

UNVEILING THE MASK OF
SOVEREIGN DEFAULT

BY

PANG YUN CHI
TAN ZHAO TONG
WONG KAH WEI
WONG VI VIAN
WONG YIN SHAN

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DECLARATION

We hereby declare that:

- (1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
- (4) The word count of this research report is 22,740 words.

Name of Student:	Student ID:	Signature:
1. PANG YUN CHI	14ABB04969	_____
2. TAN ZHAO TONG	14ABB02819	_____
3. WONG KAH WEI	14ABB05181	_____
4. WONG VI VIAN	14ABB03970	_____
5. WONG YIN SHAN	13ABB04509	_____

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LIST OF ABBREVIATIONS

ARS	Argentina Peso
BCRI	Banking Crisis
CAB	Current Account Balance
CBOE	Chicago Bond Options Exchange
CDS	Credit Default Swaps
CO	Crude Oil
CORR	Corruption
CPI	Consumer Price Index
DEM	Democracy
DSGE	Dynamic Stochastic General Equilibrium
EBA	Extreme Bond Analysis
ECU	European Currency Unit
EIA	Energy Information Administration
EXR	Exchange Rate Regime
GDP	Gross Domestic Product
GGDP	Gross Domestic Product Growth
GNP	Gross National Product
IMF	International Monetary Fund
INF	Inflation

LCO	Logarithm Crude Oil
LVIX	Logarithm Volatility Index
MENA	Middle East and North Africa Region
NCA	Net Capital Account
OECD	Organisation for Economic Co-operation and Development
PDEBT	Public Debt
PIIGS	Portugal, Ireland, Italy, Greece and Spain
QOG	Quality of Government
S&P	Standard & Poors'
SOVDEFLT	Sovereign Default
U.S	United States
VIX	Volatility Index
WTI	West Texas Intermediate

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PREFACE

Retracing the rich sovereign default history, the first sovereign default occurred in 4th century B.C. in Greece and this unwelcomed crisis is prone to both developed and developing countries. The recent European debt arises since the end of 2009 had once again caused a certain degree of anxiety lurking in most of the investors and they start to look closely to the financial condition and economy of the countries. Fears of banking crisis in recent years also motivate us to look into the connections between banking crisis and sovereign default. The detailed causes of this debt crisis varied from each country. Thus, the purpose of this research is to examine the driving forces of sovereign default.

This research includes independent variables from five big categories, namely foreign exchange variables, political variables, global variables, historical variables and economics variables. Moreover, we also look into the regional effect by determining the relevant determinants for each region.

It is expected that the result obtained is able to assist the policy makers in designing economic policies to reduce the probability of sovereign default for each country. The outcome of this result could be a reference for the government and authorities throughout the process of restructuring the fundamental factors that are significant in affecting the probability of sovereign default and reforming the country's economy.

ABSTRACT

It has been widely known that sovereign debt is one of the safest financial tools to be invested as government and national monetary authority are able to unlimitedly print money and raise tax level to repay debt. Around 50 cases of sovereign debt default had happened for the past 30 years. It shows that the probability of sovereign debt default is still highly possible while it is heavily driven by either internal factors or external factors and it is a knotty problem for investors, policy makers and bankers. Moreover, it will leave a deep harmful effect to nation itself and also spread contagion across different countries. Hence, this paper explores the general driven factor of sovereign default in 43 countries across the world, from 1985 to 2012. Afterwards, this paper narrows down its scope by identifying the relationship between banking crises and sovereign default and how magnitude of public debt affects the causation sequence. Lastly, we test the fitness of our best model region by region, pinpointing regional characteristic. This paper builds logit and probit panel model to identify probability of sovereign default in general. Moreover, we include interactive term to determine interaction effect between public debt and banking crisis and eventually find out the threshold level that has the potential to trigger a sovereign default. As a result, high inflation rate, banking crisis, low WTI crude oil price, political instability, low current account balance and high public debt to GDP are likely to drive a sovereign debt default. Lastly, this paper finds that Latin America best suit to the robust model and it mainly due to each country has its own unique characteristic and economy structure.

CHAPTER 1 RESEARCH REVIEW

1.0 Introduction

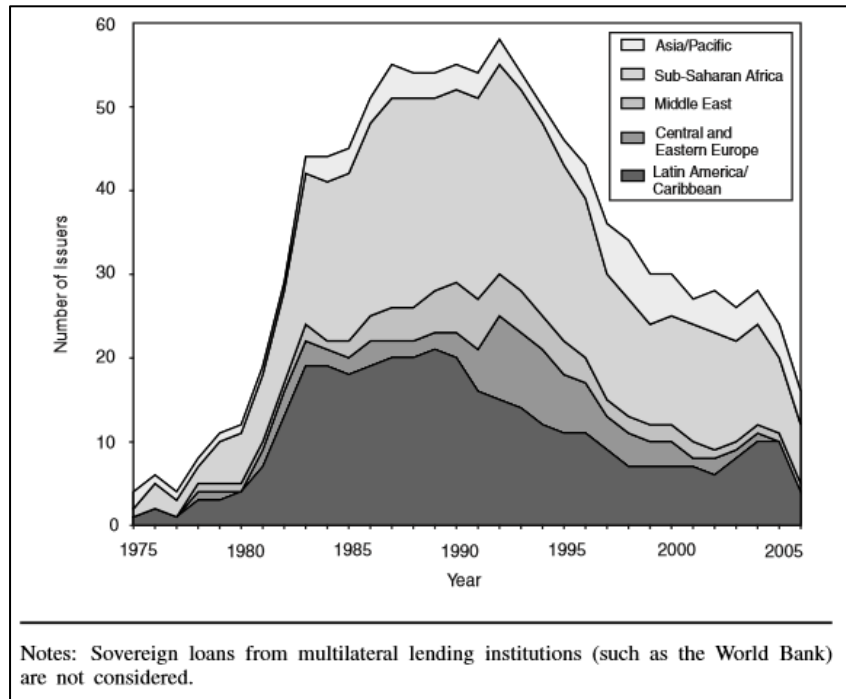
This section mainly proposes about the research background which motives us to conduct a research and analysis about sovereign debt default probability. Throughout this chapter, we will put an insight on the evolution of sovereign default, cost of sovereign default and regional-specific issues with the aids of graph and table to make it more sensible and understandable. Last but not least, this chapter is divided into several parts which namely research background, research questions, objective of the study and significance of the study and chapter layout.

1.1 Research Background

1.1.1 History of Sovereign Default

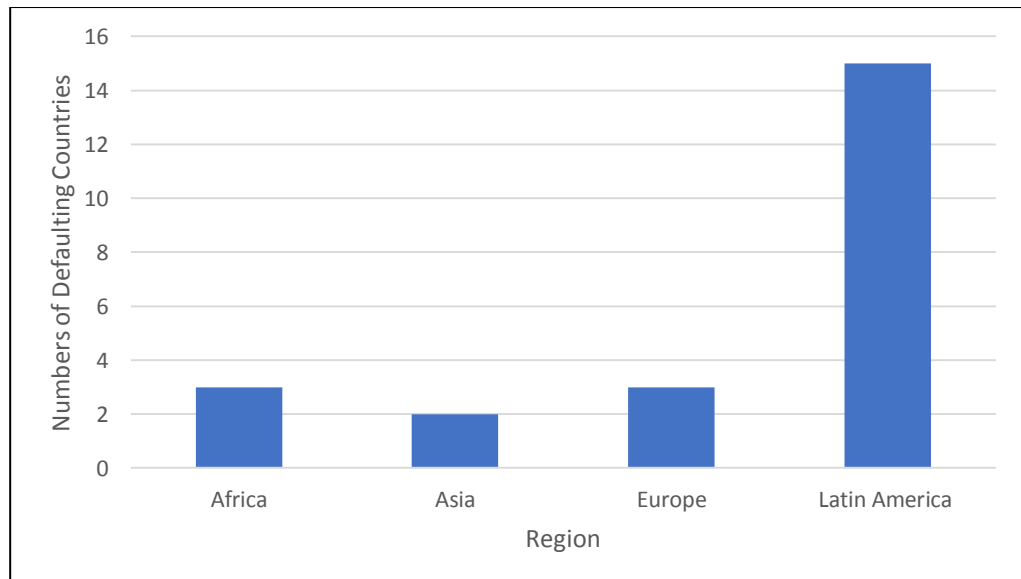
Economist and individual will be acquainted with the term “Sovereign Default” as this is no longer a new phenomenon in 21st century. Retracing the rich sovereign default history, the loans from Delos temple of Apollo was defaulted by 10 out of 13 Greek municipalities and this was documented as the first sovereign default in 4th century B.C. (Kalliomaki, 2012). As time passes and globalization takes place, the frequency of financial crisis increased and number of countries in default started to rise in 1980s and it was peaked in the earlier of 1990s as shown in Figure 1.1.

Figure 1.1: Number of Countries in Default (1975-2006)



Source: Kalliomaki (2012). *Determinants of sovereign defaults: An examination of fundamental factors derived from credit ratings.*

Figure 1.2: Numbers of Defaulting Countries According to Region (1985 – 2012)



Source: Author's Own Compilation.

By filtering the countries from each region that defaulted at least 1 time between 1985 to 2012 in our dataset, we had concluded the result in Figure

1.2 above. It is obvious that 94% of countries in Latin America from our dataset tend to default continue with Africa and Europe with 3 defaulting countries respectively and 2 defaulting countries in Asia. Without learning from the past, countries that have default history continue to experience more than 5 defaults, including Kenya, Zambia, Philippines, Poland, Ecuador, Mexico, Uruguay and Honduras, perfectly illustrate a “serial default” demonstrated by Reinhart and Rogoff (2008). The most recent default episode in this modern history consists of Argentina defaulted in 2001 and 2014 not forgetting the most discussed Greece defaulting issues in 2010.

Countries that default often shares a similar characteristic - high debt to GDP (Gross Domestic Product) ratio. A threshold of 60% public debt to GDP ratio was set by Stability and Growth Pact. It is found that most countries is highly indebted and the burden may contribute to a higher probability of default. An increased in foreign currency denominated debt turned the tone sour when its country's export is not raising at the same pace with its debt. The reason why sovereigns, mostly emerging economies, are reluctant or unable to issue debt in their home currency was this often accompanied with heavy cost. Firstly, the government have infinite resources in hand to repay domestic currency debt including money printing and this may result in unexpectedly high inflation under low degree of monitoring and supervision. Secondly, the sovereign is subject to a certain degree of exchange rate risk if there is a sizable proportion of foreign currency debt with short maturities to its total debt (Jeanneret & Souissi, 2015; Schaltegger & Weder, 2015; Tomz & Wright, 2012).

In certain countries, the sovereign default tends to repeat with several occasions such as Argentina, Spain and France, while not for other countries. This implies that there is some important component that we should not omit.

1.1.2 About the“D”Word

We had recognised some noteworthy differences in the definition of the term “default”. Referencing from Moody’s Sovereign Rating Guide published in 1999, a default simply mean as the interest and/or principal were disbursed late or missed. Payment made within a grace period, which is allowed in the indenture or deposit agreement also consider as a default as the prescribed obligation does not met when due. However, looking from the legal eyes, there is a default if and only if the obligated debt is not paid after the stated grace period (Hatchondo, Martinez & Sapriza, 2007). Eaton. Gersovitz and Stiglitz (1986) refer a default as the less willing to pay instead of solvency or liquidity problem.

Contradictory, Reinhart, Rogoff and Savastano (2003) presume a default when the sovereign restructures or reschedule its total (sovereign and private) external debt. This view was widely shared by the International Monetary Fund (IMF), and World Bank (Chakrabarti & Zeaiteer, 2014). The idea also supported by Detragiache and Spilimbergo (2001) while they enhance the explanation by adding that, default occurred when balance due on principal or interest to external debt outdid 5%.

Extending from sovereign default, political default arose when country undergone a political turnover. One country is considered experiencing a political default when government with high willingness to pay (creditor friendly) is succeeded by government with low willingness to pay (debtor friendly). The situation get worst during an economic downturn as creditor friendly government may opted to borrow more to ensure the sustainability of the country (Hatchondo & Martinez, 2010).

Technical default may be another subsection under sovereign default. Stating clearly, failure in paying debt will cause a default irrespective of the capacity of the country to repay or what the borrower intent to do with the debt borrowed. Yet, Thomas and Cachanosky (2015) argued that the

term technical default generally applies on corporate debt rather than sovereign debt. The explanation continues with if a firm continues to oblige on its debt amid breaching the debt warranty. The focus here is on the breaking of technical condition such as liquidity ratio rather than the payment obligation.

1.1.3 To Default or Not to?

It is a hard decision for government on whether to declare a default for its country. Knowing all the potential cost involved when a country officially entering a default episode is essential. The point often overlooked by authorities involved the accessibility into financial market, international trade, direct investment etc. which deemed crucial for a country's sustainability as creditors of defaulted debt often have the power to imposed sanctions and punishment on defaulting countries. Different from each country, the cost to default or repaying debt varies widely due to their different economic condition, political condition, default history as well as the country's fundamental.

A loan always associated with an interest rate. Creditors will consider charging a higher interest rate on defaulting countries to penalize the countries for their past behaviour. There is evidence showing that recent defaulters need to pay higher than 25% of interest, 8% for sovereign with defaulting history and first time borrower while 5.5% for borrower with decent credit record (Tomz & Wright, 2012). The holder of defaulted debt will team up with other potential lender to make this punishment effective. Previously, it is believed that this collaboration can sustain as the lender refuse to violate its agreement with other lender to secure the profit gained through the coordination. Even so, the increased competition in creditors market make it hard to incentivised the creditors to keep their promise as the profit share reduced when there are more creditors in the market. According to Hatchondo et al. (2007), the coordination works best during

19th century when there are only few lenders channelling the international capital flow.

A severe one would be sovereign may be shut out from obtaining funds from financial markets. Country may find it difficult to raise fund from capital market as lender found it advantageous to lend previously changed their mind. After analysing the lending activities after World War II, Tomz and Wright (2012) found that some countries still have an easy access into international capital market despite their defaulting history arguing that these countries did not receive “deserving” punishment. If a country realised that the price is too high for them to take, it may choose to fulfil their obligation to avoid larger losses in future. However, Borensztein and Panizza (2008) presumed that this classical assumption is implausible nowadays due to the structure of international market allowing bondholders to remain anonymous and can easily liquidate their position.

Potential reduction in international trade may result when a sovereign default. Sanctions implement by creditors including high tariff, quota and other barrier to restrict trading quantity with defaulter (Mitchener&Weidenmier, 2004). Across sovereign debt literature, trade sanction is considered as a traditional punishment to the badly-behaved country. Reduced in trading with creditors may affect the country’s balance of payment, this is the case especially for exporting countries.

To a certain extent, the direct investment into defaulting country can be affected as a default signals an undependable government in both debt disbursement and international affairs. If international organisation continued to question on the creditability of the defaulting country, it will affect other country willingness in entering a trade contract, military alliances or environment pacts with the country.

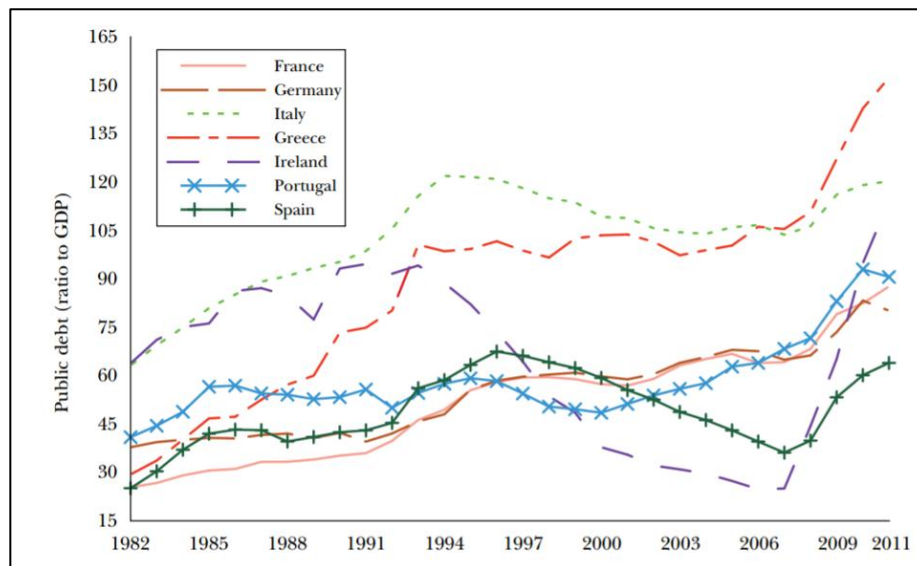
Cost of sovereign default can be a probability on future default which brings another message regarding that the government is unreliable which in turn affects the net worth and borrowing ability of firm, lowering the

amount of investment thus increasing perceived future default probability. Thus, a reputational spill over effect can be beyond the financial losses (Hatchondo et al., 2007).

Due to heavy penalty, government always upweight the cost and benefit on their defaulting decision in order to stabilise the country. However, government should not diagnose its own country problem by merely imitating other's country default decision due to the different economic structure and fundamental.

1.1.4 Eurozone Sovereign Debt Crisis

It will not be appropriate to not discuss about the series of default episode in Eurozone. The recent crisis in 2010 in Eurozone first erupted with Greece on the brink being unable to fulfil its debt obligation and quickly received bailed out from its Eurozone peers and IMF. Together with Greece, heavily indebted countries including Portugal, Italy, Ireland and Spain, generally denoted as PIIGS, started to fear about their destiny (Kalbaska & Gatkowski, 2012). Serious public debt condition in PIIGS caught attention as the public debt to GDP ratio on of the most indebted countries among European countries, Greece, touched 156%.

Figure 1.3: The Evolution of Public Debt to GDP Ratio (1982-2011)

Source: Lane (2012). *The European sovereign debt crisis*.

Figure 1.3 captures the public debt to GDP ratio evolution throughout the period of 1982 to 2011 across 7 countries in the Eurozone. It is obvious that Italy and Greece never fulfil the 60% requirement by having the ratio more than 90% since 1990s. Portugal and Ireland facing similar public debt problem too with their public debt to GDP ratio seems following the footsteps of Greece. Looking on larger country, creditworthiness of Italy caught attention when the trend seems hovering on the worrisome level (Gunduz & Kaya, 2014). All the countries shared one similar feature as the ratio skyrocketing after the 2008 global recession.

After the unification of Europe, the introduction of Euro in 1999 replaced the former European Currency Unit (ECU). The single currency is the key feature of Eurozone while also part of the root that caused a debt crisis. Without a single supranational government to supervise the tax collection, spending behaviour and wealth allocation between wealthier and poorer countries, Grammatikos and Vermeulen (2011) demonstrate that single currency system is defenceless to the crisis. Moreover, the European governments are also stressed to lend a helping hand to the failing banks to prevent cross-border contagion risk.

Waibel (n.d.) mentioned that because of the strong connections between countries and highly depending on world economic condition, sovereign default frequently cluster in a period. Eurozone sovereign default initiated from a few significant global events namely Great Recession, subprime mortgage crisis, real estate bubbles and financial crisis. One key milestone event during financial crisis in 2007 is Lehman Brothers declared bankrupt when the bank had more than \$600 billion worth of asset. The effect swept through international financial hub and higher risk countries are vulnerable to the crisis.

Greece may be largest victim under the financial tsunami resulting from their weak economic structure, extremely high social welfare and large public expenses. On October 2009, Greece government announced a 12.7% in budget deficit and public debt level equivalent to 113% of its GDP, far exceed the 3% and 60% threshold level limit under European fiscal rules. The default episode was imminent after Standard and Poor, Fitch and Moody's relegated Greece's credit rating. With a junk rating bond, limited funds from capital market placed Greece in big trouble. In May 2011, Greece received bailout amounted to €110 billion from European Commission, ECB and IMF with the condition to be supervise under strict measures and government assets being privatised. A second bailout were given to Greece on March 2012 and the country is prohibited from requesting any official assistance (Lane, 2012; Grammatikos & Vermeulen, 2011). The default is going to cost its resident for a long time.

On November 2010, Ireland was the next to receive a bailout of €67.5 billion to aid the country after numerous Irish financial institutions collapse due to liquidation problem. The phenomenon in line with the findings from Arellano and Kocherlakota (2014) stating that there is no incentive for the debtors to pay when many defaulters that do not faced serious consequences. This best explains the situation in Ireland where mortgage loan holder refuse to make debt payment believing that the bank will not take any action against them and will write off their debt. The culture of non-payment and weak bankruptcy mechanism indirectly trigger

the debt crisis. However, after 3 years, Ireland declared as the first Eurozone country that successfully exit the rescue programme.

Following the second Eurozone country that receives an assistance, Portugal reaches an agreement on €78 billion bailout to refinance and manage its debts including bonds as investors are unconvinced by the country's low economy growth and high government spending on improving the transport links (Lane, 2012).

However, Kalbaska and Gatkowski (2012) argue that a bailout package will not be effective in mitigating the risk of default but transferring the burden to government and tax payers from its European peers. Likewise, Reinhart and Rogoff (2008) highlighted that the establishment of IMF indirectly increase the frequency of economic crisis. The probability of sovereign default surge by 1.5 to 2 percentage point resulting from the IMF program as IMF tend to be too generous in providing rescuing package despite having an austerity measures and underrate moral hazard issue.

1.1.5 What Has Gone Wrong in Latin America - Argentina?

Flip through the history of Argentina, the country had defaulted for 8 times since 1970 along with the largest crisis in its history in 2014. After carefully observe the previous default episode back in 1825, it is found that fiscal misconduct, ever rising public debt and public debt to GDP ratio as well as lower growth rate in bank deposit claimed to be the major caused for most of the crisis experienced by Argentina.

The main reason for triggering the 2001 crisis is arguable. Thomas and Cachanosky (2015) claimed that the problem originated from hyperinflation in 1980 forcing the government to raise capital by issuing foreign currency debt to finance the shortages. In contrast, addressed that

the pegging Argentina peso (ARS) with US Dollar (with the rate 1 ARS to 1 US Dollar) had overvalued the ARS. The reason being the low trading volume and uncorrelated business cycle between these two countries Mulraine (2005). The overvalued ARS making the exports from Argentina relatively unattractive and low revenue from exports causing a shortage in reserves should bear the blame.

External factors had contributed and accelerate the fiscal deficit in Argentina. It is questionable that IMF keep injecting funds into Argentina although it was clear that the country does not achieve the fiscal target set but IMF and stand still that country had a zero deficit during 2001 which is deemed impossible under the negative economy growth and declining GDP. Argentina's debt become unmanageable during the crisis had no choice but choose to default (Thomas & Cachanosky, 2015).

Furthermore, crisis in Asian, Russia and Brazil in late 1990s had a contagion effect on Argentina's recession. Initially, advancement in US technology and booming stock market provide incentives to foreign investor to invest their capital in the emerging markets including Argentina. However, investors reluctant to invest in emerging markets after Russian crisis and devaluation in Asian and Brazilian currency. The sudden stop in capital inflow, plummeted asset price, lower GDP growth had made Argentina more vulnerable to the unstable economic environment. These external shocks contribute and accelerate the country's large deficit but these may not be the main drivers.

The crisis in 2014 originated when Argentina reluctant to pay bondholder under *paripassu*¹ clause. The default in payment is viewed as violating the paripassu clause. However, Judge Thomas Griesa decided that Argentina should repay its debt owed to the holdout bondholders that refuse to accept

¹All creditors are treated equally and no creditors would have privileged treatment or payment over the others. Every creditor has same legal standing and will be repaid with the same amount and at the same time. (Thomas & Cachanosky, 2015)

the debt swap offer after crisis in 2001. Many argue the fairness of Judge Griesa's rulings and describe the crisis as *Griesafault*.

It is believed that 2014 crisis is just another version of crisis in 2001 and Argentina did not learn a lesson from 2001 crisis by not improving its structure deficit. Argentina tried to use imprecise official data on GDP and inflation to mask the real happening in its country including low reserves and high inflation. In addition, when Argentina switch from a net energy exporter to a net importer because of lacking in investment, the high import cost adds on the country's burden during the crisis in 2014.

1.1.6 Bank-Debt Crisis or Debt-Bank Crisis?

Banking crisis refers to closure of financial institution due to bank runs or government provides financial assistance to financial institution in a large scale. Many researches had debated on two-way nature interconnections between banking crisis and sovereign default while the result remained ambiguous.

Arellano and Kocherlakota (2008) proved that the cause of sovereign debt crisis is banking crisis itself. Due to a lower tax revenue, government adjust their public budget, typically expansionary fiscal policies combined with generous rescue packages after financial institution crisis to uplift the lacklustre economy. The increased amount of rescue plan indicating a higher government expenses and government may force to borrow to finance this capital injection (Ureche-Rangau & Burietz, 2013). This synonym with the increase in sovereign debt which will lead to a sovereign default. The statement also supported by Reinhart and Rogoff (2011) confirming that banking crisis precedes or can foresee a sovereign default. This depicts the idea of "twin bank debt crisis", which the sovereign debt crisis is triggered by a banking crisis.

On the other side, “twin debt bank crisis” is supported by Brutti (2010) showing that sovereign debt crisis precedes banking crisis. The holdings of public debt generally rose before a debt bank crisis indicating government financing itself through banking sectors. Banks are significantly vulnerable to the fluctuations in value of government paper during the sovereign debt crisis due to their high exposure. As a result, the dropped in value of government assets, write-downs and debt restructuring negatively impact the banking sectors balance sheet leading to a credit crunch thus causing a banking crisis.

Table 1.1: Sovereign Default Episodes and Banking Crises

Region	Country	Sovereign Default (years)	Banking Crisis	
			Started or ongoing in any of 3 year prior?	Started concurrently or subsequently?
Africa	Kenya	1994-1998	Yes (1993)	Yes (1995), No
	South Africa	1985-1987, 1989,1993	No, No, No	No, Yes (1989), No
	Zambia	1985-1994	No	Yes (1995)
Asia	Indonesia	1999-2000, 2002	Yes (1998), Yes (2001)	Yes, Yes
	Philippines	1985-1992	No	Yes (1985)
Europe	Greece	2012	Yes (2011)	Yes (2012)
	Poland	1985-1994	No	Yes (1991-1995)
	Romania	1986	No	Yes (1990s)
Latin America	Argentina	1985-1993, 2001-2005	No, No	No, Yes (2001)
	Bolivia	1986-1997	No	Yes (1986)
	Brazil	1985-1994	No	Yes (1985, 1994)
	Chile	1985-1990	No	No
	Costa Rica	1985-1990	No	Yes (1994)
	Dominican	1985-1994,	No,	Yes (1996), No

Republic	2015	Yes (2003)	
Ecuador	1985-1995, 1999-2000, 2008-2009	No, Yes (1998), No	No, Yes (2001), No
Guatemala	1986, 1989	No, No	No, Yes (1990)
Honduras	1985-2005	No	No
Mexico	1985-1990	No	No
Nicaragua	1985-2012	No	Yes (late 1980s)
Panama	1985-1996	No	No
Paraguay	1986-1992, 2003-2004	No, Yes (2002)	Yes (1995), No
Peru	1985-1997	Yes (1983)	Yes (1999)
Uruguay	1985-1987, 1990-1991, 2003	Yes (1984), No, Yes (2002)	No, No, No

Sources: Adapted from Gennaioli, Martin and Rossi (2014). *Sovereign default, domestic banks and financial institutions*; Author's Own Compilation.

Table 1 summarised the sovereign default episodes from 1985 to 2012 by following the definition of Reinhart and Rogoff (2008), bringing the sovereign default meaning as restructuring nation's total external debt with private creditors. The table constructed clearly pictured whether the country's banking crisis started or was on the run 3 years prior to the country's default, or the banking crisis started alongside or subsequently.

The causality relationship between sovereign debt crisis and banking crisis were mixed according to Table 1 as one country may have both "twin bank debt crisis" and "twin debt bank crisis" such as Dominican Republic, Ecuador and Paraguay. Thus, we developed a threshold model by using the interaction between public debt to GDP and banking crisis in Chapter 3 and 4 to examine whether banking crisis has the ability to trigger a sovereign default.

1.2 Problem Statement

Previous researcher tends to classify their sampling countries into developed and developing countries, emerging markets, oil exporting and importing countries based on certain criteria and focus in explaining the significance of each determinants on these countries separately. The impact on specific region may be certain as countries in same region or under an intergovernmental organisation such as OPEC (Organization of the Petroleum Countries) share the similar fundamental or economic factors. By treating all the countries in our sample homogeneously, the overall impact resulting from the determinants remained questionable. Narrowing down to specific region, we are interested in knowing whether the general effect is consistent or varies with the regional effect.

As big giant in this universe, most of the financial crisis originated from the US including subprime mortgage crisis that causes global financial crisis in 2008, the Great Depression during 1930s and the Panic series during 19th and 20th century. However, US had seem to be always immune from the defaulting episode. This is an issue whereby the spill over effect often pave way for countries with weak economic structure, large pile of debt and weak fiscal mechanism to default. This may imply that developed or advanced countries are invulnerable during a crisis. However, question arose when developed countries in European Union such as Greece and Ireland declared a default.

Japan and US are having their public debt in proportion of GDP exceeding 200% in 2012, which is much higher than Greece, reporting at 156% on the same period. With Greece experiencing the second sovereign default in 2012, Japan and US (with public debt to GDP ratio more than 100% in 2012) are still under control.

The relationship of sovereign default and banking crisis is arguable in the sense that their causality effect namely the “twin debt-bank crisis” and “twin bank-debt crisis” is ambiguous. We intend to bring the observations that sovereign debt crisis often associated with banking crisis, yet, the severity or frequency of sovereign debt crisis varies across regions. If so, does it shows that country with

higher frequency of banking crisis tend to have higher probability of sovereign default? This driven our attention in knowing the relationship between these two variables by studying the interactive effect between public debt to GDP and banking crisis to capture the threshold level.

1.3 Research Objectives

1.3.1 General Objectives

The rising numbers of sovereign default in recent decades inspired us to investigate on what is going on in the entire world wide. Hence, the general objective of this research is to determine major driving forces of sovereign default.

1.3.2 Specific Objectives

We are curious about the relationship and sequence between banking crises and sovereign default as well as the regional effect vary and go a step further to test the fitness of model. Therefore, there are three specific objectives we would like to explore about throughout our research:

1. To identify the relationship between banking crises and sovereign default.
2. To examine whether the determinants of sovereign default will be varied by regional effect.
3. To identify which region fits our best model the most.

1.4 Research Questions

Corresponding to our executed general and specific research objectives above, we aim to response to five addressed research questions. Our analysis, discussions and arguments in the following chapters will mostly depend on answering the below listed research questions:

1. What are the major contributing factors to sovereign defaults?
2. Does banking crisis have the interaction effect with public debt?
3. What is the threshold level of public debt which brings effect to the relationship of banking crisis and sovereign default?
4. Do all factors have different effects on different regions?
5. Does general model demonstrated in this research best describe every region?

1.5 Significance of Study

Sovereign default has been an attractive issue to academics and policy makers for a long period. Global sovereign risk has brought attention around the world to the recent events regarding sovereign defaults. This research is capable to explain the main drivers of sovereign defaults and unveiling the mask of sovereign default. We aim to establish an absolute research on the factors of sovereign default.

There are many conflicts between researchers towards the relationship between banking crisis and sovereign default in the past researches. Some of them argues that banking crisis come before sovereign default; some of them claimed that banking crisis come after. Despite of the sequences of banking crisis and sovereign default, we believe that banking crisis significantly affects sovereign default. Nevertheless, we expect that there are interaction effects between banking crisis and public debt. In depth research banking crisis and public debt is carried out. We also estimate the threshold level of public debt which will describe the relationship of banking crisis and sovereign default. We proposed a contemporary

guidance to reader in the studies of relationship between banking crisis and sovereign default.

Other than that, we intend to prove that region is one of the most essential elements in determining sovereign default. Many studies focus their studies by investigating on European countries as their sovereign debt is high. However, we expand our data collection to up to four regions instead of focusing merely on Europe. This research seeks to provide a clearer picture to different regions policy makers to make a wiser and precise decisions as there might be different contributing factors effects for different regions.

Lastly, we also recommended various types of prevention, solutions and remedies for policy makers to overcome and restructure their economy at the aftermath of sovereign default.

1.6 Chapter Layout

The remaining chapters of the research are organized as follow. Chapter 2 will present a comprehensive review on past researchers result. Chapter 3 demonstrates the econometric methodologies, models and techniques to delve into the mentioned research topics. Chapter 4 describes the results and findings using model and techniques in the previous chapter. Lastly, Chapter 5 concludes with the discussion of findings, recommendation and conclusion.

CHAPTER 2 LITERATURE REVIEW

2.0 Introduction

For this section, we are going to exhibit a historical insight on different concerns of sovereign default and highlight the overview of drivers of sovereign default.

2.1 The Past Methodology and Proxy of Sovereign Default

Throughout past research, there are various types of approaches both quantitative and qualitative methods have been adopted in discussing sovereign debt default. For example, Matsuoka (2015) and Caudra and Sapriza (2008); Hürtgen and Rühmkorf (2014) adopted dynamic stochastic general equilibrium (DSGE) model to identify Japan, Argentina and Greek future sovereign debt risk respectively. Additionally, Moreover, Bi, Shen, and Yang (2016) express the link between fiscal limit and sovereign debt crisis in developing countries while Adama (n.d.) adopted DSGE model in order to capture the stochastic political position shifting that associate with different preference of default. Next, Aguiar and Gopinath (2004); Yue (2006); Chakrabarti and Zeaiter (2014) used DSGE approach to capture random economic and political variables. Zeaiter and El-Khalil (2016) used Extreme Bound Analysis (EBA, hereafter) to investigate whether which determinants are robust and also integrate the past empirical result.

On the other hand, chronology of events or event analysis methodology is one of the famous ways to describe about motives and contagions of sovereign default. For example, Belteanu and Erce (2014) adopt event analysis methodology to forecast probability of sovereign default. For example, Reinhart and Rogoff (2010), Ullah and Ahmed (2014), Juan Carlos Hatchondo and Leonardo Martinez

(2010), Gennaioli, Martin and Rossi (2014) demonstrate relationship between sovereign default and different determinants.

Next, logit model has been widely used in sovereign debt crisis topic as well. Kalotychou and Staikouras (2005) adopted panel logit to identify probability of sovereign default within Latin America and South East Asia while Reinhart and Rogoff (2012) propose a relationship between banking crisis and sovereign default. Similarly, Rowland and Torres (2004) used panel data logit model to estimate sovereign default risk. Hilscher and Nosbusch (2010) predict probability of sovereign default in response to macroeconomic variables by using logit model. Among all the methods, logit or probit panel method are more suitable for model that includes a wide range of variables while chronology of event analysis is more about logical reasoning. In addition, DSGE specifically focus on few variables and set up an economic model to test about that variables which are not suitable for including too much variables at one shot.

For estimation of probability of sovereign default, most of the studies adopted historical default data, sovereign credit swaps (CDSs, hereafter) and bond yield spreads. Historical default is considered as an important indicator for probability of sovereign default especially for country that has huge local currency bond (Jeanneret & Souissi, 2016). For example, the well-known defaulted countries in Latin America and Greece have invested more than 50% and approximately 40 % of times to default (Reinhart & Rogoff, 2008). Similarly, Reinhart, Rogoff and Savastano (2003) suggested that a country defaulted before will have a higher chance to be defaulted in the future. However, CDSs is widely used because it is a key indicator of price of sovereign risk (Gunduz & Kaya, 2014). It shows the price that an investor willing to pay for sovereign default risk (Grammatikos & Vermeulen, 2011). Hence, if CDS price is high means market perceives the country is risky (Doshi, Jacobs & Zurita, 2014). Similarly, bond yield spreads are considered as one of the informative indicator due mainly to it shows the market demand and supply that conducted by market agents (Eichler & Maltriz, 2013). Overall, CDS price and bond yield spreads are more towards market participants' perspective and expectation. Yet, historical default is more accurate in the sense that a country which has default history is more easily to be defaulted again.

2.2 The Underlying Properties

2.2.1 What is the Price of Defaulting on Sovereign Debt: Punishment

On the other hand, it has been a consensus that sovereign debt can be perceived as risk-free investment as it is issued in the name of a nation (Hatchondo, Martinez & Sapriz, 2007). However, it is not practical at all as there are a basket of sovereign default event had been occurred. There is a controversial debate about whether or not default is more costly than paying off contractual obligations. Foreign lenders may impose trade sanctions such as trade embargos and seize a defaulted country's foreign asset (Catao & Sutton, 2002). Similarly, Tornz and Wright (2013) international trade will be decrease after a country default. Hence, a more open country will be more willing to repay as it is more vulnerable to external factors (Eichler&Maltriz, 2013).

Moreover, international lenders may hinder a default country from accessing to international capital markets to acquire funds or borrowings (Hatchondo, Martinez & Sapriz, 2007). Moreover, a nation will need to pay a price for the loss reputation and subsequently affect further acquiring capital funds in the future (Jeanneret & Souissi, 2016). However, Arellano and Kocherlakota (2014) believe that the defaulted one is the one who benefit the most due to an insufficient bankruptcy institution and hence the victims are unable claim on defaulted ones' assets. Likewise, a country decides to restructure debt when encounter financial distress due to imperfect international bankruptcy law (Ullah & Ahmed, 2014). Additionally, a defaulting government will not be punished by anyone or international court (Hatchondo & Martinez, 2010).

On the other hand, evolutions like technological evolution and political-environment-evolution have brought some changes to world. One of the significant changes is a more intensive globalization and has more

borderless transactions. Globalization brings some drawbacks to the world such as higher volatility and more crises in sovereign debt markets (Reinhart et al., 2012). Hence, capturing global and external factors must be taken into account as a country's economic nowadays is vulnerable to global factors like US banking and financial market system, China market demand.

2.2.2 Does Political Quality Matter?

Hence, it is easy to find out that politic factor like quality of government, corruption and democracy play a role in sovereign default event. Regarding to Harchondo and Martinez (2010), public officials is influential enough to affect sovereign debt issuance and the willingness to fulfil obligations. Furthermore, level of corruption is powerful in affecting government's default decision (Adama, n.d.). Additionally, corruption, democracy and government stability negatively affect sovereign default (Chakrabarti & Zeaiter, 2014; Cuadra & Sapriza, 2008; Zeaiter & El-Khalil, 2016). For example, Argentina's 2001 and 2004 sovereign default was mainly driven by political factor instead of economic or external factors (Thomas & Cachanosky, 2016). An additional, there is a significant relationship between European sovereign debt crises and the unsystematic political system (Lane, 2012). The other example is sovereign spread ²of Brazil increase after holding presidential elections during year 2002 (Hatchondo et al., 2007). Moreover, an insufficient political systems and policies will affect sovereign debt default risk as well. For instance, magnitude of fiscal and political decentralization policies increase sovereign default risk (Eichler & Hofmann, 2013) whereas an efficient political institutions will decrease sovereign debt default risk (Schaltegger & Weder, 2015). Next, there is an positive relationship between political factors and sovereign creditworthiness (which means it become riskier) (Rowland & Torres, 2004). For example, Argentina

² Proxy of sovereign default probability.

Congress has promulgated law which namely “Economic Emergency Law” which give the policymaker an absolute executive right and power to amend economic policy and do not need to get the consent from Congress (Thomas & Cachanosky, 2016).

2.2.3 Is Debt-to-GDP Indicative Enough?

Besides, there is a positive relationship between government borrowings and political corruption. It is believed that different policymakers have different spending and fiscal decision. For example, policymakers utilize future resources in advance such as issue more government bond now and the amount of external debt may be increased impulsively. There are numbers of existing literature perceive debt-to-GDP as one of the important determinants of sovereign debt crises. There is positive relationship between sovereign debt crises and external debt to GNP (Chakrabarti & Zeaiter, 2014; Eichler & Maltritz, 2013; Hürtgen & Rühmkorf, 2014; Zeaiter & El-Khalil, 2016; Lemmen & Goodhart, 1999).

Furthermore, both short term debt to GDP and Total External Debt show positive result as well (Savona & Vezzoli, 2015). Most of the results of existing research are consistent and uncontroversial. However, some found out that it may not that indicative in practical. For example, an advanced countries with a high debt-to-GDP like US, Japan have a higher credit ratings than developing countries that have lower debt-to-GDP (Bi et al., 2016). Debt to GDP effect is not alike across countries, some countries can be sustainable with higher debt to GDP but some cannot (Cottarelli, Forni, Gottschalk & Mauro, 2010). Statistically, many advanced countries have been suffering from huge public and private debt. Overall, the average debt to GDP of advance countries is more than 90% (Reinhardt & Rogoff, 2012) while emerging markets has 60% of debt to GDP (Reinhardt & Rogoff, 2009).

2.2.4 Which Came First, Banking Crises or Sovereign Debt Crises?

According to Visnjeki and Bosna (2015), European peripherals like Portugal, Ireland, Italy, Greece and Spain (PIIGS) suffered economic recession, GDP growth rate, unemployment rate and long term interest rate had been affected severely during year 2009 (also the begin of U.S subprime crisis). In year 2008 and 2009, Europe peripheral bank bore a heavy burden due to bank rescue package and recession and lead to sovereign crisis. Fierce expansion of central bank balance sheet in terms of monetary value and ranges of products and it may lead to a recent systematic banking crisis and subsequently trigger sovereign debt crisis (Alessandri & Haddane, 2009).

There is an ongoing debate about the sequences and relationship between banking crises and sovereign default. Banking crisis will be happening precedent to sovereign debt crises (Reinhart & Rogoff, 2009 ; Arellano & Kocherlakota, 2014; Ullah & Ahmed, 2014). It is due to the bailout program that offered by government and government believe that bank is too big to fail. On the top of that, referring to Reinhart and Rogoff (2011) banking crises can be used for predicting occurrence of sovereign default up to 3 years. Nevertheless, the probability of banking crisis precede sovereign debt default is smaller than probability of sovereign default precede banking crisis (Sosa-Padilla et al., 2015). It may be primarily due to banks are one of the largest holder of sovereign debt and the default on sovereign debt will make a massive loss on bank's financial statement.

However, according to Balteanu and Erce (2014), there are three types of banking crises which namely single crisis (banking crisis stands alone), twin bank-debt crisis (bank precede sovereign debt crisis) and twin debt-bank crisis (sovereign debt precede banking crisis). On the top of that, banking crisis and sovereign debt crisis is prone to happen concurrently too (Gennaioli, Martin,& Rossi, 2014; Reinhart & Rogoff, 2011). As

banking industry act as a backbone of a nation, hence, if there is any difficulties surround banking industry, it brings bad influence to whole nation economy too especially vulnerable to emerging countries that with a deficit.

2.2.5 The Effect of Exchange Rate

Another growing strand of literature deals with currency and exchange rate. It may be due to approximately 70% of sovereign debt are US Dollar based and others are mainly driven by Yen, Euro, Special Drawing Right(SDRs)³ and Deutschmark. Ordinarily, previous studies focus on how exchange rate affect sovereign debt crisis and in recent years some have proposed the currency denomination is impactful in driving sovereign default as well as exchange rate policies. First of all, exchange rate is robust and inversely affects sovereign debt default probability (Chakrabarti & Zeaiter, 2014; Zeaiter & El-Khalil, 2016). A depreciation of real exchange rate will lower down a government's willingness and also ability of paying off financial obligations and sovereign debt default probability rise especially countries with massive external borrowings (Bi et al. 2016; Eichler et al., 2013).

As European countries are adopting a common currency, hence, it harms some of the countries. In Europe Union, Euro is perceived as overvaluation for some of the countries like Greece, Portugal and Spain and they will be more easily driven to sovereign debt default (Cottarelli, Forni, Gottschalk & Mauro, 2010). On the top of that, such overvaluation phenomenon will be magnified if the country adopts fixed exchange rate regime. A fixed exchange rate regime will increase a sovereign debt yield and also sovereign debt default probability (Jahjah, Wei & Yue, 2012; Bonam & Lukkezen, 2013). Jahjah et.al (2012) show that bond spread will be increase if they switch exchange policy to fixed regime. However, it is

³SDRs is neither physical cash or currency, it is a mere accounting entry in banking account and only Central Banks and particular financial institutions are accessible to use SDRs and it is also known as International currency (ACFA Prague 2015).

important that market players to pay closed attention on currency denomination of sovereign debt. If a sovereign debt is denominated by local currency, it can be perceived as lower risk as government can unlimitedly print money compare to foreign currency denominated bond as foreign currency bond will always mainly affected by uncontrollable exchange rate and it is impossible to print a foreign currency (Jeanneret & Souissi, 2015; Harchondo et.al., 2007). On the top of that, investor should be aware of inflation if the bond is major denominated by local currency while be aware of exchange rate if it is foreign currency bond. Foreign currency driven bonds are vulnerable to movements of exchange rate as well as both external and internal factors (Schaltegger & Weder, 2015).

2.2.6 Regional Characteristics

Furthermore, existing literature studies have shed a little light on regional characteristics and effect in response to sovereign debt default. It may be important as different countries have different fundamental economic structure and culture. On the top of that, it is inherent that all countries is different so that investors have different preferences of premia pay towards different countries and hence different countries may have different borrowing cost. (Espinosa-Torres, Gomez-Gonzalez, Melo-Velandia & Moreno-Gutierrez, 2016).

Risk premium of countries will always be affected by regional related factors (Doshi, Jacobs & Zurita, 2014). Each country has its own safe debt thresholds level which heavily driven by a country's historical default record (Reinhart, Rogoff & Savastano, 2003). For example, Japan is a classic example of closed economy which its sovereign debt has been mainly supported by own citizens, institutions and financial institutions unlike Argentina or European countries (Matsuoka, 2015). Next, Latin America's sovereign default probability has been affected by government debt and trade openness the most whereas GNP, reserve balances and

government spending seem the most vital determinants of sovereign default in Asian countries (Kalotychou & Staikouras, 2005). Similarly, MENA region economic is subject to oil price volatility since it is oil product producer (Zeaiter & El-Khalil, 2016). Other study just merely state an overall result, Schaltegger and Weder (2015) proposed that Latin American has higher sovereign default probability than other countries.

2.3 Conclusion

Overall, numbers of literatures widely discuss about driving forces of sovereign debt default in several ways. Some included too many variables whereas some specifically focus on a particular variable to predict the probability of sovereign default. However, this study needs to find out which are the robust one and which are the sensitive one in a general point of view. On the other hand, there are several different findings and sayings regarding to consequence and effect between banking crisis and sovereign debt default. However, this study shows how banking crisis interacts with public debt and subsequently affect probability of sovereign debt crises of a country which this is the part that seldom discussed by the past researcher. After all, this study would narrow down our scope and pay attention in each of which country separately. As we would like to identify how regional characteristics affect influence of the underlying factors of sovereign debt default. And this was inspired by some past researches included a wide scope of nations or just focus on one particular country. However, as we know countries in the same region will tend to have the same nature and structure of economics, hence, we identify it region by region.

CHAPTER 3 DATA AND METHODOLOGY

3.0 Introduction

This chapter demonstrates and describes how we apply econometric methodology and techniques in this empirical research to transform a large data set into an analytical and influential result. Logit and probit models are employed to our data set to answer the laid down research questions pertaining problem statement and research objectives. First of all, we use logit and probit model to generate general effect of variables to sovereign default. Despite the general effect, we later run testing by adding an interaction term to determine the relationship of banking crisis and sovereign default. On the other hand, time dummy variable is added in the final model in order to test the fitness of our stated model. Afterwards, we focus in figuring out the regional effects towards our empirical model and test the fitness of our model to different regions. Lastly, data collection and hypothesis are followed after the explanation of econometric models and methodologies.

3.1 Econometric Models and Methodologies

3.1.1 Logit Model and Probit Model to Determine General Effect

The dependent variable ($Y_{i,t}$) sovereign default (SOVDFLT) in this research is dichotomous where could be interpreting as:

$$Y_{i,t} = \begin{cases} 1 & \text{if country } i \text{ default in year } t \\ 0 & \text{if country } i \text{ not default in year } t \end{cases} \quad (1)$$

Thus, we adopt logit Model and probit Model which are the estimation techniques which specifically designed to handle the specific requirements of qualitative dependent variables. Jeanneret and Souissi (2016) and Peter (2002) use logit model in determining and examining sovereign default. Savona and Vezzoli (2013) use logit model to forecast sovereign defaults using multiple risk signals. Hilscher and Nosbusch (2010) use logit model to estimate and forecast the probability of default with macroeconomic factors. Although a lot of researchers widely apply logit regression, in point of fact Schaltegger and Weder (2015) claimed that probit regression is the supreme method in estimating the probability of default. N'Sougan and Soumaré (2013) use probit model with three discrete values dependent variables to reveal the sovereign default risk. Zeaiter (2016) use panel probit to include all variables along. Arazmuradov (2016) use both logit and probit model to estimate probability of default.

We first analyse the determinants of sovereign default using logit model (Eq. 2) and probit model (Eq. 3) derived as below:

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{i,t} + \dots + \varepsilon)}} \quad (2)$$

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0 + \beta_1 X_{i,t} + \dots + \varepsilon} e^{-\frac{z^2}{2}} dz \quad (3)$$

where P is the probability of sovereign default ranging from 0 to 1, $Y_{i,t}$ is an indicator that equals to one if country i is default in year t ; equal to zero if country i does not default in year t . $X_{i,t}$ is the independent variables for the country i in the year t , β_0 is the intercept and β_1 is the regression coefficient, ε is the error term, z is critical value and $e = 2.71828$ is the exponential (the base of logit natural logarithms).

Table 4.1 to Table 4.8 in Chapter 4 show the results of binary logit and probit model. First of all, we include all twelve variables from all five

categories such as economic variables, historical variable, global variables, political variables and foreign exchange variables in equation (2) and equation (3) to generate a general effect of variables on sovereign default. The following steps, we choose one or two variables from each category to examine whether the particular variable plays a key role of the categories in explaining sovereign default. Indeed, inflation and GDP growth rate are the robust variables that frequently used in previous literature and studies to determine sovereign default; therefore we treat these two variables as control variables and remain them constantly in the every following model. With the same equation holding control variables, we construct two different combination of variables showed in Table 4.3, Table 4.4, Table 4.5 and Table 4.6. Lastly in Table 4.7 and Table 4.8, we finalized the crucial variables which act a role in each category in describing sovereign default based on the results from Table 4.1 to 4.6. Thus, our finalized logit (Eq. 4) and probit (Eq. 5) models were as below:

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{1 + e^{-(\beta_0 + \alpha + \varepsilon)}} \quad (4)$$

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0 + \alpha + \varepsilon} e^{-\frac{z^2}{2}} dz \quad (5)$$

where

$$\alpha = \beta_1 GGDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 BCRI_{i,t} + \beta_4 LCO_{i,t} + \beta_5 QGOV_{i,t} + \beta_6 CAB_{i,t} + \beta_7 PDEBT_{i,t} \quad (6)$$

Equation (6) indicates the variables in final model which: *GGDP* denoted gross domestic product growth rate; *INF* denoted as inflation; *BCRI* denoted as banking crisis; *LCO* denoted as logarithm crude oil price; *QGOV* denoted as quality of government; *CAB* denoted as current account balance; and *PDEBT* denoted as public debt to GDP.

After all, we substitute interactive term and time dummy variable into the finalized model in equation (4) and equation (5) into Table 4.7 and Table 4.8 to have a further investigation based on our specific objectives. The detailed adoption will be discussed in the next section.

3.1.2 Interaction between Banking Crisis and Sovereign Default: Finding the Threshold Level of Public Debt

Basically, public debt and banking crisis might have the interaction effect in affecting sovereign default. Interaction effect also called joint effect which indicates that the presence of an independent variable could affect another independent variable in resulting to their dependent variable. Let's substitute *BCRI* and *PDEBT* into the situation to have a clearer picture. The existence of public debt might vary the linkage between banking crisis and sovereign default. In the other words, the effect of banking crisis may not enough to induce the probability of sovereign default without the presence of public debt.

To classify out the interaction effect, we subsequently create an interactive term ($BCRI \times PDEBT$). We attach the interactive term into our models:

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{1 + e^{-(\beta_0 + \alpha + BCRI \times PDEBT + \varepsilon)}} \quad (7)$$

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0 + \alpha + BCRI \times PDEBT + \varepsilon} e^{-\frac{z^2}{2}} dz \quad (8)$$

The interactive term will be significant if the interaction effect exist, insignificant if the interaction effect does not exist. If there is interaction effect captured, it can be explained as the marginal effect of public debt will influence the relationship of banking crisis to sovereign default. The presence of public debt will strengthen the relationship of banking crisis and sovereign default as shown in equation (9).

$$\frac{\Delta Y}{\Delta BCRI} = \beta_{BCRI} + \beta_{PDEBT} \times PDEBT \quad (9)$$

where β_{BCRI} denoted as coefficient of BCRI; β_{PDEBT} denoted as coefficient of $PDEBT$.

As a result, we expected there the relationship between banking crisis and sovereign default is positive; however it must be in the condition of at a threshold level of public debt. The threshold of public debt (in % to GDP) computed represents when public debt overreaches the percentage, banking crisis will have the positive effect to sovereign default; negative if lower than threshold level. As we know that, the interaction effect of public debt to banking crisis is positive which represent that increasing in public debt will direct an effect to banking crisis to cause sovereign default. Thus, we let the relationship of public debt and banking crisis to be as > 0 :

$$\frac{\Delta Y}{\Delta BCRI} > 0 \quad (10)$$

Refer to equation (10), substitute $\frac{\Delta Y}{\Delta BCRI}$ with $\beta_{BCRI} + \beta_{PDEBT} \times PDEBT$ as below:

$$\beta_{BCRI} + \beta_{PDEBT} \times PDEBT > 0 \quad (11)$$

In order to compute the threshold of public debt that will affect the relationship of banking crisis and sovereign default, we then use the coefficient (β) in Table 4.7 and Table 4.8 to calculate the threshold level of public debt based on equation below:

$$PDEBT = -\frac{\beta_{BCRI}}{\beta_{PDEBT}} \quad (12)$$

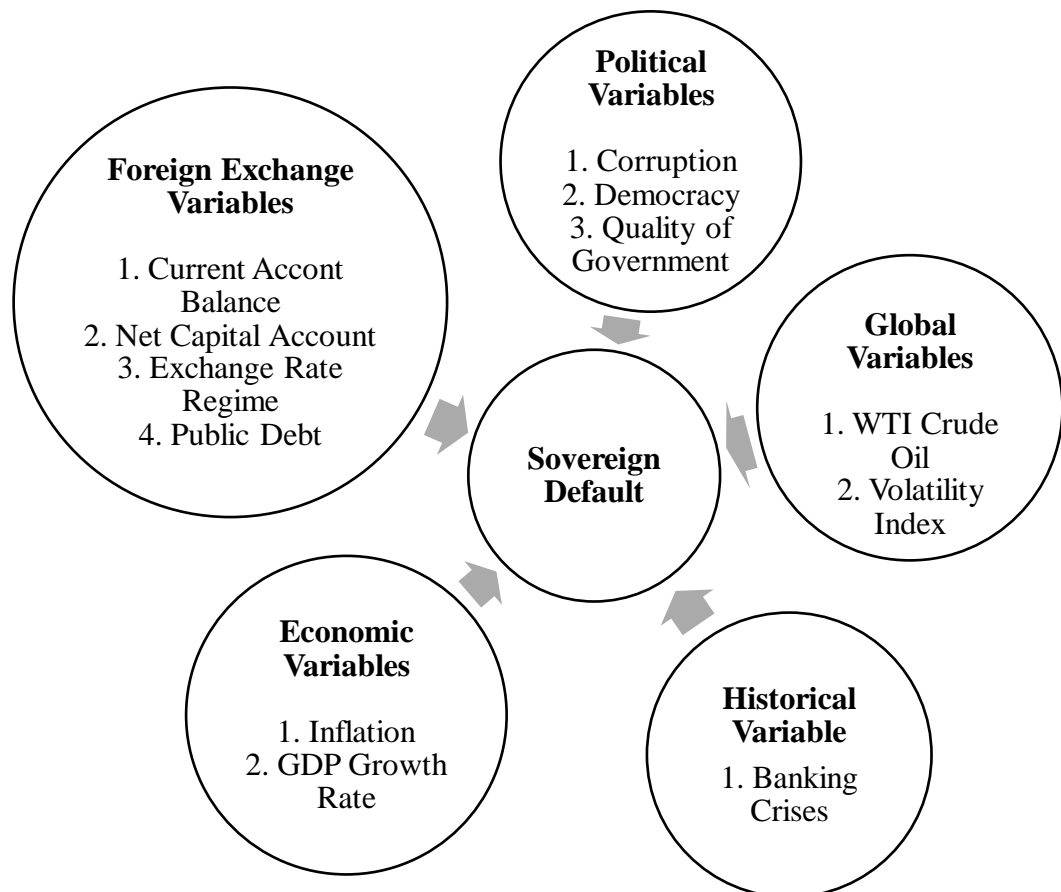
3.1.3 Different Effects in Regions to test the Fitness of Model

Past literatures and studies focus mostly on testing sovereign default for European Countries such as Ali (2012), Moisescu and Giurescu (2016), Stein (2011) and Roman and Bilan (2012). To capture effects of explanatory variables to sovereign default in other regions apart from Europe, we aim to test the fitness of model towards other regions. We divided all 43 countries into four regions including Europe, Asia, Latin America and Africa. We employ the finalized models (Eq.12 and Eq.13) which included interactive term and time dummy variable to test our models. The result will provide a clearer picture to future researchers whether each of the variables has the different effect to different region due to the distinction in all respects.

3.2 Variables

Twelve variables are selected from five categories in order to determine sovereign default:

Figure 3.1: Proxies from Each Category



3.2.1 Dependent Variable

Sovereign Default

According to Reinhart and Rogoff (2009), the dependent variable, sovereign default is defined as the events of default or restructuring of a nation's total external debt with private creditors. It is coded as a dummy variable. If the result obtaining 1, it indicates sovereign default occurs. Otherwise, the result showed 0, it indicates there is no sovereign default in the relative country. We treat sovereign default as dummy variable

because it can capture the effect of historical default of a country. The historical default in certain year is taken into account.

3.2.2 Independent Variable

(A) Economic Variables

Inflation

According to International Monetary Funds (IMF), Consumer Price Indexes (CPIs) are defined as index numbers that indicates measurement of changes in prices of goods and services purchased by households, whether households use directly or indirectly. CPIs act as a proxy of inflation rate. Therefore, the data of inflation rate is computed by the percentage change between current year CPIs and previous year CPIs. Most CPIs are used practically as weighted average of the percentage price changes of several consumer goods and services. It is an important index to show a country's inflation and purchasing power comparing with real levels of consumption in a country. It is an important indicator to sovereign default because inflation can be concluded as collapsing commodities price or interest rate increases, therefore the nominal government debt also will become higher. It is a macroeconomic variable which affected the monetary policy and fiscal policy that government implements in a country to stabilize the price of the market. According to Aguiar (2010), high inflation represents default on government nominal liabilities. Therefore, inflation is an important connection to debt crisis or banking crisis in the path of sovereign default.

Real GDP Growth Rate

Real GDP (Gross Domestic Production) is defined as GDP evaluated at consistent prices across countries over time. The source of data is from Penn World Table. Real GDP growth rate is the percentage difference between real GDP of current year and real GDP of previous year. It is a

macroeconomic variable as it affects implementation of policy of a country in the terms of production, investment, export and import.

(B) Historical Variables

Banking Crisis

Reinhart and Rogoff (2009) categorized two types of banking crisis. Firstly, bank runs that leading to takeover or merging the relative bank by public sector of one or more financial intermediaries. Secondly, if the bank no runs, other financial institutions have the similar outcomes by merging, takeover and large-scale government intervention against the relative bank, it can consider as banking crisis. It is coded as dummy variable which 1 indicates banking crisis and 0 indicates no banking crisis.

(C) Global Variables

WTI Crude Oil

The data of this variable is logarithm annual spot price (Dollar per barrel) of crude oil from 1986 to 2012. According to U.S. Energy Information Administration, WTI (West Texas Intermediate) is the point of reference for all crude oil that originates in the United States which the crude stream produced in Texas and Southern Oklahoma. We used the spot price from WTI Crude Oil because United States is dominant country in the worldwide. Most of the countries used WTI Crude Oil price as a benchmark for pricing other crude streams. It is traded in spot market of Cushing and Oklahoma. As the spot price of WTI Crude Oil fluctuates, it will affect those export-oriented countries and import-oriented countries.

Volatility Index (VIX)

VIX is a computed index that is computed based on means of real-time option Standard & Poors' (S&P) bid and ask price. According to Chicago Board Options Exchange (CBOE), it is an instantaneous estimate of expected volatility that measuring of how much the market think the S&P 500 Index fluctuate from now to the options' due date of each tick of VIX

index. VIX index is used to forecast the variability movement in future market.

(D) Political Variables

Corruption

According to Transparency International, corruption can be defined as any dishonesty and misconduct by public officials with authority for their individual benefits. We used corruption perception index as a proxy of corruption. This proxy ranging from 0 to 10 with 0 indicating highly corrupted and 10 indicating very clean. We used corruption perception index from 1995 to 2012 because Transparency International first launched the publication of corruption perception index in 1995. Therefore, we could not obtain the official index before the year of 1995. It is crucial explanatory variable to sovereign default because it may restrict the ability of government to meet their obligation like paying public debt. A corrupt country may willing to lend more funds or to purchase substantial public debt with higher interest rate in order to create opportunity for embezzling the interest of misappropriated public funds.

Democracy

According to Freedom House, democracy is consisted two elements which are civil liberties and political right in each nation. Civil liberties are related to the freedoms of voice out and religion, civil rights, law and regulations and autonomy without intervention from the policy maker. Furthermore, individuals have the voting right and freedoms to express their opinions to elect their representative or government in legitimate election to carry out their civil obligation and political rights. There are a scale ranges from 0-10 shows 0 is least democratic where 10 is most democratic. The votes in democratic countries can use their power to put pressure on their government during the time of crises in order to implementing an aggressive debt policy towards external private public debt. It may affect the decision of sovereign debt issuance and repayment. According to Hatchondoand Martinez (2010), politics can influence the

willingness of debt repayment in a country and government's spending preferences.

Quality of Government

International Country Risk Guide indicator of quality of government combines three data from political, economic and financial then convert the data into risk points. The average values of three variables which are corruption, law and order and bureaucracy quality are scaled from 0 to 1. The corruption mentioned over here is more focus in the political system. These include "favour-for-favours" phenomena such as funding from unknown party and doubtful relationship of business with government. Similar with previous explanation, corruption is a threat and poison that could reduce the government efficiency and distort the political process. The fairness of legal system had been taken into consideration too under law and order. It focuses on the impartiality of the rules and regulation and sanction imposed. In terms of bureaucracy quality, it takes into account the degree of policy revision when changing government. It focuses on whether there is a dramatic change in formulating policy and interruption in operating function when the power changed hand. Country with higher score indicates a better quality of government.

(E) Foreign Exchange Variables

Exchange Rate Regime

We use exchange rate regime as a key independent variable which constructed by Reinhart and Rogoff (2008). It is a scale range from 1 to 4 where "1" indicates fixed exchange rate regime, means government entirely determines the rate. "2" indicates crawling peg which means it allows exchange rate appreciation or depreciation gradually. "3" indicates managed floating exchange rate regime which means central bank attempt to buy or sell currency to control their exchange rate. "4" indicates freely floating exchange rate regime which means the currency determined by the demand and supply in foreign exchange rate market.

Net Capital Account

Capital Account is defined as capital transfer of non-current assets and purchase or sale of non-productive or non-financial assets. We get the data from World Bank, Asia Development Bank, Inter-American Development Bank from 1997 to 2012 and divide by real GDP to minimize the figure in order to get consistent and parallel data against other explanatory variable. It is an important variable to those export-oriented countries or import-oriented countries.

Current Account Balance

There are four components in current account balance including net exports or imports of goods (balance of trade), net exports or imports of services (balance of services), net income and net transfer. We get the data from World Bank from 1985 to 2012 and divide by real GDP to minimize the figure in order to get consistent and parallel data against other explanatory variable.

Public Debts

Public debts of a country include domestic debt and external debt. We use debt to GDP ratio obtained from IMF Fiscal Affairs Department from 1985 to 2012. Debt-to-GDP ratio indicates a country's ability for repayment their debt. According to Reinhart and Rogoff (2009), domestic debt crisis involved the action of freezing bank's deposit or forcible converting deposits from dollars to local currency. External debt crisis is the failure of government to meet their obligation to pay the principal plus interest on expired date or the government rescheduled debt.

3.2.3 Time Dummy Variable

As we obtain annual data from year 1985 to 2012 into this empirical research, our results might confront the time effect problem. Time effect captured the influence of aggregate trends from year to year. In addition, special events and unexpected variation in years will also influence the outcome variables. Therefore, time dummy variable is created in order to control the time effect on our regression. Coefficient in the model after including time dummy variable will be more sensible and reliable.

From equation (7) and equation (8), we add a time dummy variable D_t in both of the model:

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{1 + e^{-(\beta_0 + \alpha + BCRI \times PDEBT + D_t)}} \quad (12)$$

$$P(Y_{i,t} = 1 | X_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0 + \alpha + BCRI \times PDEBT + D_t} e^{-\frac{z^2}{2}} dz \quad (13)$$

The effect after adding time dummy variable will be discussed in detail in Chapter 4.

3.3 Data Collection

Our study focuses on secondary data and long term historical database. We used panel data that consisting 43 countries in four regions as samples during 1985-2012. Our analysis spans around three decades and we have concluded a wide range of variables. The dependent variable is sovereign default and independent variables including real gross domestic production growth, inflation, banking crisis, exchange rate regime, net capital account, current account balance, corruption, democracy, quality of government, public debt, WTI crude oil and volatility index.

Table 3.1: Summary of Dependent Variable and Independent Variables

Dependent Variable	Abbreviation	Source	Year	Unit Measurement
Sovereign Default	SOVDEFLT	Reinhart and Rogoff (2009)	1985-2012	1= Default; 0= No Default
Independent Variable	Abbreviation	Source	Year	Unit Measurement
Real Gross Domestic Production Growth	GGDP	Penn World Table (2012)	1985-2012	% real GDP change
Inflation	INF	International Monetary Funds (2012)	1985-2012	% CPI change
Banking Crisis	BCRI	Reinhart and Rogoff(2010)	1985-2012	1= Banking Crisis; 0= No Banking Crisis
Exchange Rate Regime	EXR	Ilzetzki, Reinhart and Rogoff (2008)	1985-2012	1 (fixed) – 4 (freely floating)
Net Capital Account	NCA	World Bank, Asia Development Bank, Inter-American Development Bank	1997-2012	In % to GDP
Current Account Balance	CAB	World Bank (2012)	1985-2012	In % to GDP
Corruption	CORR	Quality of Government (2012)	1995-2012	0 (highly corrupted) to 10 (very clean)
Democracy	DEM	Quality of Government (2012)	1985-2012	0 (least democratic) to 10 (most democratic)
Quality of government	QGOV	Quality of Government (2012)	1985-2012	0 (low quality)-1 (high quality)

Public Debt	PDEBT	International Monetary Fund Fiscal Affairs Department (2012)	1985-2012	In % to GDP
WTI Crude Oil	CO	US Energy Information Administration (2012)	1986-2012	Logarithm (Dollars per Barrel)
Volatility Index	VIX	Chicago Board Options Exchange (CBOE)	1990-2012	Logarithm

3.3.1 Sampling Period

We have used annual data form from 1985 to 2012 with total 28 years. The reason we used annual data instead of monthly or quarterly data is most of our variables have to capture whole year performance in order to get a precise and accurate data such as GDP, inflation, net capital account and current account balance. As our variables include dummy variable such as banking crisis, which indicates absence or presence of the event, we consider it as annually form no matter it happens on which month. As for dependent variable, sovereign default is a dummy variable; we ignore the country default during which period in a year. We only focus on whether the country default or no default.

3.3.2 Countries

We have concluded 43 countries in four regions. There are four countries in Africa including Kenya, South Africa, Tunisia and Zambia. Those countries are developing countries and they faced sovereign default during the period except Tunisia. In Europe, there are 13 countries including Denmark, Finland, France, Greece, Italy, Netherlands, Poland, Portugal,

Romania, Spain, Sweden, Turkey (Ottoman Empire) and United Kingdom. There are three countries in Europe occurred sovereign default which are Greece (2012), Poland (1985-1994) and Romania (1986). In Asia, we conclude 10 countries including China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Sri Lanka and Thailand. Only Indonesia (1999-2000, 2002) and Philippines (1985-1992) had sovereign default. In Latin America, there are 16 countries such as Argentina, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru and Uruguay. Most of the countries in Latin America have the historical of sovereign default except El Salvador. Our empirical test concludes not only observe in country's sovereign default but also concludes the result of region by region.

3.4 Hypotheses

According to results and researches of previous literatures, we hypothesize the variables have the effects on sovereign default as below:

3.4.1 Inflation with Sovereign Default

H_0 : There is no relationship between *INF* and *SOVDEFLT*.

H_1 : There is relationship between *INF* and *SOVDEFLT*.

We hypothesized inflation to be positively influence sovereign default. In consistent with Gartner, Griesbach, and Jung (2011), summarised inflation is having the significant positive influence on current credit spread. In addition, Sokolova (2015) concluded the default probability is affected by the upper limit on inflation. The central bank's policy impact on the inflation could affect the probability of default on government bonds. However, Georgievskaja, Georgievskaja, Stojanovic and Todorovic (2008)

stated macroeconomic variables such as inflation is insignificant in explaining the ability of country to repay its debt.

3.4.2 GDP Growth with Sovereign Default

H_0 : There is no relationship between *GGDP* and *SOVDEFLT*.

H_1 : There is relationship between *GGDP* and *SOVDEFLT*.

Researchers often include GDP growth rate in their researches with the issue sovereign default. Chakrabarti and Zeaiter (2014) considered GDP growth rate as I-variable which represented variables which are always included in researches. Chakrabarti and Zeaiter (2014) also conclude that GDP growth rate is a robust variable in order to determine the sovereign default. Therefore, GDP growth rate is hypothesized to have a positive relationship with sovereign default.

3.4.3 Banking Crisis with Sovereign Default

H_0 : There is no relationship between *BCRI* and *SOVDEFLT*.

H_1 There is relationship between *BCRI* and *SOVDEFLT*.

According to Schaltegger and Weder (2015), banking crises do not have impact to sovereign default due to their effects may be through other channels like economic growth which are already controlled. In contrast, Arellano and Kocherlakota (2014) describes the relationship between banking crisis and sovereign crisis by using the word “joint crisis” which indicates that the less one year of overlap between banking crisis and sovereign default. Regarding to Lane (2012), banking crisis is typically entwined with sovereign debt crisis. We expected that the presence of banking crisis will cause sovereign default.

3.4.4 Exchange Rate with Sovereign Default

H_0 : The more the government fixed its *EXR*, the lower possibility of *SOVDEFLT*.

H_1 : The more the government fixed its *EXR*, the higher possibility of *SOVDEFLT*.

Georgievska, Georgievska, Stojanovic and Todorovic (2008) analyse that exchange rate regime plays main role in nation's solvency. Countries with less flexible exchange rate regimes pay higher sovereign bond spread because less flexible exchange rate regime increase the borrowing costs of the countries (Jahjah, Wei & Yue, 2012). Thus, we hypothesized that more floating exchange rate will have an inverse effects on sovereign default.

3.4.5 Net Capital Account with Sovereign Default

H_0 There is no relationship between *NCA* and *SOVDEFLT*.

H_1 : There is relationship between *NCA* and *SOVDEFLT*.

Higher capital flows reduce default risk (Gennaioli, Martin and Rossi, 2010). According to Alfaro, Kalemli-Ozeanand Volosovych (2014), the net capital flows in sovereign will either positively or negatively influence the productivity growth depending in different circumstances. Thus, the net capital flows have the direct effect on sovereign default as productivity growth will directly influence the sovereign default probability of a nation. We hypothesized that the higher net capital account, the lower the sovereign default.

3.4.6 Current Account Balance with Sovereign Default

H_0 : There is no relationship between *CAB* and *SOVDEFLT*.

H_1 : There is relationship between *CAB* and *SOVDEFLT*.

Current account balance can reduce sovereign default risk in the condition when the government able to collect taxes to repay debt (Eichler& Hofmann, 2013). A strong deficit current account balance will lead sovereign default (Savona & Vezzoli, 2013). Balkan (1992) also expected that current account balance is positively reacting to sovereign default. We hypothesized current account balance has the positive relationship with sovereign default

3.4.7 Corruption with Sovereign Default

H_0 There is no relationship between *CORR* and *SOVDEFLT*.

H_1 : There is relationship between *CORR* and *SOVDEFLT*.

Many studies include political factors as essential determinants of sovereign default. Corruption is widely used among many political indices (Chakrabarti & Zeaiter, 2014). Corruption could transform loans and debts from productive to unproductive uses and caused return from investment less than cost of borrowing then default (Connolly, 2007). Sovereign risk has the positive relationship with the political risk as noted in Jeanneret and Souissi (2016). A government with high corruption index will have higher chances of default.

3.4.8 Democracy with Sovereign Default

H_0 There is no relationship between *DEM* and *SOVDEFLT*.

H_1 : There is relationship between *DEM* and *SOVDEFLT*

Hatchondo and Martinez (2010) found that higher index of democracy able avoid devastating effects on sovereign debt. According to Zeaier and El-Khalil (2016) as well as Balkan (1992), high democracy will reduce the possibility of sovereign default. We assume the more democratic countries will face lesser probability of sovereign default.

3.4.9 Quality of Government with Sovereign Default

H_0 : There is no relationship between *QGOV* and *SOVDEFLT*.

H_1 There is relationship between *QGOV* and *SOVDEFLT*.

Cosset and Jeanneret (2015) proved that quality of government has a huge impact on sovereign default and showed that better governed countries would have lesser sovereign default risk. Hatchondo and Martinez (2010) discussed many political factors may have their impacts on sovereign default included political stability, quality of government and democratic regime. In our point of view, quality of government is hypothesized to be negatively related to sovereign default.

3.4.10 Public Debt with Sovereign Default

H_0 There is no relationship between *PDEBT* and *SOVDEFLT*.

H_1 : There is relationship between *PDEBT* and *SOVDEFLT*.

According to Celasun and Harms (2010), under certain circumstances, high public debt will reduce sovereign default risk. In contrast, Reinhart and Rogoff (2010) summarized that over one half of all sovereign defaults on debts would have met the Maastricht criteria of 60%. Based on Arazmuradov (2016), sovereign debt has directly influence defaults. In this research, we hypothesized that public debt is positively affect sovereign default.

3.4.11 WTI Crude Oil with Sovereign Default

H_0 : There is no relationship between *LCO* and *SOVDEFLT*.

H_1 : There is relationship between *LCO* and *SOVDEFLT*.

There are a lot of arguments regarding to the crude oil price and sovereign default. When commodity price are high, commodity exporters are more likely to repay their external debt (Hilscher & Nosbusch, 2010). On the other hand, Sharma and Thuraisamy (2013) said that it is more likely that the importing countries will have the negative relationship between price movement and economy. However, Sharma and Thuraisamy (2013) concluded at last that cost of energy is too weak to explain the sovereign risk. Among these hypotheses made by past researchers, we hypothesized that WTI Crude Oil is significant to the sovereign default.

3.4.12 Volatility Index with Sovereign Default

H_0 : There is no relationship between *LVIX* and *SOVDEFLT*.

H_1 There is relationship between *LVIX* and *SOVDEFLT*.

Genberg and Sulstarov (2008) argued that higher volatility increases the demand for international borrowing therefore induces the higher default risk. Hilscher and Nosbusch (2010) said that volatility of term of trade could increase sovereign default. Jeanneret and Souissi (2016) hypothesized volatility in global financial market could induce a larger sovereign default probability. Savona and Vezzoli (2013) mentioned that more volatile and persistent output fluctuations will caused default.

3.4.13 Interaction Effect

H_0 : There is no interaction effect between *PDEBT* and *BCRI*.

H_1 There is interaction effect between *PDEBT* and *BCRI*.

Banking sectors in Argentine and Russian were extremely revealed to government debt (Sosa-Padilla, 2015). The degree of exposure of domestic commercial banks computed in Sosa-Padilla (2015) subject to nearly 40% for actually defaulted countries. There are a lot of banking sectors holding a slightly high average to sovereign debt especially the huge increase of government debt in consequences to financial crisis (Reinhart & Rogoff, 2008). The high government debt will lead to banking crisis afterwards, sovereign default happened. Hence, we believe the public debt would have the power to impact on the relationship between banking crisis and sovereign default.

3.4.14 Interaction between Banking Crisis and Sovereign Default: Finding the threshold level of Public Debt

H_0 : When $PDEBT > 60\%$, $BCRI$ has no stronger relationship with $SOVDEFLT$

H_1 : When $PDEBT > 60\%$, $BCRI$ has stronger relationship with $SOVDEFLT$

Lane (2012) stated European Fiscal Rules has specified debt-to-GDP to maintain at 60%. Greece which defaulted recently had the debt-to-GDP above 90% since 1990s. Reinhart and Rogoff (2010) also mentioned that when debt-to-GDP reaches 60%, the annual growth reduced by 2% however if debt-to-GDP above 90%, the GDP growth rate will be decline half. The above statistics from previous studies motivated us to hypothesize the threshold level to above 60%.

3.4.15 Different Effects in Different Regions

H_0 : All factors have no different effects on different regions.

H_1 : All factors have different effects on different regions.

We hypothesized that our factors have different effects on different regions in term of determining sovereign default. There is possibility that different factors are capable to explain specific countries better than another. For example, WTI crude oil would act a different role in oil importing and exporting countries (Breunig & Chia, 2015) On the other hand, Nyambuu and Bernard (2015) said that higher public debt will cause a lower annual growth rate especially in emerging countries. Therefore, we expected that different factors will carry different effects for different countries.

3.4.16 General Model

H_0 : General model does not describe every region.

H_1 : General model well describes every region.

We hypothesized that our model capable to describe every region in the sense of we include 43 countries from different regions. Additionally, we include control variables which always included in studies; variables from different categories that sufficient to explain different sectors; and also important variables from the past literature review.

3.5 Conclusion

In a nut shell, our testing is mainly aim to resolve the addressed research questions in Chapter 1. The massive data set of 12 variables \times 28 years \times 43 countries obtained has the capacity to describe our results more comprehensive. The application of logit and probit model is satisfied as these two models are specifically designed for our binary dependent variable. At the same time, addition of interactive term and time dummy variable strengthen the fitness of model. Lastly, the results of these testing discussed in the following Chapter 4 are sufficient and effective to provide recommendations to policy makers.

CHAPTER 4 EMPIRICAL RESULT

4.0 Overview

In this chapter, the mask of sovereign default will be unveiled. Empirical result of the probability of sovereign default caused by expected independent variables investigated using logit and probit model is shown. Comparison of the result is made between both of the logit and probit model, but it showed that the results among them are very similar.

Following tables report the results of the logit and probit regressions for various alternative specifications. Columns 1 of the tables report the analysis with economic variables, such as GDP growth and inflation rate. Then, we progressively introduce additional variables into the regression models. Column 2 adds the historical variables which is banking crisis historical data in the analysis, Column 3 includes global variables (e.g., WTI Crude Oil and Volatility Index), Column 4 incorporates political variables (i.e., corruption perception index, democracy and quality of government), while column 5 accounts with foreign exchange variables (e.g., current account balance, net capital account, exchange rate regime and public debt).

When all factors are considered in the analysis, several variables seem to help explain the probability of sovereign default (Jeanneret, Paget-Blanc, and Souissi, 2014). According to our expectation, sovereign default is more likely to occurs if one country exhibits

- i) higher inflation rate,
- ii) banking crisis,
- iii) low WTI crude oil price per barrel,
- iv) instability of politics, and
- v) deeply in debt.

The relationship between banking crisis and sovereign default will be further discussed in Section 4.2. In previous studies, Borenzstein and Panizza (2008) had found that sovereign default would trigger the occurrence of banking crisis; but Reinhart and Rogoff (2011) found the opposite result, saying that banking crisis is a significant predictor of sovereign default. While in section 4.3, we will explore the fitness of model in different country region.

4.1 Probability of Sovereign Default

4.1.1 Exploring Sovereign Default using Logit and Probit Model

First of all, we tested all of the expected influencers of sovereign default in both logit and probit regression models. The results are shown in Table 4.1 and Table 4.2, and they are found to be similar.

Referring to Table 4.1 and Table 4.2, we found out that there are only few of the variables are significant, which are the corruption perception index and public debt. Most of the variables are still insignificant even though the level of significance has widening to 10%. These might be due to overlapping of partial characteristics of one variable with another in a same category, and the correlation between variables in different categories. Therefore, changes are needed to be made in the following tables in order to produce a better model that can explain the probability of sovereign default. However, there are still some highlights in this these tables.

It is clearly shown that there is a tremendous change in the inflation rate p-value after the political variables being introduced into the regression models. The p-value increase sharply from a 0.0000 value to 0.9466 value in logit model and 0.9683 value in probit model, changing from a significant variable at 1% of significance level into a total insignificant variable. Lead to suspicion that one of the political factors has affected the

result of the regression models. Interrelationship between the political factors and inflation rate might be one of the reasons as well. According to Aisen and Veiga (2005), by measured using several political and institutional variables, they have concluded that a higher degree of political instability will generates greater inflation rates and seigniorage. This is because political instability and polarization can determine the equilibrium efficiency of tax system and the resulting combination of tax revenues and seigniorage governments use (Aisen&Veiga, 2005). Thus, the causality relationship between the political factor and inflation rate might havelead to an insignificant result in inflation rate.

Banking crisis has become significant when the foreign exchange variables were taken into both of the regression models although this only happen at 10% of significance level. In the logit model, banking crisis has a 0.0781 p-value; while in probit model, it has a 0.0736 p-value. Therefore, fulfilling the hypothesis testing that it become significant when the level of significance is at 10%. Banking crisis becomes significant is probably due to the introduction of foreign exchange variables as if a country banking sector is highly exposed to foreign currency liability, it will weaken the ability of the government to act as a “safety net” for the banking sector, causing probability of the banking problem leads to sovereign crisis raise (Correa & Sapriza, 2014).

After the involvement of political variables into the regressions models, a sudden changed has occurs on WTI crude oil too. It has become insignificant from a p-value of 0.0000 to 0.8639 in logit model and 0.5450 in probit model. A sharp change in the p-value of WTI crude oil has made it total insignificant from the significance level of 1%. This might be due to the causality relationship between oil price and political factors. By reviewing the fluctuation path of the international oil price since the last century, it is clearly to be seen that the trend of international oil price always links closely to the political situation in the oil producing areas (Yan, 2012).

Table 4.1: Sovereign Default in a Broader Aspect

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0149 (0.5604)	-0.0153 (0.5497)	-0.0065 (0.8409)	-0.0758 (0.1514)	-0.0880 (0.1173)
Inflation	0.0360*** (0.0011)	0.0361*** (0.0011)	0.0321*** (0.0000)	-0.0010 (0.9466)	0.0088 (0.7194)
Banking Crisis		-0.0161 (0.9454)	-0.0621 (0.8276)	0.8398* (0.0949)	0.9547* (0.0781)
WTI Crude Oil			-0.7812*** (0.0001)	-0.0791 (0.8639)	0.1038 (0.8514)
Volatility Index (VIX)			-0.4852* (0.0924)	-0.4394 (0.3527)	-0.7787 (0.2121)
Corruption Perception Index				-0.1769*** (0.0000)	-0.2289*** (0.0035)
Democracy				0.0725 (0.5127)	0.1166 (0.6429)
Quality of Government				-0.6914 (0.7699)	-0.7911 (0.8471)
Current Account Balance					-0.0259 (0.8421)
Net Capital Account					0.4145*** (0.0003)
Exchange Rate Regime					0.0175 (0.9414)
Public Debt					0.0197*** (0.0002)
Constant	-2.0713 (0.0000)	-2.0669 (0.0000)	1.9621 (0.0930)	4.6764 (0.0632)	4.3044 (0.2517)
Observation	1190	1190	989	717	650
McFadden R-squared	0.1299	0.1299	0.1554	0.3142	0.4762

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Logit Model

Table 4.2: Sovereign Default in a Broader Aspect

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0142 (0.2802)	-0.0128 (0.3337)	-0.0028 (0.8714)	-0.0441* (0.0901)	-0.0540* (0.0618)
Inflation	0.0125** (0.0282)	0.0125** (0.0278)	0.0191*** (0.0000)	-0.0003 (0.9683)	0.0026 (0.8056)
Banking Crisis		0.0480 (0.6841)	-0.0014 (0.9926)	0.4191 (0.1004)	0.5105* (0.0736)
WTI Crude Oil			-0.3844*** (0.0002)	-0.1300 (0.5450)	-0.0680 (0.7770)
Volatility Index (VIX)			-0.2490 (0.1032)	-0.2571 (0.2843)	-0.3617 (0.2552)
Corruption Perception Index				-0.0824*** (0.0006)	-0.0972*** (0.0046)
Democracy				0.0458 (0.3906)	0.0473 (0.6363)
Quality of Government				-0.9622 (0.4187)	-0.9630 (0.5837)
Current Account Balance					0.0077 (0.8995)
Net Capital Account					0.2289*** (0.0001)
Exchange Rate Regime					-0.0051 (0.9644)
Public Debt					0.0109*** (0.0000)
Constant	-1.1136 (0.0000)	-1.1279 (0.0000)	0.7720 (0.2009)	2.7370 (0.0317)	2.2982 (0.1962)
Observation	1190	1190	989	717	650
McFadden R-squared	0.1102	0.1104	0.1593	0.3130	0.4661

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Probit Model

The net capital account has a significant level at 1% but its relationship with sovereign default is adverse to what we expected. According to the Table 4.1 and Table 4.2, net capital account has a positive relationship with sovereign default, which means a higher net capital account will lead to a higher probability of sovereign default. This can be explained by when there is a sudden large amount of capital inflow, it is most likely that the country is borrowing from others in order to overcome the crisis they are facing. According to Park (2014), default incentives display a “U” shape in the stock of capital: showing that an economy with too small or too large amounts of capital is more likely to default. However, this “U-shape” relationship between net capital account and sovereign default couldn’t be tested using logit and probit models.

In short, this is just the first attempt of investigating the expected predictors of sovereign default. From the result of Table 4.1 and Table 4.2, it is surely that amendment on the variables needed to be carried out, so that a robust model of sovereign default can be produced.

4.1.2 Who Plays the Important Roles?

In Table 4.3 and Table 4.4, we have eliminated WTI crude oil, two of the political variables (e.g., democracy and quality of government), and two of the foreign exchange variables (i.e., exchange rate regime and public debt) to find out what are the changes when compared to Table 4.1 and Table 4.2. Other than that, we also aim to select one to two representative variables that can act a role in its category.

Table 4.3: Deeper Insight on the Driving Forces

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0149 (0.5604)	-0.0153 (0.5497)	-0.0099 (0.7601)	-0.0782 (0.1273)	-0.0931 (0.1890)
Inflation	0.0361*** (0.0011)	0.0361*** (0.0011)	0.0371*** (0.0000)	-0.0013 (0.9325)	0.0128 (0.4803)
Banking Crisis		-0.0161 (0.9454)	0.1339 (0.6366)	0.8782** (0.0332)	1.2514*** (0.0097)
Volatility Index (VIX)			-0.7565*** (0.0044)	-0.4157 (0.3465)	-1.0522* (0.0641)
Corruption Perception Index				-0.1790*** (0.0000)	-0.2154*** (0.0000)
Current Account Balance					-0.1912* (0.0588)
Net Capital Account					0.3616*** (0.0013)
Constant	-2.0713 (0.0000)	-2.0669 (0.0000)	0.1491 (0.8745)	4.5767 (0.0109)	6.9529 (0.0028)
Observation	1190	1190	989	719	652
McFadden R-squared	0.1299	0.1299	0.1369	0.3131	0.4138

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Logit Model

Table 4.4: Deeper Insight on the Driving Forces

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0142 (0.2802)	-0.0128 (0.3337)	-0.0039 (0.8135)	-0.0460* (0.0657)	-0.0567* (0.0639)
Inflation	0.0125** (0.0282)	0.0125** (0.0278)	0.02145*** (0.0000)	0.0005 (0.9487)	0.0068 (0.4409)
Banking Crisis		0.0480 (0.6841)	0.0953 (0.5137)	0.4537** (0.0397)	0.6954*** (0.0065)
Volatility Index (VIX)			-0.3991*** (0.0040)	-0.2534 (0.2573)	-0.5403* (0.0614)
Corruption Perception Index				-0.0862*** (0.0000)	-0.0954*** (0.0010)
Current Account Balance					-0.0734 (0.1470)
Net Capital Account					0.2020*** (0.0003)
Constant	-1.1136 (0.0000)	-1.1279 (0.0000)	-0.0747 (0.8810)	2.2353 (0.0286)	3.1059 (0.0185)
Observation	1190	1190	989	719	652
McFadden R-squared	0.1102	0.1104	0.1420	0.3089	0.3998

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Probit Model

The result of corruption perception index, inflation rate and net capital account in Table 4.3 and Table 4.4 is still the same. Corruption index is the only variable that is significant at the level of significance of 1% throughout the regression models. Inflation rate turned into total insignificant from 1% of significance level after the introduction of political factor. While net capital account is still holding a sign that is inverse to the expected sign.

However, the banking crisis has become more significant in Table 4.3 and Table 4.4. It has become significant at the level of significance of 5% and 1%; compare to in Table 4.1 and Table 4.2, it only has a p-value that significant at the level of significance of 10%. After the introduction of political variable into the regression model, banking crisis has a 0.0332 p-value in logit model and a p-value of 0.0397 in probit model, which made it becomes significant at 5% of significance level. But the introduction of foreign exchange variables has lowered the p-value in both of the regression models, making it significant at the level of significance of 1%. This has proved that political and foreign exchange variables have played an important role in making the banking crisis variable significant. Banking system would be instable if political crisis occurs, and it is principally due to the anxiety and no confidence of investors (Brini & Jemmali, 2016). While capital has always plays an important role in bank performance no matter it is during financial crises or normal times. This is because holding higher capital can help banks to increase their probability of survival, market share, and profitability (Berger & Bouwman, 2011).

From Table 4.3 and Table 4.4, we can see that the VIX's result is very unstable. It was significant at the highest statistical significance level of 1% at first, then surprisingly become total insignificant after the introduction of political variable, after the introduction of foreign exchange variables, it once again become significant but at the least significance level of 10%. Due to such inconsistency of VIX's result, we couldn't have an exact understanding on its effect on sovereign default. However, at the same

time, the other variable of the global variables category, which is the WTI crude oil is said to be more suitable to be the proxy of this category. Such statement would be proven in the continuing Table 4.5 and Table 4.6.

Therefore, in constructing the Table 4.5 and Table 4.6, amendments have been made based on Table 4.3 and Table 4.4's results. Firstly, the political corruption perception index is being eliminated and replaced by democracy in Table 4.5 and Table 4.6 to test the difference between them in order to find out the most suitable representative variable. Political is always an important issue that lead to a country sovereign default. Thus, we couldn't just make a conclusion based on the first and second attempt of our test model. Every selective political variable must be tried to find out the most suitable representative variable.

By referring to the result in Table 4.3 and Table 4.4, we have decided to replace VIX with WTI crude oil as the representative for global variables. As oil is traded at short-term on spot markets at a global level, it is highly exposed to volatility as well (Hooper, 2016). The fluctuation of oil prices is always linked to the macroeconomic and fiscal situation of a country, which plays a big role in affecting a country into sovereign default (Hatchondo, Martinez & Saprizza, 2007). In Table 4.1 and Table 4.2, WTI crude oil also has a better performance than VIX before the political variables were taken into the regression models. It is significant at the level of significance of 1% with a p-value of 0.0001 and 0.0002 in both logit and probit regression models.

Table 4.5: A More Profound Analysis on Sovereign Default

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0149 (0.5604)	-0.0153 (0.5497)	-0.0022 (0.9388)	-0.0137 (0.6339)	-0.0102 (0.7488)
Inflation	0.0361*** (0.0011)	0.0361*** (0.0011)	0.0371*** (0.0000)	0.0358*** (0.0000)	0.0341*** (0.0000)
Banking Crisis		-0.0161 (0.9454)	-0.1834 (0.4569)	-0.2049 (0.4131)	-0.2895 (0.2545)
WTI Crude Oil			-1.1140*** (0.0000)	-1.0433*** (0.0000)	-1.2732*** (0.0000)
Democracy				-0.1072*** (0.0003)	-0.1319*** (0.0000)
Current Account Balance					-0.2711*** (0.0000)
Exchange Rate Regime					0.0552 (0.5629)
Constant	-2.0713 (0.0000)	-2.0669 (0.0000)	1.5211 (0.0215)	2.1446 (0.0018)	2.7088 (0.0003)
Observation	1190	1190	1151	1151	1142
McFadden R-squared	0.1299	0.1299	0.1967	0.2052	0.2365

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Logit Model

Table 4.6: A More Profound Analysis on Sovereign Default

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables
	(1)	(2)	(3)	(4)	(5)
GDP Growth	-0.0142 (0.2802)	-0.0128 (0.3337)	-0.0010 (0.9484)	-0.0068 (0.6607)	-0.0056 (0.7399)
Inflation	0.0125** (0.0282)	0.0125** (0.0278)	0.0218*** (0.0000)	0.0211*** (0.0000)	0.0199*** (0.0000)
Banking Crisis		0.0480 (0.6841)	-0.0789 (0.5473)	-0.0883 (0.5065)	-0.1308 (0.3366)
WTI Crude Oil			-0.5628*** (0.0000)	-0.5250*** (0.0000)	-0.6443*** (0.0000)
Democracy				-0.0638*** (0.0002)	-0.0792*** (0.0000)
Current Account Balance					-0.1425*** (0.0000)
Exchange Rate Regime					0.0179 (0.7215)
Constant	-1.1136 (0.0000)	-1.1279 (0.0000)	0.5854 (0.0827)	0.9670 (0.0067)	1.3230 (0.0008)
Observation	1190	1190	1151	1151	1142
McFadden R-squared	0.1102	0.1104	0.1989	0.2079	0.2384

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Probit Model

In addition, net capital account is also being eliminated in Table 4.5 and Table 4.6. This is because the relationship of net capital account and sovereign default is out of expectation, which is a positive relationship. In logit and probit model, we couldn't investigate does net capital account really has a "U-shape" relationship with sovereign default as Park (2014) concluded. Elimination of net capital account is being replaced by exchange rate regime. According to Jahjah and Yue (2004), the flexibility of exchange rate regime would affect the sovereign default risk. A flexible exchange rate regime can leave the economy more dependent on investors' expectations, which can in turn increase spreads; while a fixed regime can increase default risk because the cost of exchange rate adjustment is higher relative to default cost.

Overall, the result of every variable in Table 4.5 and Table 4.6 remain consistent throughout the whole model without getting any influence due to the introduction of additional variables. GDP growth is still an insignificant variable in testing the probability of sovereign default over 43 countries. Banking crisis also have a same result as the GDP growth, remain insignificant throughout the whole regression models. Surprisingly, the exchange rate regime has also showed an insignificant result in both of the regression models. This has clearly showed that foreign exchange regime does not have any effect on a country's sovereign default. Other than that, all of the variables in Table 4.5 and Table 4.6 are significant at the level of significance of 1%.

4.1.3 A Robust Model of Sovereign Default

Based on the result throughout Table 4.1 to Table 4.6, a final regression model that is suitable to be used to test the probability of sovereign default has been produced. In Table 4.7 and Table 4.8, two additional columns have been added into the models: column 6 has taken interactive term of public debt and banking crisis into the model; while column 7 involved time dummy variable into the analysis. After the modifying of variables in each of the categories based on results found in Table 4.5 and Table 4.6, almost every variable in Table 4.7 and Table 4.8 are at most statistically significance, at the level of significance of 1%, indicates that they are the important predictors of sovereign default.

Even though the democracy did show a well result in Table 4.5 and Table 4.6, it is still being eliminated in Table 4.7 and Table 4.8 and being replaced by quality of government. Both of these variables did show a similar result in regression model but quality of government can represent the political variable better than democracy. Democracy affected the sovereign default by its political right in each country, freedom of citizens to vote in elections or join any political parties and organization. But this risk would only be present if the sovereign debt is at least partially held by local creditor with political power to deny support to political groups that advocate for a default (Hatchondo & Martinez, 2010). The main reasons that unbalanced the political order of a country are mainly due to the effects of rapid socio-political mobilization, and excessive and not institutionalized role of civil and military bureaucracy (Memon, Memon & Memon 2011). Hence, it is clearly to be seen that quality of government carries the more critical point of political variable. This is because quality of government consists of three different areas namely corruption, law and order as well as bureaucracy quality. As for the corruption perception index, it only pays attention to the corruption in public sector, which has already been included in the quality of government.

Table 4.7: The Ultimate Sovereign Default Model

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables	With Interactive Term	With Time Dummy Variable
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth	-0.0149 (0.5604)	-0.0153 (0.5497)	-0.0022 (0.9388)	-0.0075 (0.7993)	0.0169 (0.5836)	0.0261 (0.4056)	0.0093 (0.7624)
Inflation	0.03601*** (0.0011)	0.0361*** (0.0011)	0.0371*** (0.0000)	0.0270*** (0.0000)	0.0309*** (0.0000)	0.0357*** (0.0000)	0.0308*** (0.0000)
Banking Crisis		-0.0161 (0.9454)	-0.1834 (0.4569)	0.0324 (0.9017)	-0.1566 (0.5639)	-1.9817*** (0.0010)	-1.7124*** (0.0039)
WTI Crude Oil			-1.114*** (0.0000)	-1.2937*** (0.0000)	-1.2788*** (0.0000)	-1.3496*** (0.0000)	-0.1144 (0.7617)
Quality of Government				-5.4745*** (0.0000)	-5.4223*** (0.0000)	-5.4233*** (0.0000)	-5.0204*** (0.0000)
Current Account Balance					-0.1527*** (0.0006)	-0.1423*** (0.0036)	-0.1501*** (0.0026)
Public Debt					0.0203*** (0.0000)	0.0145*** (0.0004)	0.0149*** (0.0000)
Public Debt*Banking Crisis						0.0253*** (0.0004)	0.0225*** (0.0011)
Time Dummy Variable							-0.1097*** (0.0001)
Constant	-2.0713 (0.0000)	-2.0669 (0.0000)	1.5211 (0.0215)	5.0633 (0.0000)	3.4257 (0.0000)	3.9162 (0.0000)	1.1679 (0.2915)
Observation	1190	1190	1151	1149	1130	1130	1130
McFadden R-squared	0.1299	0.1299	0.1967	0.3110	0.3938	0.4061	0.4212

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Logit Model

Table 4.8: The Ultimate Sovereign Default Model

	Economic Variables	With Historical Variable	With Global Variables	With Political Variables	With Foreign Exchange Variables	With Interactive Term	With Time Dummy Variable
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth	-0.0142 (0.2802)	-0.0128 (0.3337)	-0.0010 (0.9484)	-0.0075 (0.6416)	0.0057 (0.7349)	0.0112 (0.5190)	0.0010 (0.9520)
Inflation	0.0125** (0.0282)	0.0125** (0.0278)	0.0218*** (0.0000)	0.0163*** (0.0000)	0.0180*** (0.0000)	0.0208*** (0.0000)	0.0175*** (0.0000)
Banking Crisis		0.0480 (0.6841)	-0.0789 (0.5473)	0.0484 (0.7328)	-0.0660 (0.6536)	-1.0617*** (0.0015)	-0.8817*** (0.0056)
WTI Crude Oil			-0.5628*** (0.0000)	-0.6838*** (0.0000)	-0.6743*** (0.0000)	-0.7132*** (0.0000)	0.0242 (0.9019)
Quality of Government				-3.1042*** (0.0000)	-3.013*** (0.0000)	-3.0134*** (0.0000)	-2.8613*** (0.0000)
Current Account Balance					-0.0795*** (0.0020)	-0.0741*** (0.0073)	-0.0802*** (0.0035)
Public Debt					0.0106*** (0.0000)	0.0079*** (0.0000)	0.0084*** (0.0000)
Public Debt * Banking Crisis						0.0140*** (0.0004)	0.0120*** (0.0013)
Time Dummy Variable							-0.0659*** (0.0000)
Constant	-1.1136 (0.0000)	-1.1279 (0.0000)	0.5854 (0.0827)	2.6821 (0.0000)	1.7931 (0.0001)	2.0358 (0.0000)	0.4301 (0.4541)
Observation	1190	1190	1151	1149	1130	1130	1130
McFadden R-squared	0.1102	0.1104	0.1989	0.3164	0.3963	0.4089	0.4264

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis presents the p-value. Estimation: Probit Model

As in Table 4.5 and Table 4.6 have showed that exchange rate regime is a non-related variable in investigating sovereign default of a country, it is eliminated. Public debt has been taken into the regression model to replace the exchange rate regime. Debt is always a crucial variable in determining the risk of sovereign default because it weaken investors' balance sheets and induce a contraction of credit and output upon default (Mallucci, 2015). The positive sign in the regression models has indicated that sovereign default is more likely to occur if the public debt of a country is high. This can be proved by the current debt crisis in European country, which illustrated the link between public default and financial turmoil (Gennaioli, Martin & Rossi, 2014). Public debt's p-value has present consistency throughout the model in the range of 0.0000 to 0.0004 value, which implicate that it is at most statistically significant at the level of significance of 1%.

Interactive term of "public debt*banking crisis" has been added into the regression model in order to expand the understanding of the relationships among the public debt, banking crisis and sovereign default in the model, and also allows more hypotheses to be tested at the same time. After the introduction of interactive term into the model, banking crisis has become a significant variable at the level of significance 1%. This has explained that once public debt reaches a certain level, banking crisis will affect the probability of sovereign default. According to Sosa-Padila (2015), the default cases happened in Argentina and Russian were mainly due to the high exposure of banking sectors in government debt. As financial "safety nets" become more ordinary, the link between sovereigns and banks has been tightened as the contingent liability that banking sector represents for the sovereign grew (Correa & Sapriza, 2014).

Time dummy variable is added into the regression models to examine the time trends effect. By referring to Table 4.7 and Table 4.8, the result of every variables does not change after the introduction of time dummy variable, except the representative of global variables – WTI crude oil. It

has changes from a high statistically significant variable into a total insignificant variable straight after the time dummy variable is taken into the model. This is mainly because that WTI crude oil price is being fix according to the market trend.

Overall, according to the column 7 in Table 4.7 and Table 4.8, this regression model can explain 42% of the variation in the sovereign default probability. Sovereign default is more likely to occur if a country exhibits

- i) high inflation rate,
- ii) low WTI crude oil price,
- iii) unstable politics,
- iv) low current account balance and
- v) high public debt.

4.2 Banking Crisis and Sovereign Default

In table 4.7 and Table 4.8, result of banking crisis was insignificant throughout the regression model until the interactive term was taken into account. After the involvement of interactive term, its p-value has dropped to approximately 0.0010 in logit model and 0.0015 in probit model, causing the banking crisis to become a significant variable at the significance level of 1%. It also has a β -value of -1.9817 in logit model and -1.0617 in the probit model.

The negative sign of its β -value has indicated that banking crisis has a negative relationship with sovereign default, which means if there is no banking crisis, the probability of sovereign default tends to happen is higher; or if there is banking crisis, the probability of sovereign default tends to happen is very low. Thus, direct to a result that a country with more banking crisis records tends to has a lower probability of sovereign default occurrence. This is because with a higher records of banking crisis occurrence, a country would be familiar to such crisis and have a greater understanding on preventing its appearance.

However, the significance of interactive term in Table 4.7 and Table 4.8 has represents that banking crisis will has a positive effect to sovereign default, if and only if the public debt has reaches its threshold level. The threshold level of the public debt is computed as:

$$\begin{aligned} \text{PDEBT}_{(Logit)} &= -\frac{\beta_{BCRI}}{\beta_{DEBT}} & \text{PDEBT}_{(Probit)} &= -\frac{\beta_{BCRI}}{\beta_{DEBT}} \\ &= -\frac{-1.7124}{0.0225} & &= -\frac{-0.8817}{0.0120} \\ &= 76.1067\% & &= 73.4750\% \end{aligned}$$

Take the average between the threshold level of logit and probit model, we would get a value of 74.7909% ($\approx 75\%$).

This has fulfilling the hypothesis made in chapter 3, saying that if the value of public debt over GDP is more than 60%, banking crisis will has a stronger relationship with sovereign default. To be more precise, relationship between banking crisis and sovereign default conditional on a value of public debt over GDP is 75% or more than that is much stronger. That means if the value of public debt over GDP is equal to or more than 75%, the occurrence of banking crisis will lead to a higher probability of sovereign default.

In order to test the accuracy of this threshold level, we have constructed Table 4.9, showing the actual relationship between public debt over GDP, banking crisis occurrence, and sovereign default occurrence over three randomly picked years – 1987, 1994 and 2000. (Countries are indicate using country code, refer Appendix 4.1 for country's name).

Table 4.9: Historical Public Debt, Banking Crisis and Sovereign Default

Country Code	1987			1994			2000		
	PDEBT	BCRI	SOVDEFLT	PDEBT	BCRI	SOVDEFLT	PDEBT	BCRI	SOVDEFLT
01	48.35	1	0	75.92	1	1	56.64	0	1
02	33.49	0	1	46.42	0	0	43.32	0	0
03	51.49	0	0	59.09	1	0	60.67	0	0
04	219.13	0	1	208.32	0	1	226.23	0	0
05	3.60	0	0	6.14	0	0	16.44	0	0
06	41.41	0	0	73.33	1	0	73.97	0	0
07	49.73	0	0	36.96	1	0	95.10	1	1
08	73.69	0	0	83.16	1	0	140.14	1	0
09	16.56	1	0	7.70	0	0	18.02	1	0
10	109.04	1	0	47.62	0	0	35.31	1	0
11	79.22	1	1	65.53	0	0	58.77	1	0
12	88.96	0	0	67.36	0	0	82.65	0	0
13	94.09	0	0	92.15	0	0	93.70	0	0
14	51.25	1	0	14.32	0	0	47.3	1	0
15	60.58	1	0	66.13	0	0	52.41	0	0
16	17.62	0	0	56.53	1	0	43.79	0	0
17	33.43	0	0	49.23	1	0	57.40	0	0
18	52.53	0	0	98.51	1	0	103.44	0	0
19	89.11	0	0	121.25	1	0	108.58	0	0
20	73.00	0	0	75.30	0	0	53.80	0	0
21	64.13	0	1	58.67	1	1	36.79	0	0
22	54.46	0	0	57.39	0	0	48.36	0	0
23	/	0	0	14.44	1	0	23.72	0	0
24	43.11	0	0	58.64	0	0	59.38	0	0
25	61.87	0	0	82.50	1	0	64.29	0	0
26	40.34	0	0	39.16	1	0	51.56	1	0
27	49.57	0	0	50.66	0	0	50.35	0	0
28	72.56	0	1	28.89	0	0	45.62	0	0
29	145.34	1	1	87.56	1	1	60.60	0	0
30	47.89	0	1	39.52	1	1	68.46	0	0
31	147.05	0	1	41.04	0	0	13.19	0	0
32	90.16	1	1	37.35	1	0	36.58	0	0
33	55.80	0	1	34.63	0	1	19.30	0	0
34	88.71	0	1	78.97	0	1	82.61	1	1
35	92.92	0	0	36.59	0	0	26.52	0	0
36	55.65	0	0	37.22	0	0	19.01	0	0
37	73.56	0	1	111.33	0	1	63.70	0	1
38	77.65	0	1	30.91	1	0	41.34	1	0
39	266.59	1	1	446.57	1	1	204.87	1	1
40	88.86	0	1	63.07	0	1	59.75	0	0
41	54.97	0	1	27.75	0	0	35.26	0	0
42	39.09	1	1	41.92	0	1	39.38	0	0
43	88.31	0	1	35.33	0	0	44.73	0	0

Remarks: PDEBT=Public Debt to GDP; BCRI=Banking Crisis; SOVDEFLT=Sovereign Default

Source: Author's Own Compilation.

From Table 4.9, we have proven that the 75% threshold level of public debt has a 27%, 25%, and 33% of accuracy in year 1987, 1994, and 2000. The historical default event in Russia (1998) and Argentina (2001) have also shown that it is certain the disruptions on the domestic financial system will associates with the decisions of sovereign default (Sosa-Padilla, 2012). Besides, Reinhart and Rogoff (2011) has also found the same result by analysing the cycles underlying serial debt and banking crises using long time-series on public and external debt.

In short, there would be a negative relationship between banking crisis and sovereign default if the public debt does not reach its threshold level. In adverse, if the public debt is at 75% or more than 75% of its threshold level, banking crisis will be the predictor of sovereign default.

4.3 How Regional Model Different from Each Other?

After generating the general model, we included all determinants in the general model and put each regional model into test, namely Europe, Asia, Latin America and Africa. In this section, we are going to discuss whether the results from regional test similar or different with the general model and which way they are different in.

Table 4.10: Divergent Effect on Regional Model

	Europe	Asia	Latin America	Africa
	(1)	(2)	(3)	(4)
GDP Growth	0.0768 (0.5059)	0.4240 (0.1733)	0.0238 (0.6507)	-0.0657 (0.6537)
Inflation	0.0632* (0.0147)	-0.1534 (0.4368)	0.0211*** (0.0058)	0.1507* (0.0681)
Banking Crisis	-0.7568 (0.6459)	4.2184 (0.4147)	-3.8952** (0.0300)	0.7251 (0.8848)
WTI Crude Oil	2.5315 (0.2063)	-10.3671** (0.0294)	0.7482 (0.1856)	-2.4602* (0.0679)
Quality of government	-1.7919 (0.6221)	-39.2120*** (0.0005)	-1.4740 (0.2750)	3.6114 (0.5195)
Current account balance	0.1777 (0.3668)	0.6990* (0.0514)	-0.4205*** (0.0006)	-0.7592 (0.2365)
Public Debt	0.0443** (0.0122)	0.1407*** (0.0015)	0.0457*** (0.0000)	-0.0163 (0.1447)
Public Debt*Banking Crisis	0.0273 (0.1042)	-0.0093 (0.8954)	0.06346** (0.0479)	-0.0297 (0.7494)
Time Dummy Variable	-0.3445** (0.0146)	0.6675** (0.0488)	-0.1904*** (0.0001)	-0.0594 (0.6385)
Constant	-11.5511 (0.1135)	22.7567 (0.0377)	-3.3564 (0.0254)	3.3761 (0.4985)
Observation	345	256	426	103
McFadden R-squared	0.4590	0.7177	0.4981	0.4341

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Logit Model

Table 4.11: Divergent Effect on Regional Model

	Europe	Asia	Latin America	Africa
	(1)	(2)	(3)	(4)
GDP Growth	0.0531 (0.3091)	0.2255 (0.1320)	0.0085 (0.7684)	-0.0662 (0.4119)
Inflation	0.0315*** (0.0041)	-0.0887 (0.2928)	0.0114*** (-0.0048)	0.0766** (-0.0409)
Banking Crisis	-0.2378 (0.7413)	2.6097 (0.2987)	-2.1327** (0.0157)	0.2012 (0.9291)
WTI Crude Oil	1.0709 (0.1868)	-5.8397** (0.0126)	0.5259 (0.1122)	-1.1996* (0.0701)
Quality of government	-0.9279 (0.5382)	-21.6407*** (0.0003)	-0.7210 (0.3150)	1.4043 (0.5524)
Current account balance	0.0873 (0.2518)	0.4025** (0.0350)	-0.2069*** (0.0028)	-0.3687 (0.1745)
Public Debt	0.0219*** (0.0062)	0.0768*** (0.0012)	0.0244*** (0.0000)	-0.0085 (0.1252)
Public Debt * Banking Crisis	0.0136* (0.0967)	-0.0083 (0.7905)	0.0344** (0.0285)	-0.0110 (0.7826)
Time Dummy Variable	-0.1584*** (0.0059)	0.3726** (0.0166)	-0.1114*** (0.0001)	-0.0301 (0.5902)
Constant	-5.4627 (0.0777)	13.0459 (0.0180)	-2.1038 (0.0156)	1.8430 (0.4202)
Observation	345	256	426	103
McFadden R-squared	0.4716	0.7227	0.4914	0.4302

Notes: ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively. Figures in parenthesis represent the p-value. Estimation: Probit Model

Across the regional model including the general model, the sign for GDP growth opposed our expectation, except for Africa. Its positive relationship with probability of sovereign default does not in line with the theory suggested. Zeaiter and El-Khalil (2016) as well as Eichler and Maltritz (2013) found that country with higher output growth rate will receive more taxes as revenue, thus giving the sovereign more capacity to pay their external debt which in turn reduced the default probability. The result differences may due to the heterogeneity in each country's GDP as our regional sample size consist of both developed and developing nations which their technological development, education and skills

may varies. Majority of research that suggested an inverse relationship focus solely on developed countries or developing countries. However, the different in sign does not matter when the variable is not significant in this case.

WTI crude oil price shows an asymmetric impact across the region. Sharma and Thuraisamy (2013) explained this phenomenon by referring to each country's net position in terms of oil consumption and domestic oil production. A country having net oil exports is said to have oil price movement positively related with its country's macroeconomic performance that will reduce the probability of default. Looking into Asia, one dollar increase in crude oil price will reduce the probability of sovereign default by 10.3671% and it is statistically significant. This result may appear to be confusing. In our sample, Asia is dominated by net oil importers including China, India, Indonesia, Japan and Korea (Wang, Wu & Yang, 2012) according to data released in 2011. However, our sampling period were ranging from 1985 to 2012 which China and Indonesia were both oil exporters at the earlier period when the domestic production were still sufficient to support local consumption. In this case, our result in line with theory suggested by Breunig and Chia (2015) that net oil exporting countries have stronger fundamental in meeting their country's obligation when oil price increased.

On the other hand, a positive sign for Europe and Latin America shows that both regions are dominated by net oil importing countries. These including France, United Kingdom, Italy, Portugal, Netherlands and Spain for Europe and Brazil, Chile, Guatemala and Peru for Latin America (Wang, Wu & Yang, 2012; Rafiq & Sgro, 2016). Sharma and Thuraisamy (2013) that a higher oil price will negatively affect an oil importing country's macroeconomy performance and higher probability of default.

As for quality of government, the statistically significant coefficient for Asia is extremely large compares to other regions. When the quality of government improved by one level, the ln odds ratio of sovereign default will decrease by

39.2120, holding other variables constant. The magnitude is around 8 to 21 larger and this may indicate that this model is overfit for Asia. The overstated impact may be due to several reasons including outliers in data, the incorrect coding way of data or the metric used for analysis might need to change.

Similar with other independent variables, Asia is having the highest probability of sovereign default when the public debt increased for 1% to GDP. We could claim that this effect is dominated by Japan due to its extremely high public debt to GDP ratio among OECD (Organisation for Economic Co-operation and Development) countries (Matsuoka, 2015). The rise in public debt is partly contributed by the expensive medical expenses to accommodate the aging, which is more than 25% of its population. The reason why Japan is not defaulting is that most of the country's debt are denominated in local currency and government can simply print money to repay however Greece's debt are denominated in foreign currency and Euro which the government do not have sole control on it. Quoting Matsuoka (2015) Japan's probability of default will exceed 10% along with 2% sovereign risk premium in the next 20 years if government do not take any action against the big pile of debt and let it continue to increase.

In a nut shell, our model best describes the region Latin America with 3 independent variables significant at 1% significance level and 1 independent variable significant at 5% significance level. This regional model is having a second highest Mc-Fadden R-square after Asia showing that 49.81% (Logit Model) of probability of sovereign default can be explained by the independent variables. Sovereign default is not only confined to developing countries, however the developed countries and major financial hubs around the globe such as Latin America are prone to the unwelcome crisis too.

4.4 Conclusion

After undergoing a trial an error but logical process, we developed a robust model that able to explain the driving forces of sovereign default. Generally, country will experience a higher sovereign default probability if the country possess i) high inflation rate, ii) banking crisis, iii) low WTI crude oil price, iv) unstable politics, and v) low current account balance and vi) high public debt to GDP. However, it is another story when it comes to regional effect. The general effect varies from region to region due to their unique economic structure and fundamental. As a result, the general model best explained the regional effect in Latin America due to its larger sample size.

CHAPTER 5 CONCLUSION

5.0 Introduction

In this Chapter, we bring an end to our analysis. The recent sovereign debt crisis in Greece and Ireland is the main reason that driven us to explore about sovereign default. The vulnerable of a developed or advanced country (Greece and Ireland) during debt crisis has brought up the world's awareness. We wanted to figure out what are the determinants of sovereign default. Based on the twin crisis arguments ("twin debt-bank crisis" or "twin bank-debt crisis"), it has motives us to discover the exact relationship between banking crisis and sovereign default. Besides following previous studies in classifying the sampling countries, we treated all the countries homogenously to test for the sovereign default's determinants, but questioning the consistency of general effect with regional effect at the same time.

5.1 Main Findings / Summary of Results

In order to unveil the mask of sovereign default, we have carried out an analysis on 43 countries from year 1985 to 2012. Based on the result found in Chapter 4, sovereign default is more likely to occur if a country exhibits

- i) high inflation rate,
- ii) banking crisis,
- iii) low WTI crude oil price,
- iv) political instability,
- v) low current account balance, and
- vi) high public debt to GDP

Each of these variables has a relationship with sovereign default that is tally with our expectation, except for banking crisis.

Banking crisis has a negative relationship with sovereign default, which carries the meaning that if banking crisis did not occur, the probability of sovereign default will increase. Therefore, leading to a result that sovereign default is the predictor of banking crisis. However, if the public debt reaches its threshold level, which is estimated 75% over GDP, the relationship between banking crisis and sovereign default will be positive. The higher public debt would trigger banking crisis to happen thus increases the probability of sovereign default.

Last but not least, fitness of the final model has also been tested in different region of countries. The result showed has proof that general effect of the model is not consistent with regional effect. The model is only best suitable for Latin America regions, merely on the others (i.e., Europe, Asia, and Africa). Technically, this is because the Latin America countries have accounted largest number of countries among others in the analysis. Thus, it dragged the result of the analysis more to their countries. However, in practical, it is because of the geographical features of the countries and same variable may has a different influence in different country. For example, the WTI crude oil price has different effect on exporting countries and importing countries.

5.2 Contributions

Throughout the analysis, we maximized the data we used in terms of years and countries for many categories of variables. Generally, we have included 43 countries from different regions throughout the world, without classifying the countries into specific region, emerging markets, developed and undeveloped countries, or oil exporting and importing countries. We treated all the countries homogenously at first, but go into details in testing the regional effect of sovereign default model after obtaining a general effect. Other than that, we also do not focus on only one category of variables but included 5 broad categories of

variables namely, economic variables, historical variables, global variables, political variables and foreign exchange variables. After all, we further discuss the relationship between the historical variable – banking crisis and sovereign default. The reasons of such eager to look for large amount of data in or beyond our limitations is to make sure the result would not be affected by the limitations of data thus increase the accuracy of it.

Besides, we have also discovered the threshold level of public debt over GDP to strengthen the relationship between banking crisis and sovereign default, which is 75%. When the public debt threshold level is equal or more than 75% over GDP, the occurrence of banking crisis will increase the probability of sovereign default in a country, denotes a “twin bank debt crisis”. In the other way round, there will be a “twin debt bank crisis”, which is sovereign default will influence the occurrence of banking crisis if it does not meet the threshold level.

Based on section 4.3, we also revealed the general effect of our model is not consistent with the regional effect. The robust model of sovereign default is not suitable for every region. This is because different countries have its unique geographical features. For example, the WTI crude oil price will have different effect on oil exporting and importing countries.

5.3 Policy Recommendations

The event of sovereign default is a key lesson to all the countries worldwide. Even the countries do not default, they are given a signal to do some action in order to prevent themselves from entering into crisis.

As our result showed that sovereign default is more likely occur if a country exhibits higher inflation rate, WTI crude oil price is low, unstable politics, low current account balance and high public debt.

To maintain a low inflation rate, country's policy maker or central bank can adopt inflation targeting to control the price level increase. Normally countries will set their inflation target in low single digit. In our sample set, countries that do not default during the time period usually have inflation rate below 10% such as Denmark, Italy, Singapore, Malaysia, Tunisia and Netherlands. The target inflation rate is subjective to the situation of the country and it will affect the monetary policy of a country. For example, Japan had a deflation problem, their inflation target set at 2% to stimulate the consumption in the market.

To maintain a high quality of government, we suggest that a country should have a high transparency in politics and control the corruption effectively. Government should give public more freedom in voicing out and freedom of speech. It is believed that countries pursuing this practice are more democratic and had create transparency and openness in government consumption. To reduce the occurrence of corruption, policy maker could collaborate with anti-corruption organization to develop an effective mechanism that providing legitimate treatment to those involving in corruption.

High public debt is more likely to caused sovereign default. As the result showed that if public debt has a 75% over the interactive term or more than that, banking crisis is confirm to cause sovereign default in a country. Therefore, government can set a threshold level of 75% as a signal to prevent the country from entering banking crisis. If the country's public debt threshold level is more than 75%, it indicates that the country has the potential to have banking crisis. The government or central banks have to take some emergency action to cure it such as contractionary fiscal policy or bailout.

Regulations and restrictions are one of the factors that can prevent banking crisis. Restriction on mergers of domestic bank is an important regulation to maintain the sound of financial institutions. To illustrate, there are few countries imposing these kinds of restrictions such as Canada, India and Australia. These countries restrict on the percentage of ownerships to limit merger and acquisition by either domestic bank or foreign bank. The main purpose of this restriction is to prevent the number of banks from decreasing and to allow the top financial institution to

compete with international financial institutions. A relatively low in numbers of financial institutions involving in international banking operations can reduce the possibility of banking crisis.

Banking regulators could prevent the financial institutions from investing in high-risk loan and tighten the process of loan approval. Referring to the experience of Asian crisis in 1997, Thailand central bank attempts to use all large inflow of funds to issue high risky loans without cautious evaluation. The massive borrowing accompanied with high interest rates had made the debt expensive to the borrowers and eventually harder to repay. Bank regulators can develop a strict and effective procedure before approving loans. These can avoid the financial institutions from approving too much high risky loans and thus facing liquidity problem in the future.

5.4 Limitations, Future Research and Conclusion

Our robust model comprised of GDP growth, inflation, banking crisis, public debt, WTI crude oil, quality of government and current account balance. However, it may not be applicable to all countries as we assume all countries have the same economic condition and same classification. To have a more relevant result, one can refer to our regional result.

It is beyond our ability to identify and diagnose the econometric problem such as heteroscedasticity, multicollinearity and autocorrelation between variables as the existing statistical, forecasting and modelling tools that we have do not allow us to do so. Thus, our result may be slightly different from the other researches that had developed a superior technique to identify the problem. It is highly recommended that future researcher should own a more superior modelling tools to increase the accuracy and reliability of the result.

A robust model should have the ability to forecast and predict the probability of default in the near future. Future researchers is advice to use some of the outcome

that they attained and try on the actual data that they have in hand to see whether the model that they developed speaks the truth.

Based on the general model developed, the results best explain the condition in Latin America. When we applied the general model in Latin America, most of the variables are significant including inflation, banking crisis, current account balance and public debt as well as a relatively high McFadden R-square.

In conclusion, the contagion effect of sovereign default is great and could negatively affect the country with similar economic fundamental and structure. Furthermore, country with more than 75% of public debt over GDP will trigger a banking crisis and in turn leading to sovereign default.

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APPENDICES

Appendix 4.1: Countries Codes

Regions	Countries	Country Code
Africa	Kenya	01
	South Africa	02
	Tunisia	03
	Zambia	04
Asia	China	05
	India	06
	Indonesia	07
	Japan	08
	Korea	09
	Malaysia	10
	Philippines	11
	Singapore	12
	Sri Lanka	13
	Thailand	14
Europe	Denmark	15
	Finland	16
	France	17
	Greece	18
	Italy	19
	Netherlands	20
	Poland	21
	Portugal	22
	Romania	23
	Spain	24
	Sweden	25
	Turkey/Ottoman Empire	26
	United Kingdom	27

Latin America	Argentina	28
	Bolivia	29
	Brazil	30
	Chile	31
	Costa Rica	32
	Dominican Republic	33
	Ecuador	34
	El Salvador	35
	Guatemala	36
	Honduras	37
	Mexico	38
	Nicaragua	39
	Panama	40
	Paraguay	41
Peru	42	
Uruguay	43	