 439-442
[4] *Who Triggered the Asian Financial Crisis*?, p. 444-445
[5] *The Asian Financial Crisis*, pp 49-54
[6] *The Asian Financial Crisis*, pp. 17-19
[7] *Who Triggered the Asian Financial Crisis,* pp. 449-453

exporters from benefiting from the competitive advantage of their products in the world market that arose from the very weak domestic currencies.

These companies, which are considered to be significant drivers of the ASEAN economies[8], were forced to either scale down their production or to cease operations completely and file for bankruptcy. The insolvent banking sectors in the region along with the slowdown of these regional exporters created sharp economic recessions that lasted until 1999.

At the onset of the AFC, monetary policymakers in the ASEAN attempted to tackle the crisis by defending the value of their currency in order to stabilize their economies or to preserve their existing monetary pegs. During the crisis, Malaysia, Thailand and the Philippines maintained some sort of currency peg to the US-dollar whereas the currencies of Indonesia and Singapore were mostly market-determined. Alongside this defense of their currencies, the policymakers allowed banks that were heavily burdened with nonperforming loans to become bankrupt.

These policies were generally described as insufficient and ineffective for two reasons. First, the failures of the regional banks worsened the recessions in the region since many ASEAN companies relied on the ASEAN banking sectors and their lines of credit in order to support their operations. Secondly, the policy expended large amounts of the ASEAN countries' net foreign reserves in order to defend their currencies and their US-dollar pegs but were ultimately unable to do so. The Philippines and Thailand each

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[8] *The Asian Crisis,* pp. 173-182

adopted a market-floating currency by 1998 whereas Malaysia allowed its currency to float in 2005.

There is general consensus that the AFC had finally come to an end by the year 2000. However, there was much discussion as to what triggered the crisis and why the crisis came to be in the first place. Various initiatives were drafted since then, such as the Chiang Mai Initiative (CMI), which was officially launched as a multilateral agreement in 2010, and the upcoming ASEAN Economic Community (ASEAN-EC) due to come into effect by the end of 2015. The CMI is intended to increase financial cooperation between the ASEAN+3[9] and to serve as a complement to the International Monetary Fund in the region during future crises. The ASEAN-EC on the other hand aims to deepen the integration of the ASEAN markets by reducing or removing tariffs and non-tariff barriers to trade amongst members[10].

1.2 Purpose of the study

In this study, we ask the question of how the credit default spreads (CDS) and the national current account (CA), two of the major influential factors that affected the crisis in the economies of the ASEAN-5, affect the health of the financial sectors of those countries measured by the Bank Z-score, controlling for a number of other relevant factors. Our hypothesis for this study is that the Bank Z-score would fall as CDS rises and rise as CA rises.

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[9] The ASEAN+3: Japan, South Korea, People's Republic of China, The Philippines, Indonesia, Malaysia, Thailand, Singapore, Vietnam, Brunei Darussalam, Myanmar, Laos, Cambodia
[10] ASEAN Economic Community Blueprint: http://www.asean.org/archive/5187-10.pdf

This is an interesting question to ask since the financial sectors of the ASEAN-5 economies were deemed vulnerable and unhealthy during the AFC and the investor panic spread very quickly throughout the region. During this time, many regional banks went bankrupt and caused the sharp recessions of 1997-1999. The countries of the ASEAN since then have sought to prevent another AFC from taking place by placing initiatives that tackle financial cooperation and economic integration amongst the ASEAN economies. These initiatives are ongoing and are intended to spur the economies of the ASEAN by improving the regional financial sector, thereby reducing the CDS of regional banks, and promoting inter-ASEAN trade that would provide a boon to the CA of the ASEAN economies. Since these initiatives are both underway, it is interesting to see whether improving the states of the CDS and CA of economies would make the financial sectors of the ASEAN economies less vulnerable to a similar crisis.

We use regression analysis to test the aforementioned hypothesis, and our data consists of a panel of five ASEAN countries over the period of 1998-2011. These countries are Indonesia, Malaysia, the Philippines, Singapore and Thailand. In order to test for robustness of results, we adopt three different regression strategies. The first regression strategy absorbs the year-specific differences into the model in order to address biases that may arise due to the data of the differences in the economic environments of the year when the data was gathered. The second strategy splits the dataset into a set of 1998-2004 data and a set of 2005-2011 data, and the model is run for each set. This addresses biases that may arise from the data from the time of the AFC in the first set and the post-crisis data in the second set. Finally, dummy variables are introduced in the third

strategy in order to account for unobserved country-specific differences, which would otherwise lead to biased estimates.

As a whole, this study makes a contribution to the discussion of the AFC as it focuses specifically on the financial health of the ASEAN-5 banking sectors. In their annual report, the World Economic Forum (2000) made specific recommendations to reform the financial sectors of the Asian economies, particularly those of the ASEAN-5. This study would thereby support the view that financial reform is indeed necessary in order to promote the financial health of the regional economies and to prevent future crises due to failing financial institutions. The study also serves to see whether the recommendations for reform written in the World Economic Forum publication have been implemented and whether the original model holds using new data from the ASEAN-5.

II. Literature Review and Empirical Methodology

2.1 Literature Review

There have been numerous studies that examined the AFC, starting from the onset of the crisis in 1997 until the present time. These studies sought to analyze the nature of the crisis, to identify the factors that caused the crisis and affected its severity and to make recommendations that would be aimed at making the East Asian economies more resilient against future financial crises or to prevent those crises from arising in the region altogether.

The pieces of academic literature we review for this section of the study are the compilation of the World Economic Forum or WEF (2000), the article by Michael King

(2001) that investigates which group triggered the AFC, the analysis of the AFC by Khan, Islam and Ahmed (2005) and the quantitative model for capital outflows in small, open economies written by Cook and Devereux (2006). We also refer to the study of the Chiang Mai Initiative (CMI) in the article of Chey (2009) for the Asian Survey Journal.

The central piece of literature is the WEF study, as it provides insight on the nature and causes of the crisis and identifies various factors that affected the financial health of the region. It is a report that provides a descriptive analysis using tables and graphs of data on variables such as the percentage of nonperforming loans (NPL) in the banking sectors of the ASEAN-5 and the current account balances of the ASEAN-5 economies during and prior to the crisis. These variables are identified as factors that made the regional economies vulnerable to the AFC. Finally, it presents a set of recommendations for reform in the economies of the East Asian region, including the ASEAN-5, that revolve around the strengthening of the regional financial sectors and the promotion of export competitiveness in the region.

The second literature piece is the article of King which investigates which economic agent triggered the AFC. In his article, King (2001) focuses on institutional investors such as commercial banks, portfolio investors in equity and debt and the foreign direct investments of multinational enterprises. His descriptive analysis shows that the volume of external financing in the balances of payments in the ASEAN-5 economies that are provided by these institutional investors and concludes with recommendations that greater attention must be paid to improving domestic supervision of banks, timely dissemination

of financial information and the adoption of international accounting standards in the regional banking sectors.

The third literature piece is the article of Khan, Islam and Ahmed which examines the trade patterns of the Pacific Asian countries, including the ASEAN-5, and their role in spreading the crisis through the region. Khan, Islam and Ahmed (2005) provide tables that outline the historical trading patterns of the Pacific Asian countries from the 1970's leading up to 1998 and a model that shows the existence of a contagion effect in the real exchange rate markets during the crisis. They conclude that increased regional trade does provide economic benefits for the ASEAN-5 economies as long as policies of accountability and transparency of the banking sectors and the diversification of trade are pursued.

The fourth literature piece is the article by David Cook and Michael Devereux (2006) where they frame the AFC in a dynamic, general equilibrium model of capital outflows. Their chosen scope consists of Malaysia, Thailand and South Korea and they observe the AFC as an exogenous shock in the country risk premium. They also specify a monetary reaction rule that reflects the behavior of domestic interest rates and attempt to explain the large exchange rate devaluations that occurred during the crisis.

Finally, Hyoung-kyu Chey's article on the CMI documents the evolution of the institutionalization of the East Asian financial cooperation. Chey (2009) compares the current CMI to the previous proposal of an Asian Monetary Fund during the onset of the crisis in 1997. He goes on to show that the CMI complements the International Monetary

Fund, as well as a country's net foreign reserves, by providing liquidity assistance in the event of a crisis like the AFC. However, he admits that the capability of the CMI to provide liquidity assistance has not yet been tested.

This study provides additional insight to these pieces of existing literature as it examines the effects of country risk premiums in the form of CDS and the effects of the national current account on the health of the financial sectors of the ASEAN-5. We provide evidence that either support or disprove the significance of variables that were identified as triggers and significant influences of the AFC. Aside from that, we are able to ascertain whether the current initiatives such as the CMI and the ASEAN-EC would help improve the financial health of the ASEAN-5[11]. Table 1 presents the shortlist of variables proposed in the existing literature that were initially selected below while Table 2 lists of the reforms proposed by the WEF.

Table 1: Variables and Rationale	
Variable	**Rationale**
Bank Z-Score	This is a measurement of the health of the banking in a country sector and is a proxy for the likelihood of the failure of financial institutions.
Credit Default Spread	This is a proxy for country risk premiums and is a market-based metric.
Current Account Balance	This is a proxy for the national trade balance and is an accounting-based metric.
Central Bank Rate	This is a numerical proxy for national monetary policy.
Foreign Direct Investment	This is a proxy for the yearly long-term investment inflows in an economy.
Net Foreign Reserves	This is a measurement of the US Dollar reserves that the national economy maintained at the end of the year.
Non-Performing Loan Ratio	This is a proxy for the bad debts carried by the overall national financial system.

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[11] It is important to note that the CMI follows WEF recommendations for financial reforms and international 'rescue' package. On the other hand, the ASEAN-EC follows WEF recommendation for long-term improvement of Asian competitiveness.

Table 2: WEF Reform Recommendations	
1	Financial reforms within developing countries.
2	Reform of the International Monetary Fund (IMF).
3	Reforms in the international monetary system.
4	Reforming international 'rescue' packages.
5	Regulatory reforms of international capital markets.
6	Short-term financial measures to restore growth in Pacific Asia.
7	Long-term measures to enhance Asian competitiveness.

2.2 Data Collection Process

We list the variables of interest mentioned in the existing literature and initially attempt to determine the extent of data availability by examining the databases of the World Bank and the IMF, reports published by the ASEAN organization and the central banking institutions of the ASEAN economies and the historical credit ratings published by Moody's.

The original plan was to gather data points for all ten current members of the ASEAN[12] from 1997 to 2012. However, data from many of the ASEAN nations were mostly incomplete and irregular as some countries either did not have sufficient data points for some variables or did not have reliable data. For example, there is no data at all for CDS and NPL for Brunei Darussalam and there is ongoing controversy regarding the reported NPL ratios provided by the Vietnamese central bank[13]. This forced us to scale down the pool of data to cover the ASEAN-5 countries and to shorten the time period to

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[12] ASEAN: Indonesia, Malaysia, Thailand, the Philippines, Singapore, Vietnam, Brunei Darussalam, Cambodia, Laos DPR and Myanmar
[13] *Vietnam says bad debt at 9%, below Moody's estimate*, Reuters: http://uk.mobile.reuters.com/article/rbssFinancialServicesAndRealEstateNews/idUKL3N0LR0472 0140222

1998 to 2011 as this is the period that provides a full set of data for the Bank Z-score, the dependent variable.

2.3 Dependent Variable

The dependent variable we select for this study is the Bank Z-score. The Bank Z-score is an aggregate measure of the financial stability used by the Global Financial Development Report of the World Bank[14]. The World Bank defines financial stability as the ability of a financial system, which is mostly made up of banks in the ASEAN-5 economies, to efficiently allocate resources, to manage financial risks and to maintain employment levels close to the natural rates through self-corrective mechanisms.

The Z-score is a measure of financial stability that is commonly used at the individual firm level and mainly uses accounting data. These measures include the financial institutions' working capital to total assets ratios, the retained earnings to total assets ratio, the earnings before interest and tax ratio, the market value of equities to total liabilities ratio and the revenues to total asset ratio. The Z-score is calculated by explicitly comparing the bank's capital as a percent of assets and return as a percent of assets against return volatility or risk. This gives the score a clear negative relationship to the probability of a bank's insolvency and is therefore a useful measure of the bank's solvency risk.

For this study, we use a weighted-average, national Z-score that is aggregated from the individual firm-level Z-scores. In our data, the Z-scores ranged from a minimum -7.31 points to a maximum of 47.49 points. The World Bank uses a rule of thumb wherein a Bank Z-score higher than two points to a healthy national banking sector whereas a score lower than two indicates that there may be some underlying issues in the sector. Specifically, as the Z-score falls, the sector's return risk grows larger compared to the sector's capitalization and asset return rates, making it more likely for banks in the national sector to fail and file for bankruptcy.

We chose this variable as the dependent variable since, according to the existing literature, the financial sectors of the ASEAN-5 were unhealthy during the beginning of the AFC, particularly in Thailand and Indonesia which were among the worst affected by the crisis. Therefore, in this study, we are interested to learn what variables affect the health of the banking sector in a country and how these variables influence the Bank Z-score.

2.4 Independent Variables

Our two main independent variables are the credit default spreads (CDS) and the national current account balance (CA). The CDS is a rating or risk score that measures the additional risk an investor is undertaking by investing in one country as opposed to another with a premium Aaa credit rating. The CDS is based on the risk score table of Aswath Damodaran[15] while the credit ratings are taken from Moody's ratings agency[16].

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[15] *Risk Free Rates and Default Spreads*, Aswath Damodaran:
http://people.stern.nyu.edu/adamodar/pdfiles/cfovhds/Riskfree&spread.pdf

From this, we can see that CDS is a market-determined metric. We choose CDS as the first independent variable since the credit ratings of the countries affected by the AFC were faced with credit rating downgrades that further raised the insolvency of regional financial sectors.

The national CA balance, on the other hand, is defined as the sum of a country's trade balance, net income from abroad and net current transfers[17]. When a country has a positive CA balance, then the country is maintaining a CA surplus and is a net lender to the world economy. Likewise, when a country has a negative CA balance, then the country has a CA deficit and is a net borrower from the rest of the world. The data for the national CA balances of the ASEAN-5 are taken directly from the World Bank database. This means that the CA is an accounting-based metric. The CA balance is the second independent variable since the majority of the ASEAN-5 were net importers at the time of the crisis and one of the major recommendations by the WEF was to promote long-term export competitiveness in the ASEAN region at the aftermath of the crisis.

2.5 Other Control Variables

We also consider four other control variables to be included in the empirical model. These are the central bank lending rate (CBL), the flow of foreign direct investments (FDI), net foreign reserves (NFR) and the nonperforming loan ratio (NPL).

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[16] *About Moody's Ratings,* Moody's Investors Service: https://www.moodys.com/ratings-process/Ratings-Definitions/002002
[17] *Current Account Balance for Selected Countries*, The IMF:
http://www.imf.org/external/pubs/ft/weo/2014/01/weodata/weorept.aspx?sy=1980&ey=2019&scsm=1&ssd=1&sort=country&ds=.&br=1&pr1.x=44&pr1.y=10&c=518%2C516%2C522%2C544%2C582&s=BCA&grp=0&a=

The CBL rates are a proxy for the interbank lending rates, which are the rates at which the central bank of a country lends to national commercial banks in order for them to meet short-term and medium-term financing needs[18]. These rates naturally affect the ability of commercial banks in the region to operate and were considered as the first control variable.

FDI flow is chosen as the second control variable since FDI pertains to investments made by foreign entities in companies or entities operating in the country in question and these investments are often long-term in nature[19]. The WEF compilation noted that two of the major factors that made the ASEAN economies vulnerable to the crisis were that there was a lack of long-term FDI and an excess of short-term investments and financing[20]. We should note, however, that the FDI data from the World Bank includes both long-term capital investment and short-term capital investment and made no distinction between either of the two.

The NFR of a country pertains to the value of a country's total reserves less the value of their national gold reserves. This amount is valued in US dollars and can be used by the national monetary authority to either bail out ailing financial institutions or to defend the value of the domestic currency during a crisis. Many ASEAN monetary authorities chose to extensively use their NFR to defend the value of their currency. The

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[18] *Lending Interest Rate*, The World Bank:
http://data.worldbank.org/indicator/FR.INR.LEND?page=3
[19] *Foreign Direct Investment, Net Inflows*, World Bank:
http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD
[20] *The Asian Financial Crisis*,103-107

WEF compilation claimed that when a country has more NFR, it becomes less vulnerable to crises such as the AFC.

Nonperforming loans are loans wherein the borrower, such as the clients of a financial institution, fail to make scheduled payments that are stipulated by the details of the loan agreement after a period of at least ninety days[21]. When a loan becomes nonperforming, then it becomes very unlikely that the loan will be repaid in full or even in part and the borrower is expected to default. The presence of NPL's in the portfolio of regional banks negatively affect the operations of those banks and these loans become a financial burden to them. The more NPL's present in their portfolio, the heavier the burden that the bank carries. During the AFC, foreign lenders refused to roll-over or renegotiate existing loans or to extend lines of credit to ASEAN banks[22]. This in turn further made the regional financial sectors insolvent, causing the most overburdened banks to fail and file for bankruptcy.

2.6 Descriptive Statistics

This section contains the descriptive statistics of the data that we use in this study. Table 3 describe the general characteristics of the data, Figures 1, 2 and 3 depict the histograms and kernel densities of the dependent and independent variables and Table 4 shows the matrix of correlations that exist between the variables.

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[21] *Nonperforming Loans to Total Gross Loans*, World Bank: http://data.worldbank.org/indicator/FB.AST.NPER.ZS
[22] *The Asian Financial Crisis*, pp. 21-24

Table 3: Descriptive Statistics

Table 3 outlines the descriptive statistics of the data used in this study including the mean, the standard deviation, the 25th percentile and the 75th percentile of the date. The units of each variable are provided in the footnotes at the bottom of the page.

Variable	Mean	Std. Deviation	25th Percentile	75th Percentile
Z-Score[23]	15.74212	12.70341	2.452067	24.88715
CDS[24]	1.305042	.6927542	1.072381	1.658312
CA[25]	12.94283	14.20091	4.105	15.682
CBL[26]	2.133909	.4526514	1.763589	2.496025
FDI[27]	8.561904	11.6778	1.896083	9.454931
NFR[28]	3.933017	.7949018	3.408193	4.558411
NPL[29]	2.050424	0.8816855	1.280934	2.766319
INT[30]	39.89799	61.67078	6.56	46.62305

Figure 1 - Dependent Variable: Bank Z-Score

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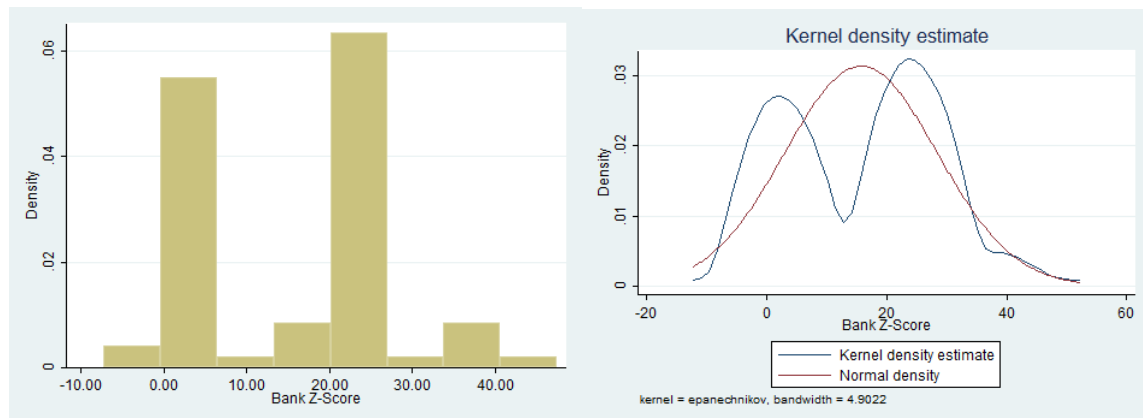
[23] The Z-score is measured in points and ranges from negative infinity to positive infinity
[24] CDS is a percentage and ranges from zero to positive infinity
[25] CA is measured in millions of US dollars and ranges from negative infinity to positive infinity
[26] CBL is a percentage and ranges from zero to positive infinity
[27] FDI is measured in millions of US dollars and ranges from negative infinity to positive infinity
[28] NFR is measured in millions of US dollars and ranges from negative infinity to positive infinity
[29] NPL is a percentage and ranges from zero to 100
[30] INT is an interaction term between FDI and NFR and is calculated by multiplying the value of NFR with the value of FDI for a given country in a given period of time.

In Figure 1, we can see that the Bank Z-scores of the ASEAN-5 countries from

1998-2011 are concentrated in the ranges of 0-5 points and 20-25 points.

Figure 2 - Independent Variable: Credit Default Spread (CDS)
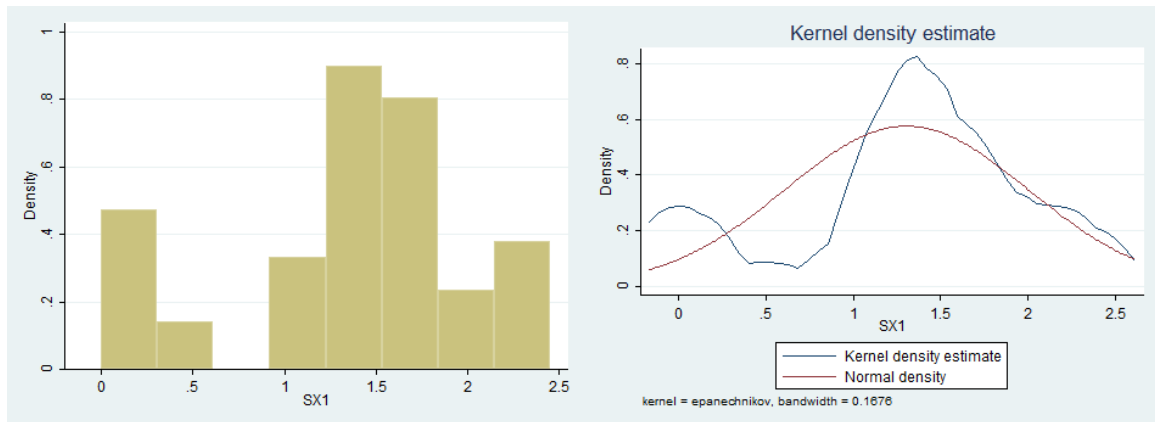
The CDS data, as shown in Figure 2, is more spread out than the Bank Z-scores.

The majority of the collected CDS data falls within the 1.25-1.75 percent range. There is

also another smaller yet noticeable concentration of CDS in the 0-0.25 percent range.

Figure 3 - Independent Variable: National Current Account Balance (CA)
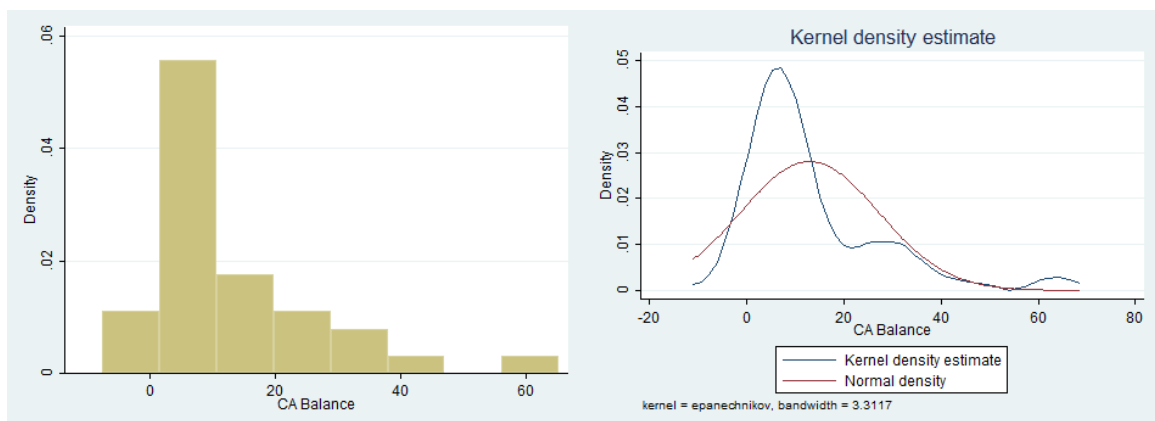
In Figure 3, we can see that the majority of the ASEAN-5 countries posted CA

balances within the range of zero dollars and a ten million dollar CA surplus.

Table 4: Correlation Matrix

Table 4 in the next page provides the correlations that exist between the variables included in the model. The bracketed numbers pertain to the p-values of the correlation. These p-values are marked with asterisks according to their significance. Three asterisks (***) pertain to significance at the 99% confidence level, two asterisks (**) pertain to significance at the 95% confidence level and one asterisk (*) pertains to significance at the 90% confidence level.

Variables	Z-score	CDS	CBL	FDI	CA	NFR	NPL
Z-score	1						
CDS	-0.365 [0.00]***	1					
CBL	-0.389 [0.00]***	0.789 [0.00]***	1				
FDI	0.133 [0.28]	-0.719 [0.00]***	-0.458 [0.00]***	1			
CA	0.229 [0.06]*	-0.662 [0.00]***	-0.507 [0.00]***	0.771 [0.00]***	1		
NFR	-0.138 [0.26]	0.676 [0.00]***	-0.621 [0.00]***	0.680 [0.00]***	0.702 [0.00]***	1	
NPL	0.140s [0.25]	0.516 [0.00]***	0.467 [0.00]***	-0.666 [0.00]***	-0.566 [0.00]***	-0.775 [0.00]***	1

From this correlation matrix, we can see that there is a very high positive correlation that exists between FDI and NFR meaning that it becomes difficult to disentangle the individual effects of FDI and NFR on the Bank Z-score. In order to separate their effects, we include an interaction term for FDI and NFR called INT and include it in the model.

III. Empirical Analysis

3.1 Model and Methodology

The data for all of the variables are compiled into panel data wherein each data point represented the data for one particular country in one particular year. This generates a total of 69 data points since Singapore was missing some data in the year 1998, which forces us to remove the Singapore's 1998 data from the data pool. Once these data points were compiled, we input them into STATA statistical software in order to create a regression model[31]. We run an initial OLS regression in order to check for the strength of the model and to see what corrections have to be made. We give the variables of CBL, NFR, and NPL logarithmic transformations whereas the variable of CDS was given a square-root transformation. After we apply these transformations and the interaction variable to the model, we test the model for autocorrelation amongst the variables, heteroscedasticity and multicollinearity.

Using White's General Test on STATA, we find that there was significant heteroscedasticity in the model meaning that there are differences in the variances of the error term. To address this, we report White's heteroscedasticity-consistent standard errors in our OLS regression.

We also detect very high multicollinearity in the model using the VIF command on STATA. VIF is a measurement of the increase of the variance of regression coefficients. Values of VIF that are 10 or greater indicate high multicollinearity The

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[31] A regression model shows how independent and control variables affect the dependent variable and also shows whether these influences are statistically significant or not

model has a mean VIF of 55.44 because of the interaction function INT. It is important to note that without the interaction function INT, the VIF of the model would be 3.69 which indicates low multicollinearity. Also, the estimators of the model with INT does not differ in signs and does not differ greatly in magnitude as compared with the model without INT. For these reasons, we have decided to use the model with the interaction function as our final model for the study in spite of the high VIF. The final model is written down in equation form below wherein Y_{it} represents the Bank Z-score in ASEAN country i and year t in the sample, β_0 represents the constant Z-score, β_1-β_7 represent the specific influence of each variable to the Bank-Z score and ε representing the error term in the model.

$$Y_{it} = \beta_0 + \beta_1 CDS_{it} + \beta_2 CA_{it} + \beta_3 CBL_{it} + \beta_4 FDI_{it} + \beta_5 NFR_{it} + \beta_6 NPL_{it} + \beta_7 INT_{it} + \varepsilon_{it}$$

In the regression model above, 'i' refers to country and 't' refers to year. ε_{it} is the normally distributed white noise with a mean of 0 and a variance of σ^2.

3.2 Regression Results

Using the new model above, we make another regression analysis in STATA which yields the following results:

$\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 CDS + \hat{\beta}_2 CA + \hat{\beta}_3 CBL + \hat{\beta}_4 FDI + \hat{\beta}_5 NFR + \hat{\beta}_6 NPL + \hat{\beta}_7 INT$

$\hat{Y} = 159.63 - 10.62 CDS + 0.35 CA - 12.95 CBL - 2.49 FDI - 21.72 NFR - 8.27 NPL + 0.42 INT$

$T: (13.85) \quad (-3.79) \quad (3.28) \quad (-3.66) \quad (-2.9) \quad (-12.19) \ (-5.44) \ (2.56)$

$R^2 = 0.6969$, F-stat $= 42.75$

From these results, we can see a number of interesting things. First and foremost, the model as a whole has a high F-value and is wholly significant. At the same time the estimators all have sufficiently high absolute t-values meaning that each one of them is statistically significant at the 99.5% confidence level. Finally, we are able to see that this combination of estimators is able to explain 69.69% of the variation in the Bank Z-scores, our dependent variable. This model is presented in Table 5 in the next page while the STATA output is provided in the Appendix as Figure 4.

Table 5: Baseline Empirical Model

This table presents the coefficients, robust standard errors, t-values and p-values of the individual variables as well as the R^2 and F-stat of the model as a whole. The p-values are marked with asterisks according to their significance. Three asterisks (***) pertain to significance at the 99% confidence level and two asterisks (**) pertain to significance at the 95% confidence level.

Variable	Coefficient	Robust Std. Error	t-value	p-value
CDS	-10.62	2.8	-3.79	0.00***
CBL	-12.95	3.54	-3.66	0.00***
FDI	-2.49	0.86	-2.9	0.00***
CA	0.348	0.11	3.28	0.00***
NFR	-21.72	1.78	-12.19	0.00***
NPL	-8.27	1.52	-5.44	0.00***
INT	0.42	0.17	2.56	0.01**
Constant	159.63	13.85	13.85	0.00***
R^2	**0.6969**			
F-stat	**42.75**			

According to these results, every additional percent of credit default spread causes a 10.62 point drop in a country's Bank Z-score whereas every additional million US dollar improvement of the current account would cause a 0.35 point increase in the Bank Z-score. A single percentage point increase of the central bank lending rate causes a 12.95 point decrease in the Bank Z-score while every percent of nonperforming loans in the financial system's portfolio decreases the score by 8.27 points as well. It is important to note that the influence of FDI and NFR on the Bank Z-score are influenced by their interaction term INT. Accounting for this interaction, we see that for every additional million US dollar of FDI, we would have a decrease of 0.838 points of the Z-score[32] . Meanwhile, every additional million US dollar of NFR would result in a decrease of 18.108 points of the Bank Z-score[33]. Given that the Z-scores from our sample range from -7.31 points at minimum to 47.39 points at maximum, we consider movements of five points or greater to be large movements and movements of less than five points to be small movements. Using this metric, we can say that CDS, CBL, NFR and NPL have large influence on the Bank Z-score whereas FDI and CA have small influence on the Z-score. However, it is important to note again that all of these estimators are statistically significant.

3.3 Robustness Tests

In order to validate this model and its results, we subject the model to three different regression strategies for robustness of the estimators. This means we are interested in checking whether the coefficients of the estimators change in sign relative to

---

[32] FDI Coefficient + (INT Coefficient*Mean NFR); -2.49+(0.42*3.933) = 0.838
[33] NFR Coefficient + (INT Coefficient*MeanFDI); -21.72+(0.42*8.6) = 18.108

our baseline empirical model and whether there is parameter stability with regards to the magnitudes of the coefficients. The first strategy absorbs the time differences into the model. This strategy is meant to address time-specific bias that may exist in the model since due to the differences in economic climate from one year to another. The second regression strategy involves splitting the data pool into two sets and running a regression analysis on each set. The first set contains data from the years 1998-2004 while the second set contains data from the years 2005-2011. This strategy is meant to assess parameter stability between the data that includes the period of the crisis (1998-2004) and the post-crisis data set (2005-2011). The final regression strategy adopts the Least Squares Dummy Variable (LSDV) estimation approach by introducing country dummy variables. The LSDV strategy is meant to address biases that would otherwise arise from unobserved country differences that are correlated with included variables. Dummy variables are created for Indonesia (DI), Malaysia (DM), Thailand (DT) and the Philippines (DP) while Singapore is our basis country.

The results of this these three regression strategies are outlined in Table 6 in the next page while the STATA output for all three strategies are provided in the appendix as Figures 5, 6, 7 and 8. The specific details of the absorbed time-difference strategy can be found in the STATA output in the appendix in Figure 5.

Table 6: Robustness Regression Strategies

Table 6 in the next page presents the magnitudes of the coefficients of the model's individual variables and the t-values of these coefficients in the bracketed numbers. These t-values are marked with asterisks that indicate their level of statistical significance. Three

asterisks (***) pertain to significance at the 99% confidence level, two asterisks (**)

pertain to significance at the 95% confidence level and one asterisk (*) pertain to

significance at the 90% level. The coefficients of DI, DM, DT and DP are marked N/A in

the Time-Difference and the Split Data portions since these strategies do not incorporate

country-specific dummy variables.

Variable	Time-Difference	Split Data (1999-2004)	Split Data (2005-2011)	LSDV
CDS	-21.31 [-4.47]***	-9.81 [-2.5]**	-10.62 [-3.79]***	-13.17 [-3.76]***
CBL	-3.49 [-0.74]	-17.71 [-3.33]***	-12.95 [-3.66]***	-4.52 [-1.42]
FDI	-1.32 [-1.39]	-8.43 [-4.09]***	-2.49 [-2.90]***	-0.53 [-1.05]
CA	0.45 [4.74]***	0.76 [1.76]*	0.348 [3.28]***	-0.02 [-0.35]
NFR	-25.87 [-10.10]***	-34.67 [-12.19]***	-21.72 [-12.19]***	-2.21 [-1.34]
NPL	-2.09 [-0.67]	-3.19 [-5.44]***	-8.27 [-5.44]***	2.58 [1.82]
INT	0.16 [0.89]	1.97 [2.56]***	0.42 [2.56]***	0.13 [1.46]
Constant	140.34 [12.21]***	194.96 [13.85]***	159.63 [13.85]***	35.19 [3.03]***
DI	N/A	N/A	N/A	8.03 [1.04]
DM	N/A	N/A	N/A	16.28 [4.16]***
DT	N/A	N/A	N/A	-2.76 [-0.59]
DP	N/A	N/A	N/A	28.86 [4.48]***
R^2	0.7772	0.7577	0.8390	0.9331
F-stat	19.86	17.77	29.42	158.34

From the absorbed time-difference regression, we can see that there are large movements in the magnitude of the variable coefficients, but there are no changes in their signs. This supports the robustness of our baseline model in terms of the coefficient signs, but the large differences in the magnitude do not show parameter stability. The results of the split-data regression strategy show us that splitting the data into the two periods does not change the signs of the coefficients. However, we can also see that the 1999-2004 differs from the baseline model more prominently and the 2005-2011 data indicates magnitudes that are very close to the baseline model. In this same light, we can see that the 2005-2011 data set has a higher R^2 and F-stat compared to the 1999-2004 data. Thus, this second strategy also supports the robustness of the baseline empirical model in terms of signs, but the overall magnitudes of the coefficients do not show parameter stability.

Finally, in the LSDV strategy, we note a number of interesting results. Like in the other strategies, we observe large differences in the magnitudes of the coefficients, disproving parameter stability. However, in this strategy, we also find that the sign of CA changes from positive to negative while the sign of NPL changes from negative to positive. On the other hand, the sign of the CDS estimator remains negative. This means that the LSDV model only partially supports the robustness of the signs of our baseline empirical model. It is also interesting to note that the R^2 and the F-stat of the LSDV model are both very high while the majority of the estimators which were individually significant in the baseline model have become insignificant at the 95% confidence level. Finally, with regards to the dummy variables, we can see that the dummy variables of Indonesia and Thailand are individually insignificant whereas the dummy variables of Malaysia and the Philippines are individually significant.

IV. Conclusion and Recommendations

4.1 Conclusion

In this study, we are interested in finding out how sovereign credit default spreads and national current accounts, two major influential factors that were documented to have made the economies of the ASEAN-5 countries vulnerable to the AFC, affect the financial health of the banking sectors in the ASEAN-5 economies. We gather annual data for the Bank Z-scores, CDS and CA of the ASEAN-5 countries for the years 1998-2011, along with the data for a number of control variables. We build a baseline empirical model and put it through a battery of three different regression strategies to test for the robustness of results. We find that the CDS is in fact negatively correlated to the Bank Z-scores and that this is a robust observation. However, in the case of CA, the baseline empirical model, two of our robustness regression strategies show that CA is positively correlated with the Bank Z-score while the LSDV strategy indicates that CA is also negatively correlated. This means that our initial hypothesis is only partially supported by our findings, pointing to the relevance of unobserved country-specific differences and, hence, the bias from applying pooled OLS. From this result, we can say that the market-determined CDS is more useful information in understanding financial crises in emerging economies as opposed to the accounting-based CA.

This study adds to the analysis of the AFC as it focuses on the stability and health of the financial sectors of the ASEAN-5 economies and uses more up-to-date data. The focus on the financial sectors allows us to take a different perspective on the crisis as we come to understand the factors that cause a financial crisis in the ASEAN-5 economies. Meanwhile, the up-to-date data lets confirm previously identified factors that affected the

crisis still partially stand true today. In particular, CDS remains a strong indicator of financial stability in an ASEAN-5 economy whereas CA is not completely supported.

Finally, this study shows that CMI and the upcoming ASEAN-EC would be helpful in strengthening regional financial sectors against financial crisis if we judge them by their intended benefits to the region. The CMI would raise the financial cooperation in the ASEAN and reduce the regional CDS while the ASEAN-EC is intended to promote regional trade and export competitiveness which are intended to raise the CA balances of the ASEAN economies. These two initiatives together have goals that would help to increase the Bank Z-scores of the region and would prepare the ASEAN financial sectors against future crises similar to the AFC.

4.2 Recommendations for Future Studies

Moving forward on this topic, we would suggest that future studies look for reliable data for the other ASEAN countries in order to expand the scope of this study from simply just the ASEAN-5 to the ASEAN as a whole. Secondly, quarterly data for these variables would help to depict the financial crisis more accurately as opposed to just annual data. Finally, another interesting question to explore in the future would be to directly study the Chiang Mai Initiative and the ASEAN Economic Community once more data becomes available. When that data does become available, it would be possible to see whether or not these two initiatives were successful in reducing the regional credit default spreads and raising regional current account balances as they had intended to do. Also, it would be interesting to ask whether these two initiatives were able to raise the regional Bank Z-scores.

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VI. Appendix

STATA Output:

Legend:

Y = Bank Z-Score

CDS = Credit Default Spread, % (Sqrt. Transformation)

CBL = Central Bank Lending Rate,% (Log. Transformation)

FDI = FDI Flow, Millions of USD

CA = Current Account Balance, Millions of USD

NFR = Net Foreign Reserves, Millions of USD (Log. Transformation)

NPL = Nonperforming Loans, % (Log. Transformation)

INTFDINFR = Interaction of FDI and NFR

DI = Dummy Variable - Indonesia

DM = Dummy Variable - Malaysia

DP = Dummy Variable - Philippines

DT = Dummy Variable - Thailand

DS = Dummy Variable – Singapore (was not used)

Figure 4

Baseline Empirical Model

```
. reg Y CDS CBL FDI CA NFR NPL INTFDINFR,robust

Linear regression                                  Number of obs =      69
                                                   F( 7,    61) =   42.75
                                                   Prob > F      = 0.0000
                                                   R-squared     = 0.6969
                                                   Root MSE      = 7.3846


-------------------------------------------------------------------------------
            |             Robust
          Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+------------------------------------------------------------------
        CDS | -10.62412    2.800598   -3.79   0.000    -16.22426   -5.023976
        CBL | -12.94913    3.538349   -3.66   0.001    -20.02449    -5.87376
        FDI | -2.492352     .860516   -2.90   0.005     -4.21306   -.7716439
         CA |  .3482251    .1061716    3.28   0.002     .1359219    .5605284
        NFR | -21.71969    1.781771  -12.19   0.000    -25.28256   -18.15682
        NPL |  -8.26513    1.518185   -5.44   0.000    -11.30093   -5.229332
  INTFDINFR |  .4214903    .1648521    2.56   0.013     .0918481    .7511326
       _cons |  159.6259    11.52166   13.85   0.000     136.5869    182.6649
-------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
   INTFDINFR |    186.90    0.005350
         FDI |    181.91    0.005497
         CDS |      5.07    0.197353
          CA |      4.01    0.249076
         NFR |      3.95    0.253194
         CBL |      3.26    0.306842
         NPL |      2.96    0.337593
-------------+----------------------
    Mean VIF |     55.44
```

Figure 5

Robustness Tests

Time-Difference Absorption Strategy

```
. xi:reg Y CDS CBL FDI CA NFR NPL INTFDINFR i.time,robust
i.time          _Itime_1998-2011   (naturally coded; _Itime_1998 omitted)

Linear regression                               Number of obs =      69
                                                F( 20,    48) =   19.86
                                                Prob > F      =  0.0000
                                                R-squared     =  0.7772
                                                Root MSE      =  7.1371
-------------------------------------------------------------------------------
             |               Robust
          Y |      Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
-------------+-----------------------------------------------------------------
         CDS |  -21.31473   4.499716    -4.74   0.000    -30.36201   -12.26744
         CBL |  -3.499655   4.551053    -0.77   0.446    -12.65016    5.650851
         FDI |  -1.328054   .9564415    -1.39   0.171    -3.251109        .595
          CA |   .4487482   .0946176     4.74   0.000     .2585067    .6389896
         NFR |  -25.86832   2.561329   -10.10   0.000    -31.01822   -20.71842
         NPL |  -2.085302   3.114757    -0.67   0.506    -8.347941    4.177337
    INTFDINFR |   .1592926   .1779974     0.89   0.375    -.1985951    .5171804
 _Itime_1999 |   10.20552   4.935201     2.07   0.044     .2826308    20.12841
 _Itime_2000 |   9.300074   5.712635     1.63   0.110    -2.185948     20.7861
 _Itime_2001 |   6.823205   4.902216     1.39   0.170    -3.033361    16.67977
 _Itime_2002 |    10.0277   6.470727     1.55   0.128    -2.982569    23.03797
 _Itime_2003 |   9.414903   5.201455     1.81   0.077    -1.043323    19.87313
 _Itime_2004 |   13.15133   7.135669     1.84   0.072    -1.195896    27.49855
 _Itime_2005 |   15.90547   5.498907     2.89   0.006     4.849173    26.96176
 _Itime_2006 |   18.10157   6.239313     2.90   0.006      5.55659    30.64655
 _Itime_2007 |   21.79251   7.577044     2.88   0.006     6.557847    37.02718
 _Itime_2008 |    20.1545    7.88049     2.56   0.014     4.309712    35.99929
 _Itime_2009 |   19.85296    8.53317     2.33   0.024     2.695877    37.01005
 _Itime_2010 |   31.25125   9.290255     3.36   0.002     12.57194    49.93056
 _Itime_2011 |   33.56605   10.01322     3.35   0.002     13.43312    53.69898
        _cons |   140.3409   11.48963    12.21   0.000     117.2395    163.4424
-------------------------------------------------------------------------------
```

```
. vif
    Variable |       VIF       1/VIF
-------------+----------------------
    INTFDINFR |    288.58    0.003465
         FDI |    280.43    0.003566
         CDS |     10.20    0.098041
         NPL |      9.68    0.103333
 _Itime_2011 |      8.76    0.114104
 _Itime_2010 |      7.68    0.130140
 _Itime_2009 |      6.32    0.158312
         CBL |      5.80    0.172329
 _Itime_2008 |      5.76    0.173601
          CA |      5.18    0.192893
         NFR |      5.09    0.196382
 _Itime_2007 |      4.91    0.203593
 _Itime_2006 |      3.84    0.260533
 _Itime_2005 |      3.63    0.275530
 _Itime_2004 |      3.53    0.283480
 _Itime_2003 |      3.15    0.317044
 _Itime_2002 |      3.01    0.331863
 _Itime_2001 |      2.96    0.337328
 _Itime_2000 |      2.87    0.348094
 _Itime_1999 |      2.53    0.394536
-------------+----------------------
    Mean VIF |     33.20
```

Figure 6

<u>Split Data Strategy</u>

```
[1998-2004 Data]
. reg Y CDS CBL FDI CA NFR NPL INTFDINFR, robust

Linear regression                               Number of obs =      34
                                                F(  7,    26) =   17.77
                                                Prob > F      =  0.0000
                                                R-squared     =  0.7577
                                                Root MSE      =  8.1793


------------------------------------------------------------------------------
             |               Robust
          Y  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         CDS |  -9.807242   3.923985    -2.50   0.019    -17.87311   -1.741376
         CBL |  -17.71199   5.323729    -3.33   0.003    -28.65507   -6.768911
         FDI |  -8.431675   2.062691    -4.09   0.000     -12.6716   -4.191754
          CA |   .7590296   .4308516     1.76   0.090    -.1265986    1.644658
         NFR |   -34.6687   4.854247    -7.14   0.000    -44.64675   -24.69066
         NPL |  -3.194812   3.512341    -0.91   0.371    -10.41453    4.024908
   INTFDINFR |   1.965564   .4636444     4.24   0.000      1.01253    2.918599
       _cons |   194.9563   24.99827     7.80   0.000     143.5716     246.341
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
   INTFDINFR |    126.66    0.007895
         FDI |    116.36    0.008594
         CDS |      8.18    0.122317
         NFR |      7.07    0.141408
         CBL |      5.12    0.195195
          CA |      4.05    0.246980
         NPL |      2.91    0.343971
-------------+----------------------
    Mean VIF |     38.62
```

```
[2005-2011 Data]
```

```
. reg Y CDS CBL FDI CA NFR NPL INTFDINFR, robust

Linear regression                                    Number of obs =      35
                                                     F(  7,    27) =   29.42
                                                     Prob > F      =  0.0000
                                                     R-squared     =  0.8390
                                                     Root MSE      =  4.7525

------------------------------------------------------------------------------
             |               Robust
           Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         CDS | -5.707361   3.546489    -1.61   0.119    -12.98416    1.569434
         CBL | -18.96006   4.177712    -4.54   0.000    -27.53202    -10.3881
         FDI | -.3936673   .7926912    -0.50   0.623    -2.020135    1.232801
          CA |  .3828946   .1185406     3.23   0.003     .1396694    .6261198
         NFR | -18.32448   2.310509    -7.93   0.000    -23.06526   -13.58371
         NPL | -7.874715   2.199768    -3.58   0.001    -12.38827   -3.361164
   INTFDINFR |  .0269866    .146327     0.18   0.855    -.2732516    .3272248
       _cons |  148.2144   18.24302     8.12   0.000     110.7828     185.646
------------------------------------------------------------------------------


. vif

    Variable |       VIF       1/VIF
-------------+----------------------
   INTFDINFR |    376.54    0.002656
         FDI |    358.22    0.002792
         CDS |      8.22    0.121600
          CA |      4.32    0.231386
         NFR |      4.26    0.234549
         CBL |      3.59    0.278896
         NPL |      2.68    0.373644
-------------+----------------------
    Mean VIF |    108.26
```

Figure 7

<u>LSDV Strategy</u>

```
. reg Y CDS CBL FDI CA NFR NPL INTFDINFR DI DM DT DP,robust

Linear regression                               Number of obs =      69
                                                F( 11,   57) =  158.34
                                                Prob > F      =  0.0000
                                                R-squared     =  0.9331
                                                Root MSE      =  3.5882


------------------------------------------------------------------------------
             |               Robust
          Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        CDS |  -13.17042   3.498928    -3.76   0.000     -20.1769   -6.163936
        CBL |  -4.518807   3.188355    -1.42   0.162    -10.90338    1.865765
        FDI |  -.5311108   .5059274    -1.05   0.298    -1.544213    .4819914
         CA |  -.0206374   .0593309    -0.35   0.729    -.1394455    .0981708
        NFR |  -2.207025   1.651258    -1.34   0.187    -5.513612    1.099561
        NPL |   2.577075   1.414139     1.82   0.074    -.2546905     5.40884
  INTFDINFR |   .1345508   .0919122     1.46   0.149    -.0495002    .3186019
         DI |   8.028824   7.730613     1.04   0.303    -7.451462    23.50911
         DM |   16.28339    3.91686     4.16   0.000     8.440012    24.12676
         DT |  -2.764467    4.72546    -0.59   0.561    -12.22704    6.698102
         DP |    28.8595   6.441723     4.48   0.000     15.96017    41.75882
      _cons |   35.18752   11.61611     3.03   0.004     11.92666    58.44839
------------------------------------------------------------------------------
```

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
   INTFDINFR |    224.06    0.004463
         FDI |    217.44    0.004599
          DI |     24.97    0.040049
          DP |     17.50    0.057135
         CDS |     16.48    0.060689
         NFR |     12.95    0.077201
         CBL |      8.98    0.111330
          DT |      8.75    0.114243
          DM |      7.02    0.142432
         NPL |      6.67    0.149907
          CA |      6.48    0.154382
-------------+----------------------
    Mean VIF |     50.12
```