

DEFAULT RISK OF INDONESIAN GOVERNMENT BOND

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Abstract

This research is aimed to find an explanation of fluctuation in Indonesian CDS spreads during January 2007 to July 2010. Macroeconomic variables and market sentiment are selected to be used in this analysis. Symmetric Diagonal VECM GARCH model and Granger causality test have been conducted to reveal relationship amongst variables and to select variables will be used in regression analysis. The final model suggests that Indonesian credit risk fluctuation can be explained by variability of exchange rate and global market sentiment. It also suggests that financial shock from developed country is transmitted to Indonesian economy through a direct way, changes in market sentiment, rather than from trade channel.

Key Word: credit risk, credit default swap spreads, market sentiment, macroeconomic variable

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CHAPTER I

INTRODUCTION

1.1. Background

Rational investors in all over the world want to maximize their investment return. However, there is constrain limit this objective. The constraint is the risk. High return usually obtained by investing in high risk. On the other hand, low risk naturally generates low return. In this trade- off between risk and return investors will invest their money in such an investment instrument as long as the return excesses its risk.

Market risk and credit risk are the risk included in sovereign bond investment. The example of market risk is the interest rate risk. It is the risk that the interest rate will become higher or lower in the future. If the bond pay a fixed rate interest rate coupon, an increase in current interest rate will make the price of bond decrease and vice versa. On the other hand, credit risk related to risk that a bond issuer cannot pay its obligation at the scheduled time.

Regarding to investing in sovereign bond, different bond issuer carry its own specific risk. In addition to market risk, the specific risk creates different interest coupon set for different bonds.

Trade off between risk and return on investment creates a relation between bond risk and yield asked by investors. Higher risk carried by the bond issued consequently will make the return asked by investors be high. Additional risk needs to be compensated with additional return. From bond issuer point of view, this situation make it has to decrease the price of its bond when the risk is higher. Normally this means that it has to increase interest rate of its coupon.

United States Treasury Bond is a sovereign bond commonly used as a benchmark for valuing other sovereign bonds. Because of its highest creditworthiness, it is assumed that the federal government of the United States will never go default. Since US Treasury Bond is assumed to be risk free, other bonds are compared to it to measure the risk of default.

Bond issuers always want to reduce their cost of borrowing; consequently, they need to decrease the risk associated by investors in their bonds. While market risk is almost always incurred in every bond, credit risk can be assumed to be specific to a bond issuer. Hence, the bond issuer needs to manage its credit risk very carefully.

If a government cannot manage the credit or default risk carefully, it will face the higher cost of borrowing as a consequence. Whenever it wants to issue a new bond for financing its budget deficit or refinancing its old bond, the price of its bond will be cheaper than the price in a managed default risk. The snowball effect happens when the government is forced to always issue a new bond due to its unavoidable need. Higher cost of borrowing due to higher interest rates will make its default risk worsened. The cycle will continue whenever it issues a new bond. The end of the game is when the government cannot pay its obligation. This means that default risk is not a mere potential risk again, but it has been transformed to be a real event.

After being hit by the Asian crisis in 1997/1998, Indonesia has tried to change its budget deficit financing strategy from foreign debt to domestic debt. Indonesia not only shifted its strategy from foreign debt to domestic debt, but also shifted it from multilateral/bilateral financing to market

financing. This strategy is done through bond issuance both in the domestic market and in the global market.

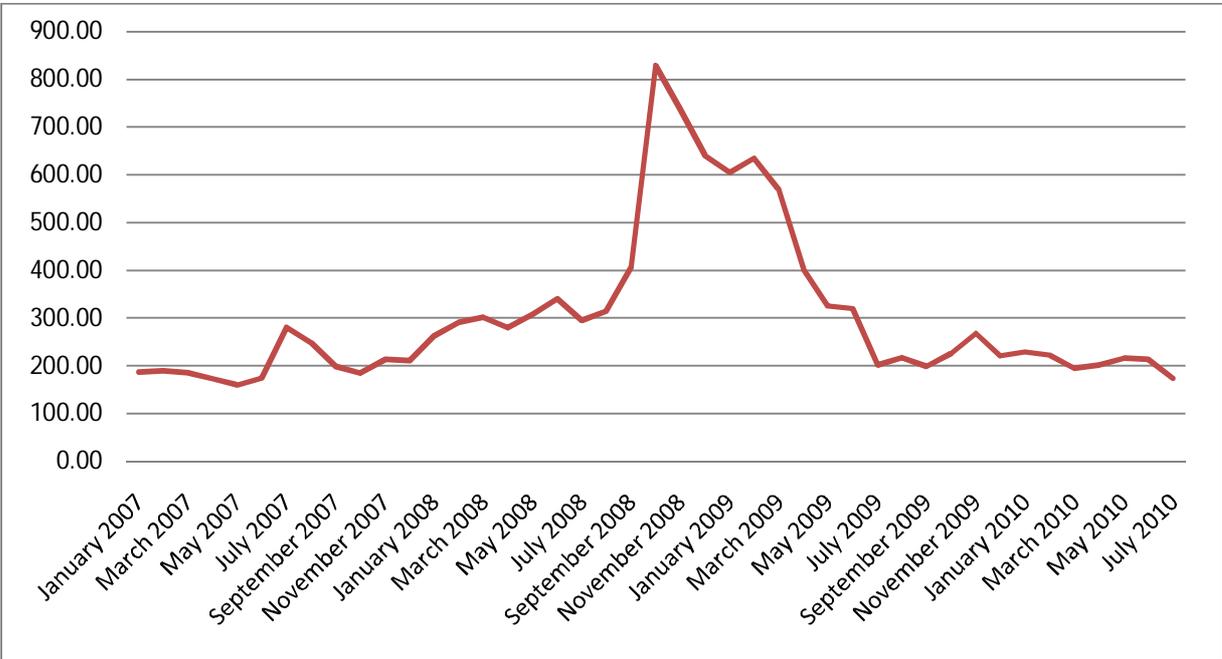
Accumulation of bond issuance from year to year created many questions about country's ability to manage its debt, especially its ability to pay coupon and bond principal. The ability to pay coupon and bond principal is reflected by default risk of the bond issuer. Higher default risk of bond issued naturally will be compensated by higher bond yield asked by investors. Default risk then becomes a concern not only for investors/creditors but also for government as bond issuer.

One of accepted instrument to measure default risk of a bond issuer is a derivative instrument which is called Credit Default Swap (CDS). CDS spreads or sometimes it is called CDS premium shows market valuation and perception about probability of one bond issuer to be in a default situation. Function almost similar as insurance premium, CDS spreads shows money to be paid for covering a credit default event. The higher a probability of one bond issuer to default, the higher CDS spreads of that issuer.

During the financial crisis in year 2008, Indonesian government bond CDS spreads jumped significantly from its level in year 2007. Additionally, the increase of CDS spreads was accompanied by difficulty in issuing new bond due to very high yield demanded by investors. At the same time, there was a shock in the stock market all over the world led by shock in Wall Street.

On the other hand, Indonesian macro economy even though got impact from financial crisis seems to be resilient. This was proven by relatively only little decrease in economic growth. Hence, the crisis and its impact to Indonesian ability to issue a new bond created questions about the relationship between Indonesia CDS spreads, macroeconomic factors, and sentiment in the stock market.

Figure.1. Indonesian Credit Default Swap Spreads: January 2007- July 2010 (basis points)



Source: Bloomberg

1.2 Research Question

Previous studies have confirmed that macroeconomic variables are significant in explaining emerging market bond spreads empirically (Cantor & Packer, 1996; Amato & Luisi, 1996; Min, 1998; Eichengreen & Mody, 1998).

Using the same logical reason, this research investigates the role of macroeconomic variables and additional variables to explain variability of Indonesian CDS spreads. This research is trying to find an explanation of fluctuation in Indonesian CDS spreads during January 2007 to July 2010. Market sentiments reflected by changes in the stock market index is chosen as additional explanatory variables.

1.3 Research Structure

This research offers a statistical test to find some better additional variables to be included in further analysis. Relationship amongst variables using available daily data is investigated using Generalized Auto Regressive Conditional Heteroscedastic (GARCH) model.

Market sentiments are differentiated between domestic market sentiment and global market sentiment. Granger causality tests are constructed to investigate the role of both sentiments in predicting Indonesian CDS spreads.

Several macro economic variables are investigated using regression analysis to find their explanatory power of Indonesian CDS spreads. Finally, macroeconomic variables and market sentiment are combined as independent variables in regression analysis. This method is taken to find a model which describes the role of macroeconomic variables and market sentiment in explaining fluctuation of Indonesian CDS spreads during the sample period. While daily data is used in variable selection using GARCH model and Granger causality test, monthly data is used in regression analysis.

Different from most of previous studies which used panel data in their analysis this research uses time series data. Time series data is chosen to find a better explanation of specific relationship characteristic between country fundamentals, market sentiment and credit default risk.

Even though several macroeconomic variables, such as Gross Domestic Product (GDP), GDP growth, term of trade, debt service ratio, have been found to be significant in explaining CDS spreads or bond spreads, they cannot be used in this research due to data availability.

Gross Domestic Product (GDP), GDP growth, and several variables which use GDP as ratios can only be acquired at most in quarterly data or annually data. They are little of use in explaining CDS spreads fluctuation in a short term or medium term.

It is difficult to convince that variables which changes quarterly or annually can be used to explain daily variability of CDS spreads. Instead, monthly data is chosen to find the closest explanation of Indonesia CDS spreads fluctuation during January 2007 to July 2010.

Relationship amongst five variables, Indonesian CDS spreads, US Dollar rate, Bond Spreads, Changes in Dow Jones Industrial Average index, and Changes in Jakarta Stock Exchange index, is investigated using symmetric diagonal VECH GARCH model. Daily data of those variables are used in this analysis. Moreover, the result of this model is also used to select one of two macroeconomic variables, Bond spreads and US Dollar rate. It is revealed from covariance parameters obtained from the model that US dollar rate is a better variable than Bond spreads to explain Indonesian CDS spreads.

To investigate the role of global and domestic market sentiment to Indonesian CDS spreads Granger causality test is conducted. The global market sentiment is reflected by changes in Dow Jones Industrial Average index while the domestic market sentiment is reflected by changes in Jakarta Stock Exchange index. The Granger causality test result suggests that, global market sentiment is a better variable rather than the domestic market sentiment to explain Indonesian CDS spreads.

Macroeconomic variables regression analysis result shows that two variables, export and inflation, are not significant in explaining Indonesian CDS spreads. Three macroeconomic variables which are Foreign Reserves, US Dollar rate, and Import are significant.

Next, including global market sentiment in regression analysis provides two variables in the final model. They are US Dollar rate and Changes in Dow Jones Industrial Average Index.

Additionally, this research also investigates additional variable, Bond spreads, to explain Indonesian CDS spreads fluctuation. At the same time, this step is taken to confirm variable selection method suggested by GARCH model conducted before. The result shows that including bond spreads variable disturbs the role of previous two variables due to multicollinearity problem. As the result, this additional variable is not included in the final model. The final model consists of two variables which are US Dollar rate and Changes in Dow Jones Industrial Average Index.

Remainder of this research is organized as follows: Chapter II provides some theories and literature review of empirical studies regarding emerging bond market and default risk. Chapter

III presents consideration in selecting independent variables and hypothesis. Chapter IV explains data and methodology used in this research. Chapter V presents a description of Indonesian Government Bond. Chapter VI presents empirical result of tests conducted and managerial insight. Chapter VII presents a summary and conclusion.

CHAPTER II

LITERATURE REVIEW

2.1 Default Risk Indicators

History of the world, especially started in 1970s recorded some countries which have problems in paying their debts. Argentina, Brazil, Mexico is an example of countries which had to struggle to survive in managing their debts (Mauro, Sussman & Yafeh, 2006). Recently, Greece has almost the same problem in paying its debt. This situation creates a potential risk that it may happen to other countries, as well.

In order to give market players information about probability of default of one entity, several default indicators are created and computed. For sovereign entity default risk probability, examples of the indicators are credit rating, debt to GDP ratio, bond yield spreads, and CDS spreads.

2.1.1 Credit Rating

Credit rating or bond rating is a current opinion about credit worthiness and quality of a bond issuer to pay its obligation (Jones, 2010b, p.35). Bond rating is issued by rating agencies and is available for investors to analyze and measure default risk of a bond issuer. By using the credit rating, investors can calculate the expected return to compensate the risk incurred in the bond. Moreover, investors can compare the price of bond offered by different issuer by comparing its credit rating.

There are many rating agencies in financial market. Each rating agency uses its own rating to presents creditworthiness of a bond issuer. For example, Standard & Poor's and Moody's use letters represents a creditworthiness of a bond issuer. The highest rating in Standard & Poor's system is AAA which represents an extremely strong capacity to pay interest and repay principal of its bonds.

It is important to understand that credit rating is an opinion about prediction of creditworthiness of a bond issuer. Likelihood to be default is used as a single indicator of the creditworthiness. Rating agency such as Standard & Poor's put emphasizes on order and rank of creditworthiness of bond issuers (Standard & Poor's, 2009). Then credit rating should be seen as a relative position in the creditworthiness of one bond issuer compares to others.

Additionally, the rating agencies divide its rating system into two broad criteria which are investment grade and speculative grade. The investment grade is credit rating from AAA through BBB in Standard & Poor's system. They represent a high quality of a bond issuer. Consequently, because of trade off between return and risk, bonds issued by this bond issuer offer a lower return. The other criterion is speculative grade. It is the grade of ratings of bond issuers from BB, B, and CCC, to CC. Because their default risk is higher the bonds they issue have to be offered in a higher return.

Even though credit ratings are accepted by most investors, they have some shortcomings. There is a probability that rating agencies may give different opinion about credit worthiness of one

bond issuer. It is normal that one rating agency may give a higher rating to one bond issuer compare to that given by another agency (Jones, 2010b).

Another shortcoming of the rating system developed by rating agencies is that it may be too broad. It cannot be used to explain why, other things being equal, two governments in the same category of rating may have different price of their bonds. Moreover, rating agencies recently have reliability problems. Their methodology to measure default risk is questioned by many financial market players (Partnoy, 2009 p.175-191). Enron case in year 2001 and recent subprime mortgage crisis in year 2008 were examples when rating system did not work well to at least give a signal about potential problem in both cases.

The other problem in credit rating is their ability to follow rapid market dynamics. It is very common that they are left behind in predicting creditworthiness of one bond issuer compare to investor reaction in the stock market or bond market (Jones, 2010b).

2.1.2 Debt to Gross Domestic Product (GDP) Ratio

It is natural to associate a default probability of one country with its economic capacity, which is commonly measured by its Gross Domestic Product (GDP) (Jones, 2010a). While debt to asset ratio measures leverage of corporate, debt to GDP ratio can be assumed measures leverage ratio of one country. The probability of default is assumed to be high when the amount of debt high. Hence, the ratio of debt to GDP intuitively can be used to measure the ability of one country to pay its debt obligations.

By using this logic, the lower ratio of debt to GDP means the higher creditworthiness of a country while the higher ratio means a vice versa situation. The higher ratio means the country becomes more vulnerable to be in a default situation. This ratio is reasonable. If accumulative debt is excessively high compare to total country's production, and then the country ability to repayment its debt becomes weak. Total production has to be used to other needs not only repaying debts. Moreover, gross domestic product reflects potential tax revenue can be collected by government. If the ratio of debt and gross domestic product is 5 %, then simply by increasing the tax rate by 5 % government can wipe out the debt accumulated for that year (Jones, 2010a).

While some countries still survive and can manage their debt well even though their current debt to GDP ratio relatively high, some other countries does not. Japan, United States and other developed countries are countries which have a ratio of debt to its GDP more than 100 %, but they seem do not have a problem in managing their debt. It can be seen from high credit rating of these countries. Jones (2010a) emphasizes the argument that there is not a magic level of debt to GDP ratio can be used to predict debt crisis. Economic size and growth prospect of the country will be the most important consideration to measure government ability to collect taxes and minimize spending (Jones, 2010a p.395).

Another shortcoming of using debt to GDP ratio for predicting default risk is a fact that GDP figure at most can be gained by quarterly data (Beck, 2001). Measuring the figure in monthly or weekly data is not easy to do. On the other hand, financial situation can change dramatically within a short period less than one month or even one week in a financial crisis situation.

2.1.3 Bond Yield Spreads

Bond yield spreads or bond spreads is a measurement of credit risk incurred in one bond compared to risk free instrument such as Treasury bond. While it is assumed that Treasury bond is a risk free rate instruments, the difference between yields of Treasury bond and yields asked by investors to particular sovereign bond of the same maturity reflecting credit risk perceived by investors and additional return asked because of holding riskier instruments.

The nature of logic behind bond yield spreads measurement is very convincing. It assumes that difference of those yields reflects the default risk incurred by particular bond issuer. However, previous study has revealed that what makes those yields different is not mere default risk (Küçük, 2010). There are certain factors influence yields asked by investors. Some of them are liquidity and tax factors.

Illiquid instruments such as some emerging market bonds got penalty by investors by asking a higher yield. Investors face the risk that they will not easy to buy or sell the bond because the instruments are illiquid. In this case, investors need to compensate this risk by asking higher return. The risk actually has nothing to do with probability of country default but mere illiquid problem.

Changes of tax policy in United States can ignite new calculation of Treasury bond yield. There will be an increase or decrease in yield spreads which is not caused by changes in default probability. Hence, bond yield spreads may not reflect a pure default risk as it is aimed.

Additionally, it is very difficult to compare two identical bonds in regard of time to maturity and schedule of coupon payment. At most, the bond spreads reflects the closest comparison only.

2.1.4 Credit Default Swap Spreads

Derivative instrument that relatively newly introduced is Credit Default Swap (CDS). This instrument offers a pure measurement of default probability of a bond issuer. The CDS spreads theoretically only deal with default risk (Beck, 2001; Benkert, 2004). Generally credit swap is a financial instrument where its value depends on credit quality of debt issuer, private or government (Chisholm, 2010 p.75).

Duffie and Singleton (2003) define credit swap as a form of derivative security that can be viewed as default insurance on loans or bonds. Credit swap offers protection of a credit event by giving the buyer a given contingent amount of at the time of a given credit event. The contingent amount most often is specified to be the difference between the face value of a bond and its market value, paid at the time of the credit event. As a return for the protection, the buyer of protection pays a premium, in the form of an annuity, until the time of the credit event or until the maturity date of the credit swap, whichever is first (Duffie & Singleton, 2003 p.173)

Credit swap can be seen as default insurance where swap buyer protects itself from losses caused by default event of bond it bought. Since each bond carry a default risk in it, one can buy a protection scheme for every bond traded in the market to ensure that cash flow expected from the money invested in that bond can be realized.

As well as bond yield spreads, the CDS spreads data which can be quoted daily reflects daily valuation and measurement of investors about default probability of a bond issuer. Especially for emerging bond market, CDS market is more liquid than the bond market. It has flexibility in maturity which is sometimes not available in underlying bond (Chisholm, 2003 p.77).

Ericsson, Jacob & Oviedo (2004) also mentions the advantages of using credit default swaps data rather than using bond yield spreads data. Default swap spreads do not need to be adjusted to reflect default risk because it is already a default risk premium. Moreover, they argue that default swap spreads offer a more accurate and quicker response to changes in credit risk than bond yield spreads.

2.2 Credit Default Swap Market and Mechanism

Credit Default Swap is traded in Over The counter (OTC) market. This means that transaction and contract of credit default swap is not conducted in an exchange market. Instead, the transaction depends on agreement between the seller and buyer. Because of potential dispute between the seller and buyer in defining a credit event and the other thing stipulated in credit default swap contract, there is an organization which minimizes the probability of dispute amongst parties. Terms of credit default swaps is standardized by The International Swaps and Derivatives Association (ISDA). The association also collects and files any information related to credit risk such as bankruptcy, cross default, rating downgrade, failure to pay, repudiation, and restructuring (Duffie & Singleton, 2003 p.175)

When an entity wants to buy a credit default swap contract for one bond issuer, it can go to a credit default swap seller and negotiate terms of contract based on standard stated by ISDA. In this case, CDS contract is different from an insurance contract. The buyer does not necessary already have a reference asset to be protected for. Instead, the buyer can buy the reference asset at the time of a credit event or sell the CDS contract to another buyer anytime it wants to.

The premium which is paid annually is called spread and it is said in basis points. The spreads times its protected amount will show the annual payment should be paid by the buyer of credit defaults swap to the seller.

CDS buyer who does not have the underlying bonds in its hand can gain profit in two ways. If the CDS buyer sees creditworthiness of its reference entity decreases, it can sell its CDS contract to a new buyer who wants to protect its position. The old buyer will get higher premium from the new buyer. The profit is margin between new premium revenue from new buyer and old premium should be paid by old buyer to CDS seller. Alternatively, the CDS buyer can hold the contract until such a credit event occurs. It can buy a cheaper reference bond in the bond market, delivered it to CDS contract seller and get a par value of the bond (Chisholm, 2003 p.77).

2.3 Determinants of Default Risk and CDS spreads

Chisholm (2003) defines credit default swap as a derivative instrument which its value has a very close relationship with reference entity creditworthiness. Hence, it is naturally that measuring the spreads of CDS also means measuring creditworthiness of an entity.

Creditworthiness or credit quality of government cannot be separated from economic performance of one country. Many scholars have investigated macroeconomic factors that offer an explanation of credit quality as measured by default risk indicators.

Duffie and Singleton (2003 p.149) lists some of macroeconomic factors including its sign relationship that are highly possible to influence a country's ability to pay its debt obligation. They are current account to Gross Domestic Product (+), terms of trade (+), reserves to imports (+), external debt (-), income variability (-), export variability (-), and inflation (-).

Additionally other variables to explain creditworthiness of one country are introduced by many studies. Cosset & Roy (1991) try to replicate Euro Money and Institutional Investment country risk rating by using economic and political variables. They find that countries which have high quality country risk rating are less indebted country compare to low rating countries. Important finding from their study is the ability to replicate country risk rating calculation in a significant degree by using only available economic statistics.

Alesina et al. (1992) investigates the presence of default risk for Organizations for Economic Co-operation and Development (OECD) countries. By comparing interest rate on government and corporate financial instruments, they find a strong relationship between the amount of government debt, and the difference of government and corporate rate of return. In addition, they find the existence of investor perception about default risk of OECD countries. Even though the portion of default risk perception is very small, it shows that investors distinguish every financial instrument by incorporating a default risk consideration in determining rates of return.

Cantor & Packer (1996) argue that Moody and Standard & Poor's rating announcements can be explained by a small number of well-defined criteria. Using several variables such as Per capita income, GDP growth, Inflation, Fiscal Balance, External Balance, External Debt, Spreads, Indicator for economic development, and Indicator for default history, they find that market, gauged by sovereign debt yields, broadly shares the same sovereign credit risk made by the true rating agencies. They argue that credit rating appears to have some independent influence on yield over and above their correlation with other publicly available information. Moreover, they investigate the impact of rating announcement to market pricing. They can show that rating announcement has immediate effect on market pricing for non-investment grade issues.

Packer & Suthipongchai (2003) report that within the same rating in high rating levels, sovereign CDS spreads is lower than corporate CDS spreads. However, they cannot conclude that the reason for this phenomenon is caused by whether liquidity factors or limited sample. On the other hand, the reverse phenomenon occur for low rated sovereigns and corporate. Spreads for low rated sovereigns is higher than spreads for low rated corporate. Explaining the latter phenomenon, they argue that this occur because investor becomes more pessimists about recovery rate of sovereigns default compare to that of corporate.

Min (1998) in his study tries to get determinants of credit risk. Min divides explanatory variables of emerging bond spread into two categories which are liquidity and solvency, and macroeconomic fundamentals. The first group of variables relates to short term country's ability to pay its debt obligations while the latter more focus on long term one. Variables included in the first group are the debt-to-GDP ratio, debt-service-ratio, net foreign assets, international reserves-

to-GDP ratio. The second group of variables consists of domestic inflation rate and terms of trade. Additionally, Min uses oil price and international interest rate as external shock to formulate its model. It is found that liquidity and solvency variables (debt-to-GDP ratio, international reserves-to-GDP ratio, and debt service ratio and export and import growth rates) are significant in determining yield spread. In addition, inflation rate, net foreign assets, terms of trade and real exchange rate are found to be significant in explaining the spreads. Interesting finding is that external shock variables are not significant to explain the yield spreads in his model.

Beck (2001) argues that emerging market Eurobond spreads after the Asian crisis can be almost completely explained by market expectation about macroeconomic fundamentals and international interest rates. Beck (2001) study shows that external shock in international interest rate is significant in explaining bond spreads. However, different external shock, reflected in the stock market volatility in the developed countries, did not play a significant role after Asian crisis.

Amato & Luisi (2006) investigate the role of macroeconomic variables in estimating the arbitrage-free rate structure models of yield and spreads of United States Treasury and corporate bonds. They find that the measurement of default risk event varies between high and low rate bonds. More importantly, it is suggested that additional compensation for the default event risk is not pro cyclical.

Ludvigson & Ng (2009) study reveals the importance of real and inflation factors in predicting excess returns of US government bonds. This predicting power is beyond the power incurred in yield spreads. This finding implies that without including the macro factors risk premium

appears virtually a-cyclical, whereas with the estimated factors risk premium have a marked countercyclical component. It is then consistent with theories that investors must be compensated for risks associated with macroeconomic activity.

Hilscher & Nosbuch (2010) investigate the effect of macroeconomic factors in sovereign risk. Using data of emerging market sovereign credit spreads; they find that terms of trade volatility has a significant effect to the spreads. This finding implies that focusing on terms of trade of country specific commodity price index in analyzing and distinguishing the relation between macroeconomic factors and sovereign risk can be done.

The importance of market sentiment for explaining CDS spreads is investigated by Tang & Yan (2010). They argue that during GDP growth rate credit risk premium in average decreases. The reserve phenomenon occurs when there is a fluctuation in GDP growth and shock in the stock market. They conclude that credit risk premium is determined mostly by market sentiment at the market level. For corporate level, they find that the most powerful factor in explaining the risk premium is implied volatility. Macroeconomic factors are found to be has a direct impact but only for a smaller portion.

Using quintile regression, Pires, Pereira & Martins (2010) argue that what they called traditional variables such as solvency factors, volatility, cannot fully explain the level of CDS spreads. The liquidity cost is also reflected in the spreads. Illiquid instruments will be penalized by higher credit risk spreads compare to the liquid ones. In investigating and measuring transaction cost for

CDS, they argued that it must be done by using absolute figure rather than a difference between bids and ask figures.

2.4 CDS Market, Bond Market, and Stock Market Relationship

Study to find a relationship amongst CDS market, bond market and stock market has been conducted by many scholars (Forte & Pena, 2009; Norden & Weber, 2009; Frank & Hesse, 2010, and Ismailescu, 2010).

The impact of common market sentiment to both domestic and foreign debt was investigated by Hanson in year 2007. Hanson (2007) argues that the composition of debt whether foreign or domestic should not be overstated. Excessive debt and negative shocks can contribute to a “sudden stop” in the demand for both government domestic debt and government foreign debt. The current attractiveness and low cost of domestic debt may reflect the international environment not fundamental changes. Panizza (2008) has also mentioned about the danger of strict differentiation between domestic and foreign debt.

Norden & Weber (2009), using data span from year 2000-2002 of corporate bond, stock and its credit default swap, investigate the inter temporal co-movement of those variables. They use Vector Autoregressive (VAR) model to study the lead-lag relationship and causality. The Granger causality test is conducted by using different terms of data which are monthly, weekly, and daily data. They find that changes in CDS spreads Granger causes bond spreads changes for more firms in United States and Europe rather than vice versa. They also argue that credit default

swap market is more sensitive to stock market than the bond market. Additionally, they find that larger bond issues and lower credit quality increase the co-movement amongst those markets.

Correlation between credit rating and credit default swap may seem a perfect correlation. Whenever credit rating deteriorates or increases, logically the possibility to default will increase or decrease as well. Consequently, credit default swap also will increase or decrease. However, credit risk changes may be anticipated differently by investors in credit default swap market and rating agencies. Credit rating announcement may take more time than changes in CDS spreads. Investor may have already incorporated information contained in credit rating announcement far before it is announced by rating agencies. On the other hand, rating announcement may enforce investors to re-calculate their perception about credit risk of particular issuer. The impact of credit rating announcement on country's credit risk then becomes an interesting subject to be analyzed (Cantor & Packer, 1996; Ismailescu, 2010).

Ismailescu (2010) finds that CDS spreads anticipate positive events (higher credit rating) announcement more than it anticipates negative events. On the other hand, CDS spreads are better in forecasting a probability of credit rating downgrade. Ismailescu (2010) also argues that financial factors were able to explain changes in CDS spreads better than macroeconomic factors or political factors.

While most of the studies confirmed the existence of parallel relationship between credit risk premium and bond yield spreads, Adler & Song (2010) reject this direct relationship. They find that negative spreads in bond yield sometimes can result in positive credit risk premium and

vice versa. They argue that the phenomenon is caused by non-par price. By constructing this non-par price through implied bond yield spreads, they can reestablish parity relationship between credit risk premium and bond yield spreads for the most part of their sample. However, unparalleled relationship still can still be found in some cases (Adler & Song 2010).

CHAPTER III

VARIABLE CONSIDERATION

This research tries to find an explanation of fluctuation in Indonesian CDS spreads during time January 2007 to July 2010. Since it relates to only one specific country, variables will be used in the analysis should be determined carefully based on the appropriateness of measurement and the availability of data.

Previous studies have been exploited broad types of variables to explain credit risk represented previously by bond spreads and recently by CDS spreads. Table 1 summarizes variables used in several previous studies. In general, variables used in previous research can be divided into two broad types. They are macroeconomic variables or fundamentals, and additional variables.

Using the same logic of previous studies, this research uses macroeconomic variables to explain a country's credit risk, in this case is Indonesian CDS spreads. Dependent variable then is Indonesian CDS spreads. Independent variables will be divided into two parts. The first part is macroeconomic variables, and the second part is market sentiment. Since sample period used in this research is argued had been influenced by fluctuation in the stock market, market sentiment is chosen as additional variable. Market sentiment measurement is represented by using changes in the stock market index.

3.1 Data Level

Level of data to be used to investigate the relationship amongst CDS spreads, macroeconomic variables and market sentiment may vary from daily, weekly, monthly, to annually. The choice

depends on the purpose and the reason of the research to be conducted. Each choice, however, has its own advantages and shortcomings (Beck, 2001).

Table. 1. Independent Variables Used in Previous Studies

Independent Variables		Eichengreen & Mody (1998)	Min (1998)	Goldman Sachs (2000)	Beck (2001)	Abid & Naifar (2010)	Ismailescu (2010)	
Macroeconomics / Fundamentals	Quarterly/ Annually	Debt/GNP	External Debt/GDP	External debt/GDP			External Debt/GDP	
		Growth rate of GDP	International Reserves/GDP					
			Current Account/GDP	Budget Balance			Government Deficit	
			Growth rate of GDP	Real GDP Growth				
	Monthly	Debt Service/Exports	Debt Service/Exports			Forecast for Current Account Deficit		External Debt/Export
			Growth rate of Export					
			Growth rate of Imports					
			Terms of Trade(Export/Import)					
			Net Foreign Assets					Foreign Reserves
			Inflation			Forecast for Inflation		Inflation Rate
			Real Exchange Rate		Real exchange rate Misalignment			US Dollar Rate
						Forecast for Real GDP Growth		
						Bond Spreads		
Additional								
	Credit Rating Residual			Openness of the economy		Rating		
				Amortization/Reserves				
	International Interest Rate	International Interest Rate		Long run LIBOR	LIBOR	Free Risk Interest Rate	Domestic Market sentiment	
		Real Oil Price				Time to Maturity	Credit Rating Events	
						Slope of the yield curve (long-short Interest rate)	Composite index of Political risk	
				Volatility index	Volatilities of Equities			

Most of previous studies used panel data, consist of several countries data, to get general explanation of sovereign credit risk (Eichengreen & Mody, 1998; Min, 1998; Beck, 2001; Abid & Naifar, 2010; Ismailescu, 2010). Hence, annually or quarterly data could be used for their researches. On the other hand, this research tries to explain specifically credit risk of one country only, Indonesia. As a consequence, another approach is needed to get a proper result by considering data availability and the aim of this research.

Using daily data for investigating the relationship between credit default swap market and stock market will not have a problem in data availability. Both markets record any information needed daily. However, daily data should be used carefully. News and rumors sometimes affect those markets more than fundamental issues (Beck,2001).

Data availability will be another concerns should be taken care in doing this investigation. Fundamentals macroeconomic variable such as Gross Domestic Product (GDP) growth is released at most quarterly. Inflation rate, export, import, inflation and the level of country foreign reserves can be accessed at most in monthly data. Hence, to obtain the closest relationship between CDS spreads and macroeconomic variables it is argued that using monthly data is the most appropriate method.

Using monthly data in investigating the relationship between CDS spreads and macroeconomic variables offers the closest approach to reveal investors' decision and calculation based on the true publicly available data. Moreover, averaging the daily data into monthly data will minimize

the effect of unrelated rumors to changes in credit default swap market or stock market (Beck, 2001).

There is a consequence of using monthly data strictly. Some variables which theoretically important in estimating credit worthiness of one country and its credit default swap spread, such as debt to GDP ratio or credit rating, may not be able to be included in the analysis. Some scholars tried to bridge the gap between quarterly or annually data and monthly data by transforming it using interpolation technique or using forecast of the data (Beck, 2001). However, it is argued that interpolated data is “interpolated data” which means that they do not reflect the actual data of variable itself. Some subjective judgments and assumptions are extensively used to get the data.

Since the research is implicitly trying to reveal investor behavior and perception about default risk, interpolated data will not be used. Hence, some variables suggested by theories and other studies are excluded from the research not because they are not important but because of the research purpose and data limitation.

3.2 Macroeconomic Variables

Macroeconomic variables used by previous studies to explain credit risk of one country can be presented in various forms. Each scholar as it is presented in Table 1 emphasizes the importance of selected variables to represent a country’s ability in honoring its obligation. Using the same logic used in Beck (2001), this research will use monthly data in regression analysis. Since this

research will use monthly data in regression analysis, the available macroeconomic variables are Bond Spreads, US Dollar Rate, Export, Import, Foreign Reserves, and Inflation rate.

3.2.1 Bond Spreads

Bond yield spread or bond spreads has been widely used as one of credit risk indicator of a bond issuer (Eichengreen & Mody, 1998; Beck, 2001). The explanatory power of bond spreads to represent a country's economic performance is based on its direct comparability with others country economic performance.

Benchmark for bond spreads is the yield of US Treasury bond with the same maturity. Wider spreads reflects higher credit risk of a bond issuer. In a situation where another country issues the same maturity bond but with less wide bond spreads, this implies that its economy is worse than another country's economy..

Since Bond spreads basically measure credit risk of bond issuer as well as CDS spreads, their relationship is expected to be in positive one. Wider bond spreads intuitively should be accompanied by higher CDS spreads and vice versa.

3.2.2 US Dollar Rate

US Dollar nowadays stills the most important currency in the world proved by the fact that many economic activities are measured by US Dollar equivalent. Export, import, foreign reserves, and many others activities are examples of economic activities measured by US Dollar to represent

the country's economy. Using the US Dollar currency as standard measurement offers an easy comparison of countries economy to others.

Foreign exchange rate shows the power of one country economy compare to another one. Weak domestic currency reflects a weak economy relatively and vice versa. Moreover, exchange rate also reflects how well the economy is managed by the government (Jones, 2010a).

Changes in the exchange rate will give impact to many economic activities in one country. International trade will get the first impact. Revenue and cost of doing international trade depends heavily to fluctuation of exchange rate (Jones, 2010a). In regard to government foreign debt management, the fluctuation of exchange rate will make the nominal amount of debt and its following obligations measured in domestic currency also will fluctuate. Since most part of government revenue is generated by domestic tax revenue, the domestic currency depreciation will hamper the country's ability to pay its debt obligations. Consequently, when domestic currency is devaluated severely, the probability of credit default will increase. Since higher US Dollar exchange rate gives a positive contribution to higher default risk, expected sign of this variable in regression analysis is positive.

3.2.3 Export

Export activities measure economic activities of one country and the role of it to the world economy. In globalization and trade openness era, a country which is able to increase its export value normally will get higher benefit for its own economy (Jones, 2010a). Moreover, export value also reflects the role of one country's economy in the world economy.

One of source of foreign reserves for most of countries in the world come from foreign currency revenue generated from export activities. Regarding to country ability to pay its foreign debt, the higher the export value will offer the higher ability to pay the country's financial obligation. Increasing the value of export generates more money for the economy. Hence, it is hoped that there will be a negative relationship between value of export and default risk of one country.

3.2.4 Import

Import activities create cash flow from the host country to others countries. When import mainly consists of consumptive goods and services, the value of import reflects the inability of one country to produce its needs for economic activities. On the other hand, when import consists of productive goods and services which were used to produce new products by including value added to be exported to other countries, then import activity is a necessary condition to improve country economy (Jones, 2010a).

However, from cash flow point of view, import activity is cash out flow activity. This means the activity is part of activities that need to be funded by country's economy. The higher the cash needed to fund import activity, the less cash remain to fund others activities. Hence, the relationship between import value and country ability to pay its debt obligation is expected to be in a positive relationship.

3.2.5 Foreign Reserves

Foreign reserves are the measurement of how much deposits and bond foreign currency owned by government or monetary authorities. The level of foreign reserves reflects country ability to

fund its obligation in paying international economic activities. The activities include importing and paying coupon and principal of government bond. Higher foreign reserves level shows higher ability to pay international financial obligations (Jones, 2010a). In regard to default risk of government bond, the higher level of foreign reserves means the lower level of default risk. Consequently, CDS spreads as a measure of default risk will be lower.

Level of foreign reserves changes depends on foreign currency cash inflow and outflow. Source of foreign currency cash inflow not only come from export activities but also from several financial transactions. The examples of the transactions are remittance from foreign country, and foreign currency denominated government debt issuance. Cash outflow of foreign reserves mainly caused by import transaction and international financial obligations.

3.2.6 Inflation rate

Inflation rate is one of indicators which can be used to measure how well economy of a country is managed (Jones, 2010a p.202). High inflation tends to show a bad sign of economic management. Managed inflation accompanied by economic growth is a required condition for sustainable economic growth. Related to investing in government debt instruments, high inflation means a decreasing in the real income gained by investors. Since there is not investor who wants to see its future income decreases, it will naturally react negatively to information about high inflation.

The relation of inflation and bankruptcy rates was investigated by Wadhvani (1986). The study confirmed that inflation increase bankruptcy rate and default premium for private companies.

Borrowing the same logic to be used in sovereign bond issuer case, a positive relationship between the inflation rate and CDS spreads can be expected to occur in a regression analysis.

3.3 Market Sentiment, Global or Domestic?

Market sentiment can take the form of the domestic market sentiment or the global market sentiment. Domestic market sentiment represents investors sentiment whether positive or negative to make investment in the domestic market by buying local financial instrument. Related to Indonesian CDS spreads, this sentiment is argued can be used to measure the direct impact of investors desire to invest in Indonesian financial instrument without differentiating between corporate or government instruments. Positive market sentiment is represented by positive changes (current index is higher than previous index) in Jakarta Stock Exchange index, while negative market sentiment is represented by negative changes.

On the other hand, global market sentiment is measured by using developed stock market index changes. Since United States is the most leading financial market in the world, the index changes in this country are used as a proxy of the global market sentiment. The market sentiment represents global investors desire to invest their money in riskier financial instrument around the world. Hence, positive market sentiment will be represented by positive changes in US market index and vice versa. Dow Jones Industrial Average Index is chosen to reflect global market sentiment.

Dow Jones Industrial Average index is perhaps the most known and the most quoted index in the world. The Dow Jones name comes from The Dow Jones & Company the publisher of The Wall

Street Journal. The index is computed from 30 stocks selected by the company. The index due to its historical background carries a unique index compares to others index which come later, such as Standard & Poor's 500. The Dow Jones index uses price-weighted index rather than market value-weighted index. Consequently, the index gives a higher weight for higher-priced stocks rather than the lower priced stocks. It is implied that since 30 stocks were chosen selectively from the most leading stock in each industry they carry the same market value. One important thing should be mentioned about the index is its divisor. Because stocks that are used to compute the index has been changed several times, the Company has to make sure that any changes except the changing of stock price including in the index, will not change the index (Jones, 2010b p.92).

The index which measures stock price changes in Jakarta Stock Exchange is well known as Jakarta Composite Index (JCI). Different from the Dow Jones Industrial Average index, the Jakarta Composite Index does not use price weighted average index, but market value weighted average index. The index uses all companies stock market value listed in the market. Market value is calculated by timing closing price times and its nominal amount of stocks listed. The base value for index calculation uses 10 August 1982 as the base market value.. As well as the Dow Jones Industrial Average index, the company which responsible for index calculation adjusts any changes in the stock market that do not make the price of index changes such as a stock split and introduction of a new stock.

3.4 Variable Selection Method

There are two variables can be used to reflect a country's fundamental by using daily data. They are Bond Spreads and US Dollar Rate. Daily data for both variables can be accessed from market.

To explain Indonesian CDS spreads the goodness of using both variables or using one of them should be investigated first.

The same situation occurs for market sentiment variables. Global and domestic market sentiment relationship may need to be investigated first before put them in regression analysis. Based on the phenomenon of Indonesian CDS Spreads and stock market index in United States and Indonesia it is argued that market sentiment has a relationship with the spreads. However, which market sentiment can be used to explain better variability of Indonesian CDS spreads is not easy to determine. Even though both market sentiments seem to have nothing to do with default risk measurement, they may offer additional information for explaining variability of Indonesian CDS spreads.

Ismailescu (2010) uses domestic market sentiment, measured by domestic stock exchange index, as additional variable in the study to reveal determinants of CDS spreads. However, using global market sentiment in this research is compelling due to stock market fluctuation during the sample data. Since there is no base theory to select which market sentiment can be used to explain variability of Indonesian CDS spreads, another approach is needed. The approach should be based on statistical test, the test which does not need a basic theory first. Granger causality test offers such a test of causality based on statistical test.

3.4.1 Symmetric Diagonal VECH Model

GARCH model is one of econometric models recently popular in financial analysis. The model is designed to capture volatility clustering. It is able to capture financial time series characteristic

where high volatility followed by high volatility and low volatility followed by low volatility (Seddighi, Lawyer & Katos, 2000; Alexander, 2008; Wang, 2009; Francq & Zakoïan, 2010).

Generalized Auto Regressive Conditional Heteroscedasticity (GARCH) model is a model based on ARCH model. This model is heteroscedastic time varying conditional variance with both auto regression and moving average.

$$y_t = \varepsilon_t, \varepsilon_t \sim N(0, \sigma_t^2) \quad (1)$$

$$\begin{aligned} \sigma_t^2 &= \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_p \sigma_p^2 \\ &= \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^p \beta_j \sigma_{t-j}^2 \end{aligned} \quad (2)$$

Widely adopted GARCH model in the empirical analysis is GARCH (1,1) model where p=1, and q=1. In this simplest case of GARCH model, the conditional variance is:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (3)$$

In multivariate GARCH model, conditional variance is extended to the conditional variance and conditional covariance. GARCH term usually written in h or H. Hence, multivariate GARCH model known as Vector GARCH can also be written as VECG. The simplest possible multivariate in GARCH model is symmetric diagonal VECG GARCH model. Conditional variance or covariance in this model is written as:

$$h_{ij,t} = \omega_{ij} + \alpha_{ij} u_{i,t-1} + \beta_{ij} h_{ij,t-1} \quad (4)$$

Where ω_{ij} , α_{ij} , β_{ij} are parameters.

In this symmetric Diagonal VECM model, variances can never be negative, and the covariance between two series is the same irrespective of which the two series is taken first (Brooks, 2008 p.434). To explain parameters obtained from the model, plain vanilla GARCH parameters interpretation stated by Alexander (2008 p.137) will be used as guidance.

Alexander (2008) mentions that GARCH error parameter α measure how sensitive the conditional covariance to market shocks. Higher α means that covariance is more sensitive to events in market. How long the impact of market shock to conditional covariance persists will be measured by parameter β ; higher β value means that impact of market shock to conditional covariance will persist for a longer time. The sum of $\alpha + \beta$ determines the rate of convergence of the conditional volatility to the long term average level. When $\alpha + \beta$ is relatively large above 0.99 then the term structure of volatility forecast from the GARCH model is relatively flat. GARCH constant parameter together with sum of $\alpha + \beta$ determines the level of the long term average volatility when $\omega / (1 - \alpha - \beta)$ is relatively large then the long-term volatility in the market is relatively high (Alexander, 2008 p.137).

Basis of a GARCH model is actually simple linear regression. Hence, it is argued that GARCH model can be used to select a better variable will be used in regression analysis. Its conditional variance and covariance information amongst variables arguably offers a deeper insight about the relationship of those variables rather than offered by conventional Pearson's Correlation coefficient.

Covariance is a measurement of dependency between two assets. Meanwhile, correlation measure the same thing as covariance, but the figure is divided by the product of their standard deviation (Alexander, 2008 pp.94-95). Covariance value can be used to indicate a linear relationship of two variables. Positive value indicates a positive relationship and a negative value indicates the other one. Bigger value indicates stronger linear relationship whether positive or negative (Anderson, Sweeney & Williams, 2011 p. 120).

Additionally, multivariate GARCH imply that the model can capture not only volatility clustering but also clustering in correlation. Since the GARCH model allows covariance and implicitly correlation to be time variant, it is argued that it can capture the financial and macroeconomics time series better than the conventional model. It can give better information about variable relationship in regard to its strength and its sign.

3.4.2 Granger Causality Test

As it defined by Granger (1969), a variable X can be said to be causal of variable Y if past history of X is useful to predict the future state of variable Y over and above knowledge of the past history Y itself. Granger causality then means a precedence where one time series variable changes before changes in another variable (Studenmund, 2011 p.416).

To see if X Granger caused Y, this regression should be run:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \alpha_1 X_{t-1} + \dots + \alpha_p X_{t-p} + \varepsilon_t \quad (5)$$

To find whether X Granger cause Y or not, null hypothesis testing is conducted by stating that the coefficient of X jointly equal zero. F-test will be used to test the null hypothesis. If the null hypothesis can be rejected, conclusion that X Granger causes Y then can be confirmed.

Using the logic in testing of Granger causality, there are three possible results which are unidirectional, bidirectional, and no relationship. Studenmund (2011 p.417) suggests that test the possibility of bidirectional relationship between two variables to conclude a Granger causality relationship is needed.

Before conducting Granger Causality test, all variables included should be in stationary condition. Dickey-Fuller unit root test will be conducted to test stationary condition of each variable. If variables included in the Granger causality test are not stationary in their level form, then the first difference form of variables will be used to conduct the test.

Basically, Granger causality test is a type of Vector Auto Regression (VAR) model. How many lags need to be included in equation should be decided first. There are several ways can be used to decide how many lags will be included in the equation to get a proper result. Brooks (2010, p.293) mentions two broad methods can be used to select proper lag lengths which are cross-equation restrictions and information criteria. Recently the most common approach is using information criterion such as Schwartz Information Criterion or Bayesian Information Criterion, Akaike Information Criterion, and Hannan-Quinn Information Criterion.

Of those information criteria, there is not one criterion which is superior to others (Thornton & Batten, 1985). However, Schwartz Information Criterion (SIC), which applies the most severe penalty to additional variables, offers a more consistent model (Brooks, 2009 p.233). Since the SIC offers more consistent model, it is argued that Granger Causality test to do variable selection method using SIC criterion is the most appropriate way.

3.5 Hypothesis

Based on the phenomenon of Indonesian CDS spreads fluctuation from January 2007 to July 2010, theories and literature review presented before, it is hypothesized that Indonesian CDS spreads is a function of macroeconomic variables and market sentiment variables.

Since final investigation of this function will use regression analysis, it is hypothesized that independent variables in this function can explain more than 50 % of variability in Indonesian CDS spreads. Coefficient of determination of regression and adjusted coefficient of determination result will be the measurement of the model obtained.

Null Hypothesis is that the coefficient of determination of regression result is more than 0.5.

Alternative Hypothesis is that coefficient of determination of regression result is equal to or less than 0.5. These hypotheses can be written as:

Indonesian CDS spreads = f (macroeconomic variables, market sentiment)

$$H_0 = R^2 > 0.5$$

$$H_A = R^2 \leq 0.5$$

CHAPTER IV

DATA AND METHODOLOGY

4.1 Data

Indonesian CDS spreads data is obtained from Bloomberg. It is spreads of a 10 year contract of credit default swap span from January 1st 2007 to July 31st 2010. Monthly data for Indonesian CDS spreads is obtained by conducting arithmetic mean from all available data in respected month.

Bond spread daily data is obtained from the central bank of Indonesia's website, www.bi.go.id. It is the daily yield spread of government of Indonesia's bond coded INDO'14. This bond with a nominal amount USD 1 billion will mature in March, 10 2014. Bank of Indonesia presents the spreads in negative value. Higher negative value means wider spreads. As well as Indonesian CDS spreads, monthly data for bond spreads is obtained by averaging all data available in respected month using the arithmetic mean.

Daily data of US Dollar rate for this research is gained from financial data in www.finance.yahoo.com span from January 1st 2007 to July 31st 2010. Arithmetic mean is also conducted to obtain monthly data. The rate is the price of one United States Dollar in Indonesian Rupiahs.

Monthly data for Indonesian export data is gained from Indonesia Statistics Agency's (*Badan Pusat Statistik*) website, www.bps.go.id. Data of export value is based on data from all areas in

Indonesia. The figure is a free on board (FOB) value. The agency presents data of export monthly by its value in US Dollar and the weight of goods exported.

Import data used in this research obtained from Indonesia Statistics Agency's (*Badan Pusat Statistik*) website, www.bps.go.id, which issues it regularly in monthly base. The data consists of data from all area in Indonesia excluding free trade zone area. The value is in Cost Insurance and Freight (CIF) value stated in US Dollar denomination.

Foreign reserves data in Indonesia is issued monthly by Indonesian Central Bank (*Bank Indonesia*). Foreign reserves, as reflected by its name, consist of several foreign currencies. However, the level of foreign reserves is presented in US Dollar equivalent to make it easier to compare with others countries' economy. Data for this research is obtained from Indonesian central bank website which is www.bi.go.id.

Inflation or deflation rate in Indonesia is measured by measuring increase or decrease in Customer Price Index. Monthly Consumer Price Index (CPI) is obtained by collecting goods and service prices from 66 cities in Indonesia. Generally, goods and services price are calculated using the arithmetic mean. However, there is an exceptional for some seasonal goods and services which are calculated using the geometric mean. Monthly data for the inflation rate is gained from www.bps.go.id.

Additionally, data related to Indonesian debt management is obtained mainly from Debt Management Office, Ministry of Finance Republic of Indonesia and Bank of Indonesia. The data

consists of information such as the proportion of bond issued based on currency denomination, foreign investors ownership in government bond, and Indonesian credit rating history.

4.2 Methodology

There are several steps will be taken to obtain the final model. The model is aimed to be able to explain variability of Indonesian CDS spreads during January 2007 to July 2010. The steps involve selecting variables and conducting regression analysis.

4.2.1 Investigating Daily Data Relationship and Variable Selection Using GARCH Model

A simple plain vanilla symmetric diagonal VECM GARCH model will be used as a tool of analysis in this regard. The model is chosen because it offers the simplest parameter estimation but still provides the strength of GARCH model. Symmetric GARCH model assumes that response of the conditional variance to negative market shocks is exactly the same as its response to positive market shock of the same magnitude (Alexander, 2008 p.132).

High correlation between dependent variable and independent variables is needed to get a better explanatory power of the regression model. However, the independent variables should not be highly correlated to each other to avoid multicollinearity problem. If there are two competing independent variables, a better independent variable is the one which has a higher correlation with dependent variable. At the same time, it must have not a high correlation with other independent variables.

Using GARCH model as a variable selection tool means that rather than correlation value it is covariance value that will be used as criteria. Better independent variable then means larger potential value of covariance between the independent variable and dependent variable.

4.2.2 Investigating Market Sentiment Role to Indonesian CDS Spreads Using Granger Causality Test

Since this research is mainly interested in one way direction, from market sentiment to Indonesian CDS spreads, the possibility that it can run in other way then will not be explored further. However, bi-directional relationship between domestic market sentiment and global market sentiment will be investigated to find special relationship between them.

To check stationary condition of variables, unit root test using Dickey-Fuller test will be conducted by using a software package, E-Views version 6. Five and ten lags length are set as a-priory maximum lags allowed in the system. This decision is based on a reason that the stock market and credit default swap market are very dynamic. Hence, any changes and information in one market is expected will be transferred to other market almost instantly. Five days lags or one week lags is considered enough to capture the process of information flow from one market to other market. Lag length selection based on maximum five and ten lags criterion then is tested by using econometric software package E-Views 6. Stability of lag length selected by information criterions will be confirmed by using ten lags as a-priory maximum lags. Maximum lag length will be used in the analysis is the lag length selected by Schwartz Information Criterion (SIC).

Pair wise Granger causality test will be confirmed by using Block Exogeneity Wald test provided in E-Views version 6. This test will give a clearer relationship amongst those variables.

4.2.3 Regression Analysis

A multivariate regression analysis will be conducted to find explanatory power of selected independent variables to explain variability of Indonesian CDS spreads. Ordinary Least Square (OLS) regression analysis is chosen as a tool for this analysis. Software package SPSS version 11 will be used as the tool to do the regression analysis.

Multivariate regression model with k independent variables can be represented:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i \quad (6)$$

There will be five independent variables in the first regression analysis. All independent variables are macroeconomic variables, and then the equation will be:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \varepsilon_i \quad (7)$$

Where: Y_i = Indonesian CDS Spreads (CDS)

X_1 = Inflation (INFLATION)

X_2 = Foreign Reserves (FRESERVES)

X_3 = Export (EXPORT)

X_4 = Import (IMPORT)

X_5 = US Dollar rate (USD) or Bond Spreads (B_spreads)

CDS _i	=	Indonesian CDS spreads in basis points
INFLATION _i	=	Monthly inflation rate in percentage
FRESERVES _i	=	Level of foreign reserves owned by Indonesian monetary authorities in thousand of US Dollars
EXPORT _i	=	monthly value of Indonesian goods and services exported to foreign countries in thousand US Dollars
USD _i	=	monthly value of Indonesian goods and services imported to Indonesia in thousand US Dollars
B_SPREADS _i	=	10 year Indonesian Government Bond yield spreads in basis points

The last step taken in the research is investigating explanatory power of statistically significant macroeconomic variables based on the second step (regression with macroeconomic variables as independent variables) and market sentiment based on the result of Granger causality test in the first step.

The model then can be presented as:

$$\text{CDS} = f(\text{macroeconomic variables, market sentiment})$$

Coefficient of determination and adjusted coefficient of determination obtained from this regression analysis and that from previous one will be compared to select the better model. The model which obtains higher value of those coefficients will be selected as the final model.

This research will use Variance Inflation Factor (VIF) as a first step to detect multicollinearity problem in regression result. Variance Inflation Factor (VIF) value more than 2 is treated as a threshold for detecting the presence of multicollinearity. The next step will be taken is temporarily eliminating one variable which has variance inflation factor more than 2. A new regression by excluding that variable then will be conducted. The result will be analyzed by including significant test of coefficient and a investigating whether the multicollinearity problem still exist or not.

Additional multivariate regression analysis will be conducted by including variable that was not selected by variable selection method. This step is conducted to test the possibility of the existence of a better model. Simultaneously, it can be used as a test to confirm the variable selection method used before.

CHAPTER V

INDONESIAN GOVERNMENT BOND

5.1 Structure of Indonesian Government Bond

Indonesian Government Bond consists of domestic currency (Rupiah) denominated bond and foreign currency bond. Biggest part of Indonesian government bond is in Rupiah denominated bond which is issued in the domestic market. On the other hand, foreign currency denominated bond are in US Dollar and Japanese Yen denomination.

US Dollar denominated bond is called global bond. This bond is offered not only to investors in United States market but also to investors in several foreign countries such as Japan, Europe, and Gulf countries.

Japanese yen denominated bond is issued in Japan market. This bond has a special characteristic which is it is guaranteed by Japan Bank for International Cooperation (JBIC). Indonesia is rated BBB- by Japan Credit Rating Agency, but this special Bond is given an AAA rating. The JBIC's guarantee to Indonesian Government Bond made the bond is assumed to have the same bond issued by JBIC itself in Japan market. An AAA rating gave Indonesian government the advantages in lowering its cost of borrowing. The yield offered definitely can be much lower than that of bond in BBB- rating. Moreover it also broadened the investors who can buy the bond. An AAA rating is in investment grade rating. This means that it can be bought by regulated institutions such as Pension fund and insurance companies.

There are two types of bond issued by Indonesian Government based on interest rate of bond coupon. They are fixed interest rate coupon and variable interest rate coupon. Additionally, government of Indonesia also issued zero coupon bonds. It is a bond issued and sold under its par value. While the domestic currency denominated bond consists both types of bonds, fixed rate and variable rate coupons, foreign currency denominated bond recently was issued in fixed interest rate coupon only.

The anchor for variable interest rate in domestic currency denominated bond is the three months Indonesian Central Bank certificate rate (Bank of Indonesia rate). Mean while, fixed interest rate coupon is determined based on the market situation and budget constraint, at the time the bond issued.

Besides normal bond, which is traded in the bond market domestically and globally, government of Indonesia issued not tradable bond. This bond is issued to fulfill special need and cash management amongst government. The example of this type of bond is the bond issued by the government to pay its debt to the central bank. Another example of non tradable bond is the bond issued for managing special account of public fund in Indonesian ministry of religion affair.

As its name means, non tradable bond is arranged based on negotiation between two parties, mostly government institutions. There is no market intervention in this transaction. However, the bond is still recorded in debt management unit as a government debt.

In addition to conventional bond financing, government of Indonesia also issued *Sharia* bond or *sukuk* to diversify its financing sources. This type of bond is based on Islamic law debt structure.

The increasing development of *sharia* based financing instrument made this instrument attractive for any bond issuer. Its potential investors are come from rich oil countries in the gulf area such as Bahrain, Kuwait, and others rich oil producer countries.

One of the main parts which differentiates *sharia* bond from conventional bond is that *sharia* bond does not recognize interest rate in its structure. Instead, it recognizes some benefit for bond buyer based on real economic activity. The real economic activity or underlying asset is also the main ingredients of *sharia* bond issuance. Indonesia's *sharia* bond not only issued in the domestic market but also in the global market. Global *sukuk* is denominated in US Dollar.

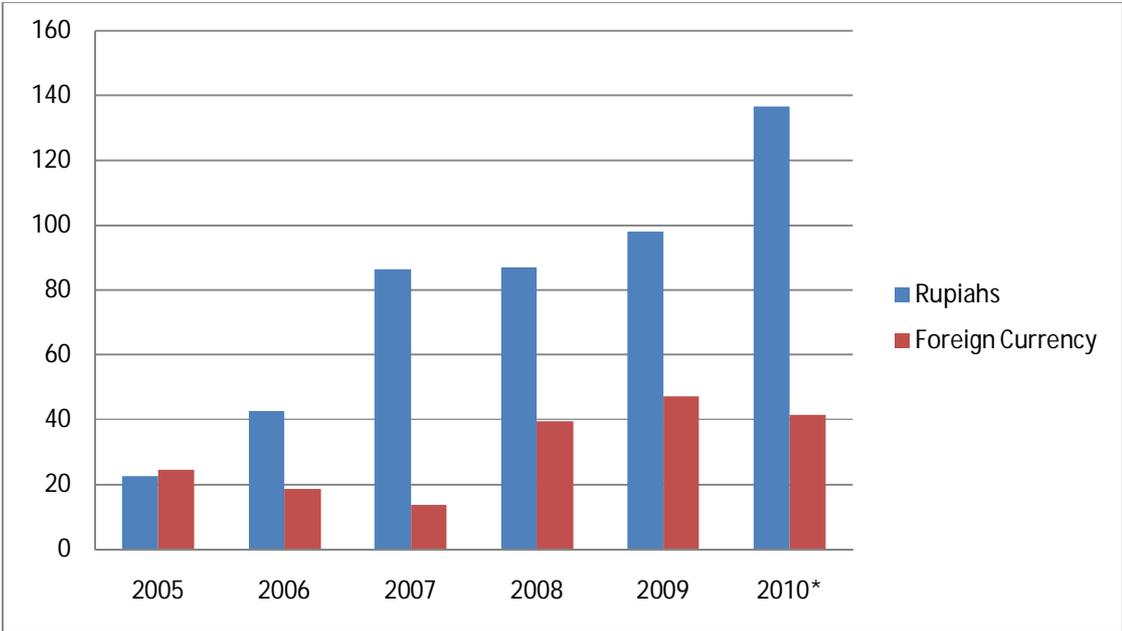
The simplest structure of *sharia* bond, which is used by government of Indonesia, is what is called *Ijara* contract or Sale and Lease Back contract. In this bond contract issuance, government's asset is sold to one Special Purpose Vehicle (SPV) company. The company then will issue bond and sell it to investors to finance the money needed to buy government assets. Right after the government sold its asset, the government will lease back the asset from the SPV Company. Under this lease contract, it is arranged that government will pay a leasing fee to the SPV Company. This leasing fee will be used to pay return to investors who buy the bond. At the time of bond maturity, the government will buy back the asset from the SPV Company. Next, the SPV Company will use the money from the government to pay bond principal to all investors.

In the domestic market, government also issues a new type of bond which is aimed to retail investors. Retail bond par value is set at much cheaper price than price of usual bond. The par value is set at 5 Million rupiahs (around 500 US Dollars).

5.2 Domestic and Foreign Currency Denominated Bond Proportion

Indonesian debt strategy initially is aimed to get finance for budget deficit from as much as it can from domestic financing through bond issuance. This strategy is based on a philosophy that development process should give more benefit to the citizens. The benefit was not only from the expenditure side but also from the financing side.

Figure 2. Proportion of Indonesian Government Bond Issuance 2005-2010 (Trillion Rupiah)



Source: Debt Management Office, Ministry of Finance Republic of Indonesia; * =July 2010

When the amount of government debt to foreign donor increases rapidly, interest cost of the debt consequently will increase. Cash flow from Indonesia to foreign countries in regard of interest

and principal payment increases. This situation creates negative sentiment politically and economically from parliament and other non government organization.

Financial crisis in year 1997/1998 gave a bad experience for Indonesia. External debt financing strategy created a crisis when rupiah was depreciated severely. Nominal amount of debt expanded rapidly due to Rupiah depreciation. Indonesian economy in year 1997 was in good situation. Economic grew almost always in two digits. The situation changed almost instantly in year 1997/1998. Banking system, which was grew rapidly before 1997, collapsed, and brought other real sectors such as manufacturing industries to fall. This situation occurred mainly because of bad management of external debt in foreign currency.

Since the government does not want the crisis in year 1997/1998 happens again, the debt strategy for budget deficit financing was revised. Domestic market will be the main sources for debt financing while at the same time keep decreasing the role of foreign debt.

However, data from 2005 to 2010 shows that nominal amount of bond issued in foreign currency is increasing. This phenomenon may raise a question about the consistency of Indonesian strategy to focus on the domestic market.

On the other hand, the phenomenon may offer a real condition in Indonesian domestic market. That situation may happen because Indonesian domestic market is unable to absorb fund government needed as it is called original sin (Mehl & Reynaud, 2005).

The increasing nominal amount of foreign currency denominated bond naturally will increase exchange rate risk in managing government bond. Any fluctuation in the exchange rate will affect nominal amount of government debt. Appreciation of Rupiah will decrease nominal amount while depreciation of Rupiah will increase the nominal amount of bond. Hence, government needs to be careful in issuing foreign currency denominated bond.

During year 2005-2007 Indonesian strategy to focus more on domestic bond issuance can be seen clearly. The trend of domestic bond issuance in Rupiah was increasing rapidly while the trend for foreign currency denominated bond was decreasing. This phenomenon shows the consistency of government strategy. On the other hand, it might show the new area in the domestic market which was not exploited before. Massive government bond issuance started in year 2005 offered a relatively new fixed income instrument for domestic market players. This euphoria, however, is limited by market capacity to absorb government needs in financing its budget deficit. New developing domestic bond market triggered by government bond could not give all what government wants. Limited investor base and crowding out effect still shadows the developing of domestic government bond market.

Limited capacity of the domestic market to absorb government need can be seen from the composition of bond issuance in year 2008. There was a high increase of bond issuance in foreign currency denominated. In fact, foreign currency denominated bond was issued in the foreign market and aimed to international investors.

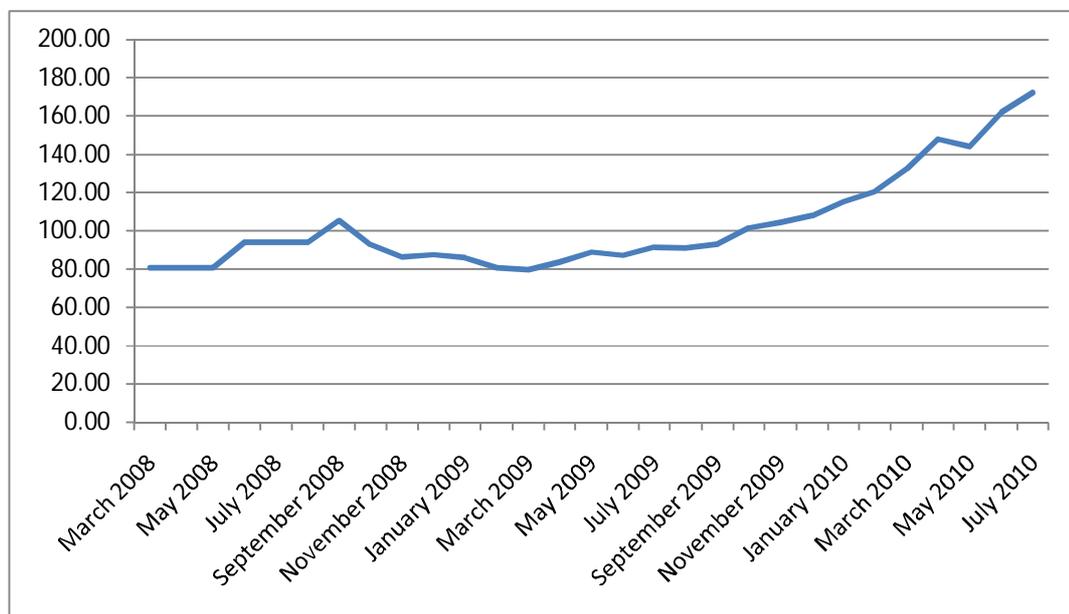
Additionally, year 2008 was the financial crisis year which was marked by liquidity crunch in the global market. The liquidity problem also hampered the domestic bond market. Yield of government bond increased rapidly. At the same time in that year, Indonesian government had to find another source of financing to be able to cover the budget deficit. Aiming to foreign investors in the foreign market and issuing new instruments become alternatives of bond financing taken by the government. That was a year when the government issued global bond and Samurai bond.

5.3 Foreign Investor Ownership in Domestic Government Bond

Record of foreign ownership in Indonesian domestic government bond is available from Debt Management Office's website from March 2008. Figure.3 shows that the trend of foreign investor ownership in domestic government bond is increasing. There was a decrease in the ownership amount from September 2008 to March 2009. After that month, the amount has been increasing continuously.

Foreign investors who invest their money in domestic bond market may offer two interpretations of its cause and effect. In positive point of view, the increasing amount of money invested in Indonesia government domestic bond suggested that they see a higher probability of good economic growth. They believe that their money will give higher return rather than return of investing in other places. This also implied that the government has managed its economy well.

Figure.3. Foreign Investor Ownership in Domestic Government Bond (in Trillions Rupiah)



Source: Debt Management Office, Ministry of Finance, Republic of Indonesia

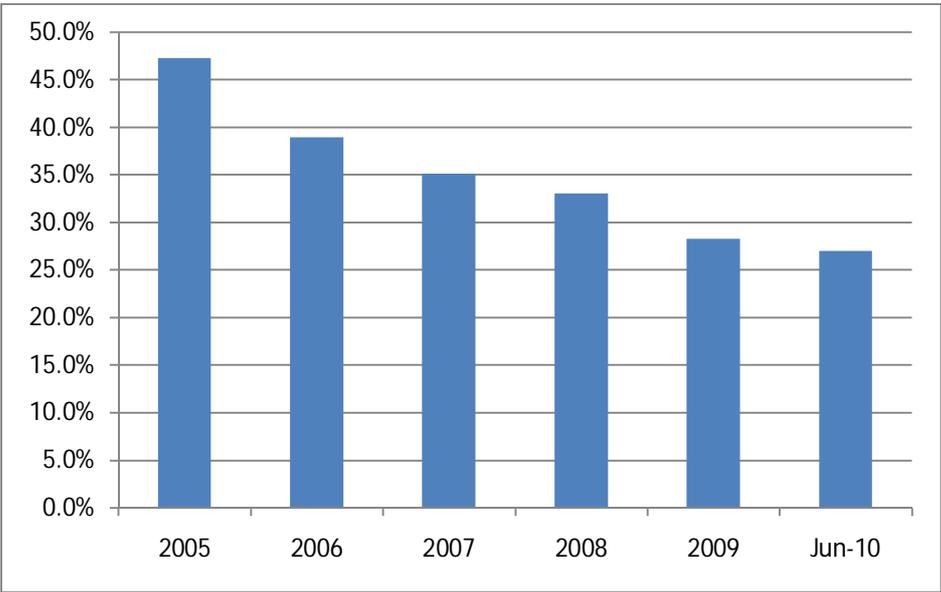
On the other hand, the increasing amount of foreign money invested in domestic bond market may create a potential risk. Hot money effect may hamper Indonesian economy if the money is withdrawn instantly from the system. Hence, government needs to measure the impact of the increasing amount of foreign cash flow invested in domestic bond market carefully.

5.4 Debt to GDP Ratio

One of conventional indicator widely used to measure default risk of one country is the ratio of its debt to Gross Domestic Product. Decreasing ratio of debt to GDP implicitly shows that money from debt was used efficiently in economic growth process. It also shows that the economy is less depends on debt.

The amount of Indonesian government debt was almost 50 % of Indonesia GDP in year 2005. The trend of the ratio was decreasing continuously in subsequent years. In year 2009, the ratio was below 30 %. If default risk is measured merely by debt to GDP ratio, there must be a significant amount of decreasing probability in Indonesian government debt default risk.

Figure 4. Indonesian Debt to GDP Ratio



Source: Debt Management Office, Ministry of Finance of Republic of Indonesia

5.5 Credit Rating History

From year 2007 Indonesia’s credit rating is not changing a lot. However, there is an increasing trend toward a better rating.

Table 2 presents information that Indonesian credit rating did not change much from year 2005 to year 2010. Even for year 2008 when the financial crisis occurred, rating agencies mostly affirm that Indonesia creditworthiness did not change. The situation implied that Indonesia did not get

any impact of financial crisis in regard to its creditworthiness. This might be true or wrong. In fact, financial crisis in year 2008 had made Indonesian economy downturn and projected economic growth should have been revised down.

Table 2. Indonesian Credit Rating History from 2005 to July 2010

Date	Standard & Poors	Moody's	Fitch	Rating & Investment	Japan Credit Rating Agency
January, 27 2005			BB-		
May 19 2006		B1			
July 26 2006	BB-				
October 12 2006				BB-	
September 21 2006					BB-
2007					
September 2					BB
October 22		Ba3			
October 31				BB+ (affirmation)	
2008					
February 14			BB		
September 25					BB (affirmation)
November 7	BB- (affirmation)				
December 23		Ba3			
2009					
January 21			BB (affirmation)	BB+ (affirmation)	
February 5					BB (stable)
June 11		Ba3 (positive)			
July 7					BB+
September 16		Ba2			
October 23	BB- (positive)				
2010					
March 12	BB				
June 21		Ba2 (positive)			
July 13					BBB-

Source : www.bi.go.id

The evidence that Indonesia credit rating did not change during the financial crisis in year 2008 raise a question about the ability of credit rating to measure actual creditworthiness of one country. The credit rating could not explain why Indonesia had a problem in issuing its bond during the financial crisis due to increasing yield asked by investors. At the same time, another indicator of credit default risk shows a better measurement related to the real situation in financial market.

CHAPTER VI

EMPIRICAL RESULT AND MANAGERIAL INSIGHT

6.1 Relationship Amongst Variables Based on GARCH model

Table 3 and Table 4 present the result of the conditional variance and covariance parameters based on symmetric Diagonal VECH model. The model is conducted to investigate the relationship amongst daily variables of Indonesian CDS spreads, Bond spreads, US Dollar rate, changes in Dow Jones Industrial Average index and changes in Jakarta Stock Exchange index.

Table 3. Result of Symmetric Diagonal VECH GARCH Model

No.		Variables		ω	α	β
1	Variance	Bond Spreads		102.35 (0.0000)	0.8421 (0.0000)	0.0759 (0.0000)
2	Variance	CDS		46 (0.0000)	0.8473 (0.0000)	0.0701 (0.0002)
3	Variance	DJIA CHNGS		556 (0.0000)	0.0698 (0.0000)	0.9062 (0.0000)
4	Variance	JKSECHNGS		206 (0.0000)	0.1721 (0.0000)	0.6689 (0.0000)
5	Variance	USD		1278 (0.0000)	0.8698 (0.0000)	0.0558 (0.0010)
6	Covariance	CDS	Bond Spreads	-36.52 (0.0000)	0.8406 (0.0000)	0.0739 (0.0001)
7	Covariance	Bond Spreads	DJIA CHNGS	485.38 (0.0000)	-0.2035 (0.0001)	0.0817 (0.2639)
8	Covariance	Bond Spreads	JKSECHNGS	3.38 (0.0127)	0.0023 (0.2373)	0.9503 (0.0000)
9	Covariance	Bond Spreads	USD	-113.11 (0.0000)	0.8486 (0.0000)	0.0699 (0.0001)
10	Covariance	CDS	DJIA CHNGS	-379.56 (0.0000)	-0.2077 (0.0000)	0.0286 (0.7199)
11	Covariance	CDS	JKSECHNGS	-7.79 (0.0257)	0.0035 (0.1666)	0.9266 (0.0000)
12	Covariance	CDS	USD	134.88 (0.0000)	0.8455 (0.0000)	0.0719 (0.0001)
13	Covariance	DJIA CHNGS	JKSECHNGS	59.61 (0.3403)	-0.0013 (0.9171)	0.9193 (0.0000)
14	Covariance	DJIA CHNGS	USD	-1307.91 (0.0000)	-0.199 (0.0001)	0.0696 (0.3821)
15	Covariance	JKSECHNGS	USD	-77.38 (0.0000)	0.0025 (0.5091)	0.834 (0.0000)

Table 4. Variance and Covariance matrix

	CDS	DJIACHNGS	JKSECHNGS	B_SPREAD	USD
CDS	42170.00	-1954.339	-910.2330	-55614.78	169641.2
DJIACHNGS	-1954.339	27368.02	930.3497	2248.585	-3602.196
JKSECHNGS	-910.2330	930.3497	1489.655	800.4125	-935.0178
B_SPREAD	-55614.78	2248.585	800.4125	77918.10	-245723.6
USD	169641.2	-3602.196	-935.0178	-245723.6	922707.0

All variance parameters for CDS, B_SPREAD, and USD are statistically significant with p-value 0.0000. Parameters for error (α) are much higher than those for previous variance parameters (β). If the error is defined as market events or market shock then the result suggest that the variance for those variables are very sensitive to market shock or market events. Moreover, the relatively small value of parameter β suggests that market shock to those variables will be less persistent.

Parameters of the conditional variance for changes in Dow Jones Industrial Average index (DJIACHNGS) and changes in Jakarta Stock Exchange index (JKSECHNGS) are also statistically significant. The parameters imply that the variables are less sensitive to market shock, but depend more on previous variance. This result confirms widely known fact about volatility in the stock market return that volatility in the market is persistence due to effect of previous volatility.

Covariance of CDS and Changes in Dow Jones Industrial Average index shows a high constant parameter, and relatively low parameter for market sensitiveness. Parameter for persistence shows an insignificant parameter. The result suggests that the covariance of CDS and changes in DJIA relatively high but it is sensitive to market events. Meanwhile, the impact of previous covariance is insignificant. While they tend to move together, the movement is sensitive to events in the market. This result suggest a common shock that work to both variables.

On the other hand, parameters of the conditional covariance of CDS and Changes in Jakarta Stock Exchange index show relatively low of constant parameter, insignificant market sensitiveness, and highly persistence the effect of previous covariance. Hence, it can be concluded that even though the covariance relatively low but it tends to stay for a long time.

Covariance of DJIA changes and JKSE changes shows a positive constant parameter which suggests a positive relationship of them. Insignificant parameter market sensitiveness suggests that market event does not give impact to the relationship. Highly persistence of previous covariance impact shows a relatively stable co-movement relationship.

Volatilities of three variables, CDS, USD and B_SPREAD, are very sensitive to market events. This explain why during the financial crisis their value volatile severely, but during relatively more stable global economy their volatilities are low.

Parameters of Changes in the stock market index reveal information that developed stock market volatility relatively influenced more by previous volatility rather than shock in market. Indonesian stock market volatility is more sensitive to market events, but the impact is less persistence.

To find a better variable to be included in regression analysis, which Indonesian CDS spreads is chosen as dependent variable, conditional covariance of competing variables should be compared.

Competing variables in daily macroeconomic variables are B_SPREAD and US Dollar rate. It is shown on Table 3 that constant parameter conditional covariance of B_SPREAD and CDS (-36.52) is lower than conditional covariance of US Dollar rate and CDS spreads (134.88). Moreover, parameter for market sensitivity (α) of CDS and USD is higher than that of CDS and B_SPREAD. It can be argued that conditional covariance of USD and CDS suggests a stronger relationship rather than CDS and B_SPREAD. Since conditional covariance also implies a conditional correlation, USD is argued to be has a higher correlation with CDS. Hence, USD is a better variable to be included in regression analysis rather than B_SPREAD.

Moreover, parameters of covariance of B_SPREAD and USD show a relatively high figure compare to those of covariance of B_SPREAD and CDS and those of covariance of USD and CDS. This result suggests that including both variables in regression analysis will not be a wise decision. It is predicted that multicollinearity problem will arise if both variables are included together as independent variables.

While parameter of the conditional covariance comparison between B_SPREAD-CDS and USD-CDS can be done straight forward, it cannot be done for CDS-DJIACHNGS and CDS-JKSECHNGS. Insignificant parameter made the comparison is difficult to do.

6.2 Granger Causality Test Result

Result of Dickey-Fuller Test for three variables, Changes in Indonesian CDS spreads (CDSCHNGS), Changes in Dow Jones Industrial Average index (DJIACHNGS), and Changes in Jakarta Stock Exchange index (JKSECHNGS) is shown in Table 5. Dickey-Fuller test statistics

of all variables are less than 1 % t-statistic value. The result confirms that all variables to be investigated in the test have not unit root. Hence, they are all already stationary.

Table.5 Dickey- Fuller Test Result

	CDS CHNGS	DJIA CHNGS	JKSE CHNGS
Exogenous: Constant			
Lag Length: (Automatic based on SIC, MAXLAG=20)	6	0	0
Dickey-Fuller test statistic	-13.97836	-34.29971	-28.14310
Probability: (MacKinnon (1996) one-sided p-values)	0.0000	0.0000	0.0000
Critical Value : 1% level	-3.437695	-3.437643	-3.437643
Critical Value: 5% level	-2.864672	-2.864649	-2.864649
Critical Value: 10% level	-2.568491	-2.568479	-2.568479

Pairwise Granger causality test result is presented in Table 6. Schwartz Information Criterion selects two lags length as stable and optimum lags to capture dynamic relationship amongst variables. F statistic value of Pair wise Granger causality test between Changes in Dow Jones Industrial Average Index and Changes in Indonesian CDS spreads shows a significant result at 5 % significance level. The result implies that we can reject the null hypothesis that Changes in Dow Jones Industrial Average Index does not Granger Cause Changes in Indonesia CDS spreads. Then, there is Granger causality from changes in Dow Jones Industrial Average index to changes in Indonesian CDS spreads.

Table 6. Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Sample: 1 860			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
DJIACHNGS does not Granger Cause CDSCHNGS CDSCHNGS does not Granger Cause DJIACHNGS	858	5.26423 0.27493	0.00534 0.75969
JKSECHNGS does not Granger Cause CDSCHNGS CDSCHNGS does not Granger Cause JKSECHNGS	858	1.42554 9.35002	0.24095 9.6E-05
JKSECHNGS does not Granger Cause DJIACHNGS DJIACHNGS does not Granger Cause JKSECHNGS	858	1.51976 6.26254	0.21936 0.00200

F statistic value of Granger causality test between changes in Jakarta Stock Exchange Index and Changes in Indonesian CDS spreads shows F statistic value 1.42554 with the probability value 0.24095. Since probability value is higher than 0.05, the null hypothesis that Changes in Jakarta Stock Exchange Index does not Granger cause Changes in Indonesian CDS spreads cannot be rejected. Hence, Granger causality from Changes in Jakarta Stock Exchange index to Changes in Indonesian CDS spreads cannot be confirmed. The result implies that previous value of Changes in Jakarta Stock Exchange index cannot be used to improve prediction of Changes in Indonesian CDS spreads better than the previous value of the Changes in CDS spreads itself.

Based on F statistic value of Granger causality test between Changes in Dow Jones Industrial Average Index and Changes in Jakarta Stock Exchange Index test, there two result can be obtained. The null hypothesis that Changes in Jakarta Stock Exchange Index does not Granger Cause Changes in Dow Jones Industrial Average Index cannot be rejected. On the other direction,

the null hypothesis that Changes in Dow Jones Industrial Average Index does not Granger Cause Changes in Jakarta Stock Exchange index can be rejected.

The Granger causality test confirms the claim that stock market index in under developed country mostly following market sentiment of stock market in developed country. The Granger causality test result also has a meaning that Changes in Jakarta Stock Exchange Index can be predicted by including previous value of Changes in Dow Jones Industrial Average Index.

To find a clearer relationship of dependency amongst variables, Block Exogeneity Wald test is conducted for those variables. The result is shown in Table 7.

Wald test as it is shown in Table 7 suggests that Changes in Dow Jones Industrial Average index can be used as independent variable to explain Changes in Indonesian CDS. On the other hand, Changes in CDS and Changes in Jakarta Stock Exchange index are not good independent variables to explain Changes in Dow Jones Industrial Average index. The result also reveals that Changes in Jakarta Stock Exchange index depends on Changes in CDS and Changes in Dow Jones Industrial Average index.

Based on the Granger causality tests then it can be concluded that Changes in Dow Jones Industrial Average index (DJIACHNGS) is a better variable to make a better prediction of changes in Indonesian CDS spreads rather than JKSECHNGS. Then, Changes in Dow Jones Industrial Average Index will be used as independent variable reflecting market sentiment in subsequent regression analysis.

Table 7. Block Exogeneity Wald Test Result

VAR Granger Causality/Block Exogeneity Wald Tests			
Sample: 1 860			
Included observations: 858			
Dependent variable: CDSCHNGS			
Excluded	Chi-sq	df	Prob.
DJIACHNGS	10.35703	2	0.0056
JKSECHNGS	2.698952	2	0.2594
All	13.23603	4	0.0102
Dependent variable: DJIACHNGS			
Excluded	Chi-sq	df	Prob.
CDSCHNGS	0.152046	2	0.9268
JKSECHNGS	2.634719	2	0.2678
All	3.184983	4	0.5274
Dependent variable: JKSECHNGS			
Excluded	Chi-sq	df	Prob.
CDSCHNGS	17.74469	2	0.0001
DJIACHNGS	11.59066	2	0.0030
All	30.50095	4	0.0000

6.3 Regression Analysis Result

There are three regression analyses conducted in this research. Each of them is conducted by step by step including additional independent variable into the system.

6.3.1 Independent Variables : Macroeconomic Variables

Five macroeconomic variables are treated as independent variables. They are Foreign Reserves, Export, Import, Inflation rate, and US Dollar rate. Bond spreads is not used due to reason suggested by variable selection method conducted previously. The result of this regression analysis is presented in Table 8.

Table 8. Regression Result, Independent Variables: Macroeconomic Variables

	Dependent Variable : Indonesian CDS spreads					
	Coefficient		Std. Coefficient	t-statistic	Sig.	VIF
	B	Std. Error				
Constant	-1196.872	195.576		-6.12	0.000	-
F_Reserves	-0.006	0.002	-0.319	-3.546	0.001	1.583
Import	0.028	0.006	0.386	4.391	0.000	1.514
USD	0.169	0.015	0.826	10.928	0.000	1.120
N=	42					
F-Test	52.379					
Sig.	0.0000					
R	0.895					
R ²	0.801					
Adjusted R ²	0.796					
Durbin-Watson	1.215					

Regression result gives F statistic value 52.379 and highly significant coefficient. This means that all coefficients in the regression equation have a value different from zero. The coefficient of determination (R^2) is quite high which has a meaning that around 80.1 % of variability in Indonesian CDS spreads can be explained by three independent variables which are US Dollar rate, Import, and Foreign Reserves. Two variables are found to be not significant in regression analysis. They are inflation and export.

Using only macroeconomic variables, Indonesian CDS spreads function can be written as:

$$\text{CDS} = -1196.872 - 0.006 \text{ F_RESERVES} + 0.028 \text{ IMPORT} + 0.169 \text{ USD}$$

Foreign reserves coefficient is statistically significant at 5% level and it has the expected sign. A rise by one thousand US Dollar in Indonesian Foreign Reserves will decrease Indonesian CDS spreads by 0.006 point.

Indonesian import is highly statistically significant in explaining variability of Indonesian CDS spreads. It has expected sign. A rise of one thousand US dollars in import will increase Indonesian CDS spreads by 0.028 basis points.

US Dollar rate coefficient is highly significant in explaining Indonesian CDS spreads. It has a positive sign as expected. The significant role of US Dollar rate to CDS spreads can be seen also from its beta. High beta (0.826) reflects US Dollar rate explanatory power in explaining every one point of Indonesian CDS spreads.

6.3.2 Independent Variables: Macroeconomic Variables and Market Sentiment

There are two variables eliminated from initial regression which including market sentiment in the regression analysis. They are Import and Foreign reserves. They are eliminated due to insignificant coefficient result test conducted after multicollinearity problem was detected.

Final regression, which consists of two variables US Dollar rate and Changes in Dow Jones Industrial Average index, is presented in Table 9. The regression equation has a coefficient of

determination value 0.830. This value implies that 83 % of variability in Indonesian CDS spreads can be explained by two variables, which are US Dollar rate and Changes in Dow Jones Industrial Average index. F statistic value is 95.031 with significance probability 0.000. This value confirms a conclusion that regression analysis is significant in explaining variability in Indonesian CDS spreads.

Final Regression equation can be written as:

$$\text{CDS} = -1200.893 + 0.156 \text{ USD} - 0.124 \text{ DJIA CHNGS}$$

Table 9. Regression Result, Independent Variables: Macroeconomic Variables and Market Sentiment

	Dependent Variable : Indonesian CDS spreads					
	Coefficient		Std. Coefficient	t-statistic	Sig.	VIF
	B	Std.Error				
Constant	-1200.893	132.644		-9.054	0.000	
DJIA CHNGS	0.156	0.014	0.763	11.363	0.000	1.033
USD	-0.124	0.022	-0.38	-5.663	0.000	1.033
N=	41					
F-Test	95.031					
Sig.	0.0000					
R	0.911					
R ²	0.83					
Adjusted R ²	0.821					
Durbin-Watson	1.318					

6.3.3 Test of Including Bond Spreads Variable

Last step in regression analysis is including Bond Spreads as additional independent variable. This step is taken to test a possibility that the final model explanatory power can be improved by adding one more independent variable. Moreover, this last step can be used to confirm variable selection suggested by GARCH model before.

Table 10. Regression Result by Including Bond Spreads as Independent Variable

	Dependent Variable : Indonesian CDS spreads					
	Coefficient		Std. Coefficient	t-statistic	Sig.	VIF
	B	Std.Error				
Constant	312.669	141.703		2.207	0.0330	
DJIA CHNGS	-0.045	0.012	-0.139	-3.717	0.0010	1.467
USD	-0.027	0.017	-0.134	-1.643	0.1090	7.036
B_SPREADS	-0.764	0.064	-1.037	-11.875	0.0000	8.012
N=	41					
F-Test		337.795				
R		0.982				
R ²		0.964				
Adjusted R ²		0.961				
Durbin-Watson		1.258				

The result shown in Table 10 confirms the prediction by GARCH model variable selection method before that there is a high correlation between US Dollar rate and Bond spreads. Severe multicollinearity of two variables is detected by unexpected sign of USD and high VIF value. Hence, bond spreads cannot be included as additional independent variable.

6.4 Managerial Insight

In order to understand better how the model can explain variability of Indonesian CDS spreads during January 2007 until July 2010, relation of each variable should be investigated carefully. Kindleberger (2002) explains modes of transmission of shock in one country economy to others. There are several channels from commodity price, interest rate movement to pure psychology. Moreover, the channels may take into various forms and inter related each other (Kindleberger, 2002 p.119).

6.4.1 Insignificant Variables

This section will try to explain how did a shock in one variable transmitted to other variable. The possible explanation why some macroeconomic variables, which are proven to be significant in explaining CDS spreads in previous studies, become insignificant in this research also will be explored.

6.4.1.1 Changes in Jakarta Stock Exchange Index

Stock market index usually changes lead to changes in country economy. Jones (2010b pp.334-335) states that stock prices get its peak typically one year before economic recession. On recovery time it usually leads the recovery four months before. More specifically, studies which investigates corporate stock and CDS spreads relationship reveals that there is bi-directional causality between stock prices in the stock market and CDS spreads in credit default swap market. Hence, changes in Jakarta Stock Exchange index theoretically will lead changes in Indonesian economy. Next, changes in Indonesian economy will change credit worthiness of Indonesia as reflected in CDS spreads. However, Granger causality test reveals that changes in Indonesian CDS spreads lead changes in Jakarta Stock Exchange index. Moreover, the test also confirms that the information flows from developed stock market to developing stock market and not vice versa (Soydemir, 2000).

The result should be interpreted that during the sample period Indonesian CDS spreads is influenced more by global market sentiment than the domestic market sentiment. Investor in credit default swap market captured information from shock in United States stock market faster than they captured information from Jakarta stock market. Even though changes in Jakarta Stock

Exchange index reflects a better measurement of Indonesian economy, investors seem to assume that what happen in United States economy soon or later will impact the economy of Indonesia. Hence, during the downturn of United States economy, investors react fast to adjust risk calculation of emerging economies such as Indonesian economy as reflected in the spreads changes (Kim, Loretan & Remolona, 2010).

However, this research assumes that there is a same process when positive changes or positive economy news occur in United States. Investors naturally react differently to bad news and good news. Another approach such as threshold GARCH may reveal such a relationship which is beyond the scope of this research.

6.4.1.2 Inflation

The result that inflation did not have significant power to explain variability of Indonesian CDS spreads is quite surprising. Many previous studies confirmed that inflation plays a significant role in explaining default risk of one country, for example study by Wardhani (1986). Theory also suggests that inflation reflects how government manages its economy. Positive relationship between inflation and default risk was expected in the regression analysis.

Theoretically, inflation influences country's economy and price calculation of government bond. Higher inflation will decrease purchasing power of money obtained from bond return. Increasing inflation will decrease bond price and increase bond yields (Jones, 2010b p. 455). Higher or lower inflation rate reflects dynamics of government role in managing its economy. Hence,

higher or lower inflation should be reflected in CDS spreads. However, the regression analysis shows that this variable is not significant in explaining variability of Indonesian CDS spreads.

The result may suggest a fact that investors did not really care about small changes of monthly inflation in Indonesia. The fact that inflation in Indonesia was relatively stable during the sample period may support this opinion. Investors saw a relatively stable inflation in Indonesia; hence they did not take it into their calculation in pricing Indonesian default risk. Instead, they reacted more to other variables than inflation. Another explanation may lay on the assumption that investors already predict Indonesian inflation rate. During the sample period, the Indonesian inflation rate relatively does not fluctuate severely. Hence, investors may already contain information of the inflation rate in their risk calculation.

Most of previous studies confirmed that the inflation rate is significant in explaining variability of sovereign CDS spreads. The explanation and the reason why this not happen in explaining one country case may also be given from historical study conducted by Mauro, Sussman & Yafeh (2006).

Mauro, Sussman & Yafeh (2006) investigate the differences between previous period and recent period of credit risk determinants. They conclude that country specific fundamentals recently play a less significant role in explaining bond spreads rather than they did in the past (Mauro, Sussman & Yafeh, 2006 p.104). This conclusion helps explanation about the role of country specific fundamental such as inflation rate in explaining country credit risk.

6.4.1.3 Export

The insignificant of export variable in explaining variability of Indonesian CDS spreads may be caused by its relation with other variables especially import and foreign reserves. The explanation about the role of Indonesian export and trade during the financial crisis is investigated by Siregar & Wiranto (2009) and Patunru & Zetha (2010).

Transmission of shock in one country to another country can take the form in trade link. During year 2008 to 2009, United States was in down turn economy situation. From international trade channel of shock transmission point of view, it can be understood that down turn of United States economy will make demand for foreign goods in United States market decrease. Consequently, all countries with high dependence in exporting their products to United States will face a situation where demand for their products decreasing. Export value of those countries to United States then decreasing severely. This situation pulls those exporter countries to have same down turn economy due to deterioration of their export revenue.

Analyzing Indonesian economic resilience during the financial crisis, Patunru & Zetha (2010) and Siregar & Wiranto (2009) argued that the resilience of Indonesian economy is caused by huge domestic market and the fact that relatively Indonesian economy is less dependent on export for its growth. Indonesia fortunately did not depend on export revenue from United States like other countries. Indonesian export destination more diversifies than, for example, export destination of Malaysia or Vietnam. Indeed, United States is only the third Indonesia trade counter party. The main export destination is Japan and China. Hence, Indonesia did not face first round effect of economic down turn in United States. Additionally, goods exported from

Indonesia mainly consist of raw material. This help to explain why Indonesian export relatively was not influenced severely from down turn in the global economy.

Moreover, share of export activities to Indonesian domestic product is only one third. The main contribution to domestic product growth comes from consumption. During the year of financial crisis this consumption played as a buffer for shock in Indonesian economy (Patunru & Zetha , 2010).

Looking to this phenomenon of Indonesian export, it is understandable that export variable does not contribute significantly in explaining variability of Indonesian CDS spreads. This suggests that shock transmission from developed countries to Indonesian economy might not run through trade channel, but through other channel.

6.4.1.4 Foreign Reserves and Import

Foreign reserves and import variables are statistically significant in explaining variability of Indonesian CDS spreads before market sentiment variable included in regression analysis. This phenomenon suggests that variability of those variables is dominated by global market sentiment.

The big three origin of Indonesian import comes from Asian countries which are People Republic of China, Japan, and Singapore. On the other hand, United States is only fourth Indonesian import trade partner. As well as export value, the impact of financial crisis shock from the global economy to Indonesian economy took the form in the second round effect from United States via

those of trade partner countries rather than first round effect from developed countries (Patunru & Zetha , 2010).

6.4.1.5 Bond Spreads

As it has already predicted by GARCH model in variable selection, Bond spread and US Dollar rate have a high correlation. Hence, including both variables as independent variables will face severe multicollinearity problem.

6.4.2 Significant Variables

This section will explore the explanation of both significant variables in the final model to variability of Indonesian CDS spreads. Transmission of shock of both variables and possible causal relation also will be explored here.

6.4.2.1 US Dollar Rate and Indonesian Credit Default Risk

Regression analysis suggests that high rate of US Dollar to Indonesian Rupiah will make Indonesian credit default risk increases. The increasing of Indonesian credit default risk is reflected in increasing of spreads/premium in Indonesian Credit Default Swap.

The transmission process from increasing or decreasing of US Dollar rate to Indonesian credit default risk can be understood that it works in almost a direct process. Higher US Dollar rate will make the nominal amount of foreign currency denominated Indonesian bond, mostly in US Dollar denomination, also increases. Anything else being constant, the increasing amount of

nominal debt will decrease government ability to pay its obligation in paying coupon and principal.

The decreasing ability to pay coupon and bond principal will make one country getting close to default situation. Hence, premium should be paid by investors who want to protect their investment from such a default situation naturally will increase. In credit default swap market, this situation means that spreads or premium of Indonesian CDS spreads will increase.

Reverse situation will occur when Indonesian Rupiah is appreciated against US Dollar. Anything being constant, Rupiah appreciation (US Dollar depreciation) will make nominal amount of Indonesian foreign currency denominated bond decreases. This means that government ability to pay coupon and principal will increase. The increasing ability will be reflected naturally in Indonesian CDS spreads. It will go lower than before.

Generally, appreciation or depreciation of currency is a result of supply and demand mechanism. As the law of supply and demand constitutes, increasing supply of goods will make the price lower and decreasing supply will make it higher. On the other hand, an increase in demand of goods will make the price higher and vice versa.

In Indonesian Rupiah and United States Dollar case, more supply of United States Dollar in Indonesian economy will make the price of Dollar in Indonesian rupiah decrease. The source of US Dollar supply can come from many sources. Main sources are export revenue, remittance from foreign countries, government and private US Dollar debt, and foreign investment. On the

other hand, demand for US Dollar currency mainly comes from the needs to pay foreign debt and import expenses.

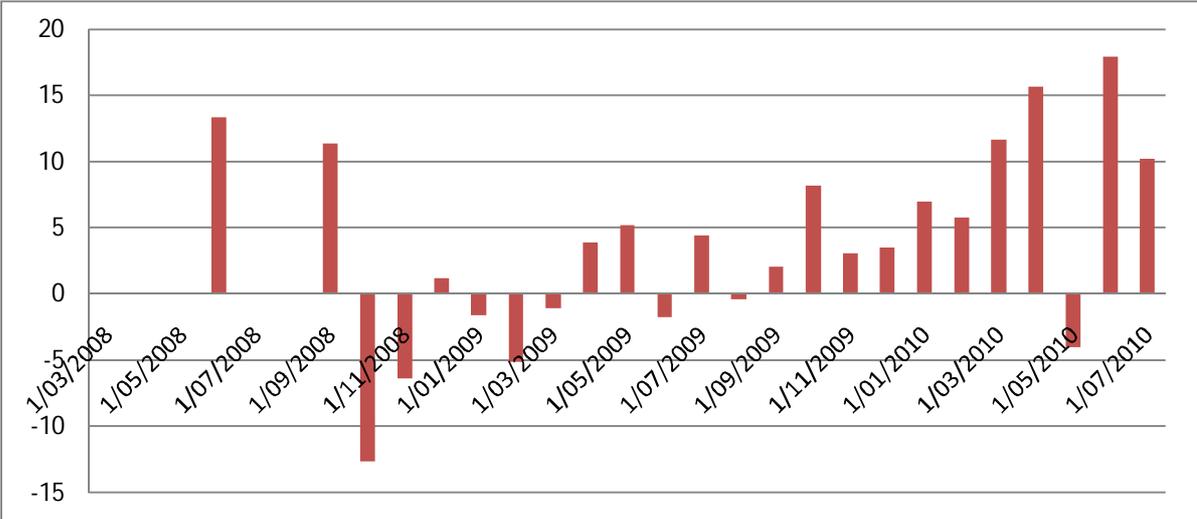
During year 2007 to June 2010, several events regarded this flow of US Dollar currency to Indonesian economy can be seen. Indonesian export and import during year 2007 and 2008 were still relatively stable, even though financial crisis due to subprime mortgage started to be revealed on midyear 2007. Shock to Indonesian export and import started to emerge in the end of year 2008 and in the beginning of year 2009 (Patunru & Zetha , 2010).

Financial crisis in United States made the economy of other developed countries slowed down. The recession in United States and other developed countries soon directly or indirectly made Indonesian export to developed countries decrease. This situation made supply of US Dollar to Indonesian decrease. From supply and demand perspective, this situation made the price of Dollar increase and consequently Indonesian Rupiah was depreciated.

Fluctuation in foreign investment can be seen from the fluctuation of foreign investors in Indonesian domestic government bond presented in Figure 5. During year 2007, trend of foreign investment in Indonesian domestic government bond was increasing. This situation was changes when the financial crisis threat becomes uncovered especially after the collapsed of Lehman Brothers on September 2008. Foreign investors pulled out their investments in almost all emerging countries including Indonesia to cover their loss in their own country market.

This situation was a double shock for relationship of Indonesian Rupiah and United States Dollar. From the supply side, there was a sudden stop of investment inflow. From demand side point of view, there was a demand increase in US Dollar. Both sides made Indonesian Rupiah depreciated severely.

Figure.5. Changes of Foreign Investor Ownership in Domestic Bond (Trillion Rupiah)

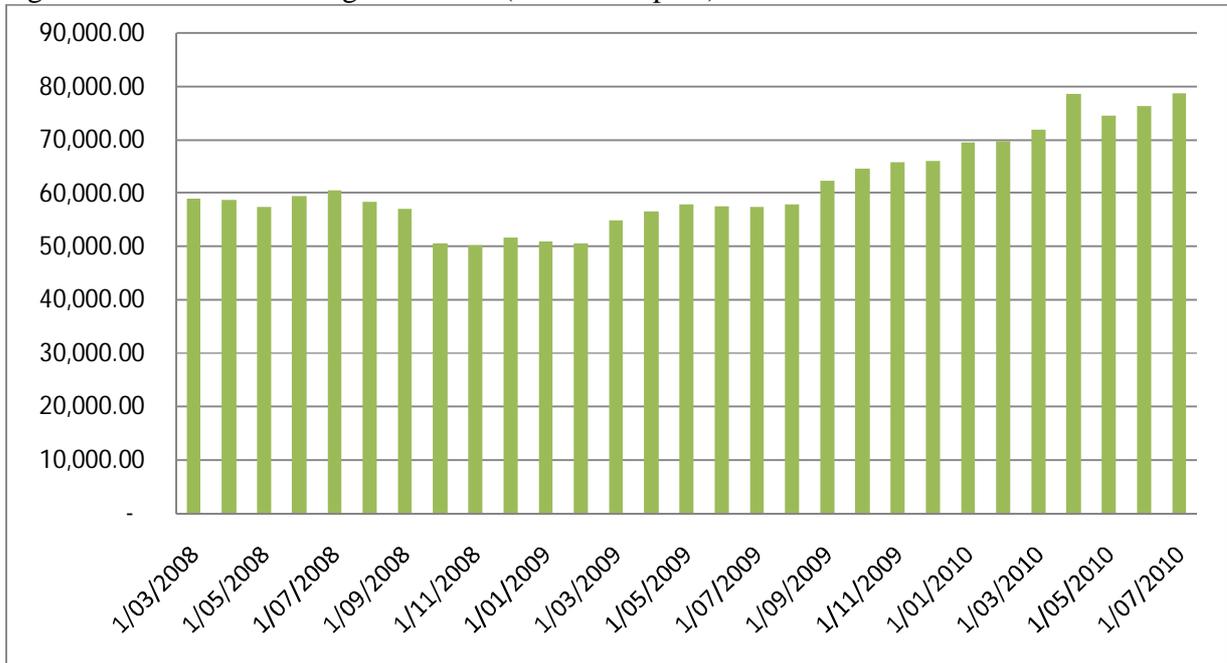


Source: Debt Management Office, Ministry of Finance, Republic of Indonesia

However, situation was changes again in year 2009 and after. Middle year of 2009 was a turning point for foreign investment in Indonesia. There was a quite massive foreign currency inflow invested in Indonesian economy. This situation can be seen from the trend of foreign investor’s investment in Indonesian domestic government bond and increasing trend of Foreign reserves.

Regarding to the issue of foreign investment flow to emerging market such as Indonesia, differentiation between the investment flow caused by fundamental economy reason and the investment caused by just temporary over liquidity in developed countries should be carefully investigated.

Figure 6. Indonesian Foreign Reserves (Trillion Rupiah)



Source: Bank of Indonesia

Baek (2006) studies factors determine portfolio investment flows to Asian and Latin America economies. The study aimed to investigate whether portfolio investment flows is caused by ‘pull’ or ‘push’ factors. He finds that while investment flows to Latin America mostly caused by fundamental economic growth, investment flows to Asian economies is pushed by investors sentiment about risk calculation. In other word, investment flows to Asian economies is mostly a hot money effect (Baek, 2006). Consequently, sustainability of such investment depends on the global market factors and sentiments rather than fundamental economy.

Data from January 2007 to July 2010 shows that fluctuation in the amount of government domestic bond held by foreign investors followed market sentiment. Hence, government of Indonesia should be careful in managing foreign investment flow to Indonesian economy. There

is always possibility that foreign investors may withdraw their money instantly when global financial factors push them to do so. They did it in year 2007 and 2008, and they may do it again next time.

Central bank can influence the movement of foreign exchange rate by increasing or decreasing benchmark interest rate. In Indonesia, it is done through one instrument called Bank of Indonesia rate (BI rate). Increasing BI rate will make higher gap between interest rate in Indonesia and interest rate in foreign countries. It will make foreign investors attracted to invest their money in goods and assets in Indonesia due to higher return offered. Since the investors need to change their money into rupiah first before making investment, demand for Indonesian rupiah will increase. Consequently, higher demand will make appreciation of Indonesian rupiah.

Another factor which influences the equilibrium of supply and demand of United States Dollar in Indonesian economy is government and private debt in foreign currency. In year 2007, Indonesian government started to issue global bond. In the heat of financial crisis in mid year 2008, liquidity problem occurred in all financial market. Cost of borrowing become higher than before. Government did several things to cover the budget deficit. The actions included issuing unconventional bond, issuing samurai bond, and borrowing from bilateral/multilateral donor. All these debt, which were in foreign currency, helped the government increasing the supply of US Dollar to Indonesian economy. (Anderson, Silva & Rubiano, 2010).

6.4.2.2 Changes in Dow Jones Industrial Average Index and Indonesian Credit Risk

The transmission of increase or decrease in Dow Jones Industrial Average index to Indonesian CDS spreads can be seen from many perspectives. In general the perspectives can be divided into two broad perspectives.

The first one is a direct process which explains a direct relation and a direct action taken by investors from the stock market and credit default swap market. In this sense, there is a common shock that makes market sentiments changes almost in the same direction in both stock market and emerging credit default swap market (Forbes & Rigobon, 2002). This relation is intensified during volatile market (Alexander & Kaeck, 2008).

This common shock whether positive or negative will impact investor's perspective about return and risk. When a positive sentiment occurs, investors desire to invest will increase. The same phenomenon, a desire to invest, will happen in emerging market such as Indonesia. Investors believe that investing in emerging market is not as risky as before. Naturally, the changes in risk perspective will make risk calculation changes also toward a lower risk. Since the risk to invest in emerging market such as Indonesia decrease, CDS spreads will decrease as its consequence.

Beck (2001) mentioned about the role of global risk appetite, reflected in market variables such as the stock market index, which is a demand for high yield emerging market bonds related to performance of other high yield asset such as equities in the stock market.

Another approach to explain the relationship between United States stock market and Indonesian CDS spreads is indirect process through changes in perception about economic growth in both countries.

Stock market is commonly believed as a predictor for economic growth in one country. Several studies had been conducted to investigate the relationship between stock market and economic growth. Developed stock market can enforce economic growth when it functions well as financial intermediaries (Arestis, Demetriades & Luintel, 2001).

Comincioli'95, (1996) mentions two theories about the relationship between stock prices and economic growth. The first one is derived from traditional equity valuation. This valuation states that equity prices is the present value of all cash inflow can be generated from investing in the equity. Hence, increasing price of the equity reflects a prediction that the company who issues the equity will generate more cash inflow in the future. Company's growth can be fulfilled only in economic growth, hence, increasing stock price indirectly reflecting investor prediction about economic growth.

Another theory is "wealth effect" theory. This theory states that increases or decreases of stock prices will increase or decrease investor's wealth. The changes in investor's wealth will impact aggregate consumption. Hence, stock prices can be used as a predictor of the future economy. Even though both theories see the causal relation between stock prices and economic growth in a different way, they confirm that stock markets predict future economy (Comincioli'95, 1996).

Study by Comincioli'95, (1996) implies the existence of a causal relationship between stock prices and future economy can come in bidirectional way. There is a possibility that stock prices changes create a change in the economy. On the other hand, changes in economy sometimes will make stock prices changes. Levine & Zervos (1988) found that the stock market liquidity positively and significantly correlated with current and future rates of economic. Hence, positive market sentiment in the stock market can be used as a predictor for a better economy.

Choi, Hauser & Kopecky (1999) investigates whether the stock market return reflects real activity of developed countries which are members of G-7 countries. Using co-integration test they can confirm a long run equilibrium relationship between the log levels of industrial production and real stock prices for most countries. The ability of stock market to enhance prediction of industrial production also can be confirmed in United States, United Kingdom, Japan, and Canada. (Choi, Hauser & Kopecky, 1999)

Since United States nowadays still play as a locomotive for the global economy, a positive market sentiment in United States stock market can be used as a predictor for global economic growth. A better global economic growth is hoped will give a positive impact also to Indonesian economy. United States is still one of target countries for Indonesian export of goods and services. Economic growth in United States, as may be predicted by positive market sentiment (positive changes in Dow Jones Industrial Average index), will pull Indonesian economy toward a better economic growth.

This situation will make Indonesian creditworthiness increases. The ability to pay coupon and bond principal will increase. Consequently, default risk will decrease. CDS spreads as a measure for default risk probability will decrease, as well.

Both perspectives, direct and indirect impact of shock in developed market such as United States market to Indonesian economy and later to Indonesian credit risk are reasonable. Direct impact of shock is transmitted through changes in investors' risk appetite. On the other hand, indirect impact of shock is transmitted through trade channel.

Structure of Indonesian trade, especially its export, during the sample period suggests that indirect channel through trade changes did not offer a significant role in explaining fluctuation in credit risk indicator. Hence, direct impact of changes in the global market sentiment may play a more significant role. This argument is supported by the fact that changes in the global market sentiment, reflected by changes in Dow Jones Industrial Average index, is significant in the final model.

Moreover, the fact that US dollar rate significantly play a higher role in explaining fluctuation in Indonesian credit risk indicator can be explained better by using a combination of direct impact of changes in the global market sentiment, and changes in Indonesian fundamentals.

6.4.3 Role of Government

The role of US Dollar rate fluctuation and the insignificant trade channel in explaining Indonesian credit risk suggest that structure of Indonesian economy is still vulnerable to external

financial shock. The shock is transmitted through exchange rate channel. While Indonesian economy relatively does not depend on international trade, its financial sector connected highly to international financial market including changes in risk appetite, flow of hot money and risk of a sudden stop from capital flow.

Government of Indonesia can manage its credit risk by stabilizing the exchange rate. Especially during negative market sentiment, the government needs to act fast to avoid Indonesian rupiah depreciated severely. Fluctuation of Indonesian rupiah is influenced by flow of foreign investment in the domestic market. In the long term, government needs to attract more foreign direct investment rather than foreign investment in financial market. This can be done through increasing the easiness of doing business in Indonesia.

CHAPTER VII

SUMMARY AND CONCLUSION

This research is aimed to find an explanation of fluctuation in Indonesian CDS spreads during January 2007 to July 2010. Macroeconomic variables and market sentiment are selected to be used in this analysis. It is hypothesized that the model obtained by using the variables can explain more than fifty percent of variability in Indonesian CDS spreads.

Symmetric Diagonal VECM GARCH model has been conducted to reveal relationship amongst variables and to do variable selection using daily data. The result obtained from this model confirms volatility behavior of all variables. US Dollar rate is selected as a better variable to be included in regression analysis rather than Bond spreads. High correlation between US Dollar rate and bond spreads is predicted from their conditional covariance parameters.

Granger causality test has been conducted to select a better market sentiment variable will be used in the analysis. Global market sentiment is reflected by changes in Dow Jones Industrial Average index, while domestic markets sentiment is reflected by changes in Jakarta stock exchange index. Both variables are investigated to find their relationship with changes in Indonesian CDS spreads. The result of Granger causality test reveals an empiric result that changes in Dow Jones Industrial Average index is a better variable to be used in explaining variability of Indonesian CDS spreads.

Regression analysis with macroeconomic variables as the only independent variables has been conducted with 5% significance level. Dependent variable is Indonesian CDS spreads.

Independent variables are Indonesian Export, Import, Inflation, Foreign reserves, and US Dollar rate. The result shows that export and inflation are insignificant in explaining variability of Indonesian CDS spreads. Coefficient determination of the regression by three significant variables is 0.80.

Global market sentiment is included in next regression analysis. After conducting another regression by temporarily eliminating variable which detected has multicollinearity problem, two variables are found to be insignificant. The final model consists of two variables which are US Dollar rate and Changes in Dow Jones Industrial Average index.

Additionally, Bond spreads variable role is investigated by including it in the model. As predicted before, the regression analysis result shows that this variable creates multicollinearity problem and gives unexpected relationship sign of US dollar rate.

The final model obtained from this research is:

$$\text{Indonesian CDS Spreads} = -1200.893 + 0.156 \text{ USD Rate} - 0.124 \text{ changes in Dow Jones Industrial Average Index}$$

Coefficient determination of this regression result is 0.830. This coefficient determination is higher than that of obtained from previous regression, a regression with independent variables consist of macroeconomic variables only which is 0.801. The result shows that we can accept the null hypothesis. The hypothesis that macroeconomic and market sentiment variables can explain more than 50 % of variability in Indonesian CDS spreads is proven. Moreover, the final model

shows that including market sentiment increase the explanatory power of macroeconomic variables in explaining variability of Indonesian CDS spreads.

The final model suggests that Indonesian credit risk fluctuation is influenced more by variability of exchange rate and market sentiment. Analysis of the transmission channel from the model also suggests that financial shock from developed country is transmitted to Indonesian economy through a direct way, changes in market sentiment and investor risk perception. The transmission through trade channel takes a longer time due to export less dependent economy.

Source of Indonesian credit risk then mainly comes from foreign exchange rate and changes in market sentiment. Government of Indonesia can manage its credit risk by stabilizing the exchange rate. Especially during negative market sentiment, the government needs to act fast in avoiding Indonesian rupiah depreciated severely.

This research focuses on one specific country, Indonesia. Hence, model obtained here may not be suitable for explaining other countries' CDS spreads. Moreover, sample period used is a period dominated by world financial crisis and its following effects to market. Common external factor to the investment world such as psychology of investors may not be captured properly by market sentiment used in this research. Positive and negative sentiment may give different effect to investor behavior in calculating credit risk.

Further Research should explore whether the model obtained can be used to explain a longer period of sample and to other countries, as well. Threshold GARCH model, which differentiate between positive and negative events, can be used to investigate such events and their effects to investor behavior in CDS market.

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