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DETERMINANTS OF THE INDONESIA GOVERNMENT YIELD CURVE

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Abstract

The bond market plays an important role as an alternative source of financing in the current economic growth. Indonesian government funding through the domestic bond market continues to grow, indicated by the issuance of bonds which tends to increase over time. Research on the yield curve usually imposes the effect of macroeconomic fundamentals such as interest rates, inflation, economic growth, money supply and exchange rate. However, research on the determinants of the yield curve beyond macroeconomic factors, especially in developing countries such as Indonesia, is still limited. By using a vector error correction model, this study aims to analyze the determinants of the yield curve of government securities (SUN) in Indonesia by looking at how the yield curve responds to shocks on these factors. The results of study concluded that the development of yield curve on government bonds experienced a fluctuating movement influenced by liquidity factors, fundamental macroeconomics, external factors and market risk factors.

Yield curve, Macroeconomy, Liquidity, Market risk, Vector error correction model, Indonesia

INTRODUCTION

Background

The bond market plays an important role as an alternative source of financing in the current economic growth. Even in 1997, the economic crisis in Asia has prompted the development of the domestic bond market needs to reduce the vulnerability of exchange rate uncertainty and maturity (Piesse, Israsena, and Thirtle, 2007). The bond market can also support the government to improve access to financial services, financial services costs, and improve the stability of the financial system, as well as providing long-term financing for infrastructure projects and corporations. Indonesian government funding through the domestic bond market continues to evolve indicated by the trends in the market value of the bond issuance. Value of government bond issuance continued to show a rising trend from year to year as shown by Figure 1. Development of government bonds experienced rapid growth, as indicated by Compound Annual Growth Rate (CAGR) of outstanding government bonds go down by 13.04 percent and 29.23 percent per year for government bond issuance. This is one indication that the Government is serious about advancing the bond market in Indonesia. Even

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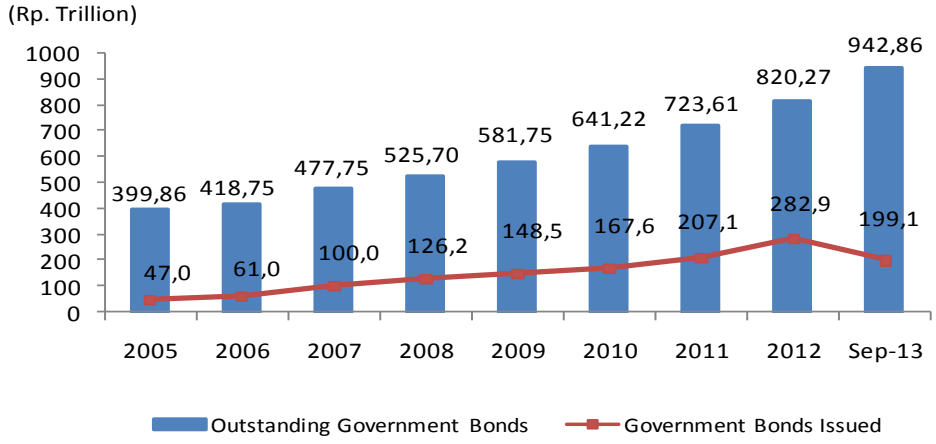

Figure 1 Bond issuance and Market Developments in Indonesia 2005 – September 2013

Government continually has issued a series of bonds maturing variety that can be used as a benchmark for other bonds. Bonds in Indonesia are owned largely by financial institutions, banks and non-banks alike, which store government bonds as assets which yield capital gain and income from interest. Furthermore, the financial institutions set the bonds as secondary reserve. If the financial institutions face liquidity problems, the bonds can then be sold or subjected to repo to protect the institutions against liquidity.

The correlation between the bond yield and maturity level is called term structure interest rate or yield curve (Yield Curve, Figure 2). Investors and market players refer to the yield curve development as a guidance to monitor the government bond portfolio value at hand.

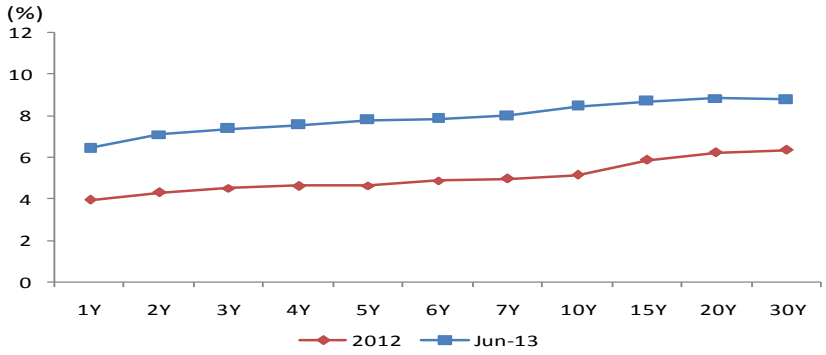

Figure 2 Yield Curve of Government Securities (SUN)

Yield curve movement will affect the interest liabilities of the government over the issued bonds. For companies, the yield curve serves as a benchmark for issuance of bonds within the same period of time. Meanwhile, investors can refer to yield curve as a reference for the expectations towards bond yield or to measure the performance of the bond portfolio at hand. Bond investors use yield curve as a reference in predicting interest rate, specifying bond prices and specifying a strategy to generate more profit. On the other hand, monetary policy makers use yield curve to formulate policy on interest rate, target inflation rate and maintain sustainable economic growth. Monetary policy tightening usually results in upward yield curve with faster short-term increase in yield.

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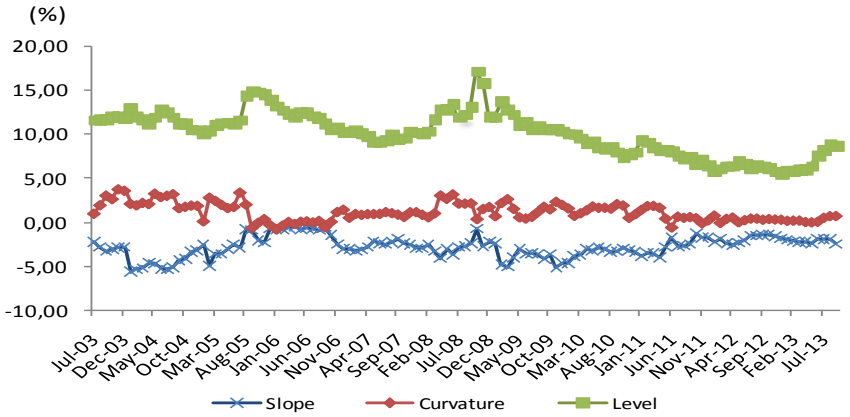

Figure 3. Yield Curve Movement (Slope, Curvature and Level)

Yield Curve has been modelled in different ways, but the Nelson and Siegel model (1987) is the most commonly used by central banks across the world, as stated in a survey conducted by Bank for International Settlements (1999). Yield curve is identified based on its three factors: slope, curvature and level. These factors represent the short-term, medium-term and long-term interest rate. Slope, curvature and level movements of Indonesian government securities (SUN) such as shown in the above Figure 3 shall become a strong inspiration for researches on the Indonesian government securities (SUN) yield curve determinants.

Several researches have been conducted to identify the correlation between fundamental variables of the economy and the bond market. Research by Ang and Piazzesi (2003) has spearheaded the studies on yield curve. Dewachter, Lyrio and Maes (2006), Hordahl, Tristani and Vestin (2006), Diebold, Rudebusch and Aruoba (2006) and Cherif and Kamoun (2007) have conducted research on correlation between the yield curve and macroeconomic factors such as economic growth, inflation, exchange rate, etc. The result shows that macro economy affects the movement of yield curve with different level of significance for each yield term.

Studies on yield curve often focus only on the effects of macroeconomic fundamentals such as interest rate, inflation, economic growth, unemployment rate in advanced countries, and only a few were conducted on developing countries, especially Indonesia. This research develops the studies conducted by Ang and Piazzesi (2003), Dewachter and Lyrio (2006), Hordahl, Tristani and Vestin (2006), Diebold *et al*. (2006) and Cherif and Kamoun (2007) by examining the effects of macroeconomic fundamentals, liquidity risk factor, external shock factors and market risk.

Comprehensive studies on the effects of macroeconomic fundamentals, liquidity/solvency risk, external shock factors and market risk have been conducted by Min (1998), Ferrucci (2003), Grandes (2007), Baldacci, Gupta and Mati (2008), Gonzalez-hermosillo (2008), Bellas, Papaioannou and Petrova (2010), Alexopoulou, Bunda and Ferrando (2010) and Gibson Hall and Tavlas (2012) regarding yield spread sovereign bond. This study analyzes factors affecting the movement of Indonesian Government securities yield curve by examining the yield curve's response towards a number of shocks.

LITERATURE REVIEW

Term Structure Interest Rate

According to Fabozzi (2002), bond yield is the potential return rate of a bond. According to Martelli, Priaulet and Priaulet (2003), Bond yield or Term Structure of Interest Rate (TSIR) is a series of interest rates ordered according to a certain due period. The value and condition of the interest rate will determine the value and condition of the time structure, which will finally result in yield curve. According to Nawalkha and Soto (2009), the term "TSIR", also referred to as yield curve, is defined as a correlation between the investment yield and the investment maturity period.

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Yield curve is normally estimated using the discount bond yield per annum added with continuously compounded interest. Yield curve cannot be observed directly due to the lack of discount bonds with continuous maturity period. As a consequence, yield curve is usually estimated by implementing time structure method which creates bonds with coupon and with different maturity period. There are four theories which explain the creation of yield curve (Martelli, Priaulet and Priaulet, 2003) as follows:

1. The Pure Expectations Theory, yield curve in a certain period which describes the expected short-term interest in the near future. Increase / decrease in yield represents an increase / decrease in short-term interest rate.
2.The Pure Risk Premium Theory, which has two versions of premium risks: Liquidity Premium and Preferred Habitat. The Liquidity Premium theory states that investors are more interested in maintaining bonds with longer maturity period with expectations that it would provide higher yield (at certain premium risk level) to compensate for its high volatility level. The Preferred Habitat theory states that investors are not always willing to liquidate their investment in the shortest amount of time, usually due to their liability conditions.
3. The Market Segmentation Theory: According to this theory, there are several categories of investors in the market which invest in a certain segment according to their liabilities with disregard to other segments.
4. The Biased Expectations Theory, is a combination of Pure Expectations Theory and the Risk Premium Theory. This Theory states that the yield curve reflects market expectations of the future interest rate with uncertain liquidity rate over time.

Previous Studies

Several researches have been conducted to test the yield curve and macroeconomic fundamentals, namely those by Cherif and Kamoun (2007), Dewachter *et al*. (2006), Diebold *et al*. (2006), Hordahl *et al*. (2006), and Ang and Piazzesi (2003). The results show that macroeconomy affects the yield curve at different levels of significance depending on the maturity term. Cherif and Kamoun (2007) saw dynamic correlation between the term structure interest rate and macroeconomic variables (GDP and inflation) for euro area using Vector Auto Regression (VAR). This research uses Euro Interbank Offered Rate (Euribor) and zero-coupon yields with different maturity terms from 1999 to 2006. The result of research shows that there's a correlation between the effects of latent factors (level, slope and curvature) of yield curve and the macroeconomic variables. Yield curve has effects on the monetary policy. Furthermore, the level and slope of yield curve respond to changes in economic activities and monetary policy disturbances.

Dewachter *et al*. (2006) tested the macroeconomic variables (output gap and inflation) and latent variables in a continuous time term structure model. This model is also used to study the real interest rate policy using data output, inflation and term structure interest rate. The main purpose of this study is to identify the cause of term structure interest rate dynamics based on output gap and inflation. They made analysis using monthly data on United States zero coupon bonds of different periods from 1958 to 1998. The Vector Autoregressive (VAR) model concludes that the macroeconomic dynamics affect the term structure interest rate, but the interest rate, inflation and economic activities do not affect the yield curve. Long-term interest rate or the level of term structure interest rate cannot be explained by observing the macroeconomic variables. Yield curve is affected by premium risk and excess of bonds return rate. Diebold *et al*. (2006) estimated yield curve model using latent factors (level, slope and curvature) and the macroeconomic variables (economic activities, inflation and monetary policy) from 1972 to 2000 using the United States bonds. The main purpose of their research was to identify the cause and effect between macroeconomic variables and yield curve. Estimations were made using non-structural VAR representation and the results showed strong correlation between the macroeconomic variables and the future yield curve movements. However, it was found that yield curve does not necessarily affect the future macroeconomic variables. Furthermore, an expectations hypothesis occured in which yield curve can be used to predict the Fed's interest rate during a certain period.

The term structure interest rate is affected by the macroeconomic variables in different ways, as was concluded by Hordahl *et al*. (2006). Their research had the purpose of examining the dynamic relationship between yield curve and risk premia in

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macroeconomic fundamentals such as inflation, economic activities and short-term interest rate policy. Using data on German bonds (1975 to 1998), it was concluded that monetary policy shock has strong effects on the short-term yield or slope compared to the long-term yield or level. Medium-term curvature or interest rate will be affected by the inflation and shocks in economic activities (output). Changes in the inflation target shall have significant effects on the long-term yield (level). This finding shows the role of premium risk dynamics in determining the yield curve dynamics.

How does the macro variables change bond prices and yield curve dynamics? This is the main focus of the research conducted by Ang and Piazzesi (2003), which purpose was to establish the term structure interest rate determinant model with inflation, economic growth and latent variables using the Vector Auto Regression (VAR) method. This model was tested for the British bonds in 1952 – 2000. This research has concluded that macro factors play large roles in short-term and medium-term yields (slope and curvature) of the yield curve, whereas factors which cannot be observed affect the long-term yield (level). Inflation shock has the most profound effect on the yield curve's slope.

Min (1998) analyzed the determining factors of bond yield spreads in US dollars in 11 developing countries from 1991 to 1995. He concluded that the differences in yield spreads between the countries were determined by debt to GDP, reserves to GDP, debt service to export, export and import growth rate, inflation rate, net foreign asset, term of trade index and real exchange rate. Furthermore, the ability to access foreign market is highly determined by domestic fundamental factors, and therefore it is highly suggested that developing countries intending to seek larger access to the international bond market should improve their macroeconomic fundamentals.

RESEARCH METHODOLOGY

Types and Sources of Data

This research was conducted using the monthly secondary data from July 2003 to September 2012. Data sources were obtained based on the information compiled and published by certain institutions. Secondary data came from Bank Indonesia, Indonesian Stock Exchange (IDX), Central Bureau of Statistics (BPS), Debt Management Office (DMO) and Bloomberg websites. Generally, the data used in this research are summarized in Table 1.

Table 1 Types of Data, Symbol, Unit and Data Sources

No.	Type of Variables	Symbol	Unit	Data Source
1.	Slope	SLOPE	Percent	Bloomberg and processed
2.	Curvature	CURVATURE	Percent	Bloomberg and processed
3.	Level	LEVEL	Percent	Bloomberg and processed
4.	Industrial Production Index	IPI	Nominal	Statistical Central Bureau
5.	Consumer Price Index	CPI	Nominal	Statistical Central Bureau
6.	Money supply	M1	Billion IDR	Bank Indonesia
7.	Rupiah to Dollar Exchange Rate	KURS	Rupiah	Bank Indonesia
8.	Bank Indonesia Interest Rate	BIR	Percent	Bank Indonesia
9.	Jakarta Composite Index	JCI	Nominal	Indonesian Stock Exchange
10.	S&P Volatility Index	VIX	Nominal	Bloomberg
11.	World Oil Price	OIL	US$	Bloomberg
12.	Fed rate	FFR	Percent	Bloomberg
13.	Foreign exchange reserve	CD	Billion US$	Bank Indonesia
14.	Foreign Investor ownership of Government bonds	FP	Trillion IDR	DMO

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Model Specifications

Vector Error Correction Model (VECM) is used to study the factors which affect the yield curve dynamics in the form of restricted Vector Autoregressive (VAR). This additional restriction must be given for non-stationary yet co-integrated data form. When two or more variables found in an equation at level data become unstationary, there's a possibility of cointegration on the equation (Verbeek, 2000). If there's equal cointegration in the model used after a cointegration test, it is recommended to input the cointegration equation to the model used. Most data time series have I (1) or stationary at the first difference.

Therefore, to anticipate the loss of long-term information in this research, the VECM model shall be used if the I (1) data is used. VECM would then make make use of the cointegration restriction information in its specifications, and thus is often referred to as VAR designed for non-stationary series with cointegration relationship. VECM specifications restrict long-term relationship between endogenous variables so that the cointegration relationship becomes convergent by sparing short-term dynamics. The term 'cointegration' is also commonly referred to as 'error' due to the deviation from long-term equilibrium being corrected in multiple stages through a series of partial short-term adjustments.

The VAR/VECM model was used in this study due to its abilities in providing analytical tools such as Impulse Response Functions (IRF), which is used to track present and future responses to every change variable or shock to a certain variable, and Forecast Error Decomposition of Variance (FEDV), which is used to estimate the variance percentage contribution of each variable toward the change of a certain variable. Generally, the VECM model used in this research refers to Verbeek (2000), expressed as follows:

$$\Delta Y_t = \sum_{i-1}^{k-1} \Gamma_t \Delta Y_{t-1} - \gamma \beta Y_{t-1} + \varepsilon_t$$

where:
Γ = Short-term correlational coefficient.
β = Long-term correlational coefficient.
γ = Speed of adjustment to equilibrium.
Y_t = Endogenous variables used in the model.

Variables used in the above model include Industrial Production Index (IPI), Consumer Price Index (CPI) and Money supply (M1), Rupiah to US Dollar exchange rate (KURS), Bank Indonesia Interest Rate (BIR), Combined Share Price Index (IHSG), S&P 500 Volatility Index (VIX), World Oil Price (OIL), Federal Reserve Interest Rate (FFR), Foreign exchange reserve (CD) and Foreign investors ownership of Government bonds (FP). Except for BIR and FIR, all of those variables are stated in natural logarithm form. Meanwhile, the yield curve components are calculated using the following formula: Slope = [(yt (3)) - (yt (120))], Curvature = [2 x (yt (48)) - (yt (3)) - (yt (120))] , and Level = yt (120) with yt representing yield.

RESULT AND DISCUSSION

Volatility Index Shock against Yield Curve

Result of IRF (see figure 4) shows that generally the volatility index shock shows an increase in slope and level, both in short and long terms. On the other hand, the volatility index shock causes short-term and long-term decrease in curvature. This yield curve response occurs when the volatility index shock increases the volatility index. Increase in volatility index as a reflection of the market risk sentiment will be responded by the investor by selling the bond. This will in turn increase the slope and level.

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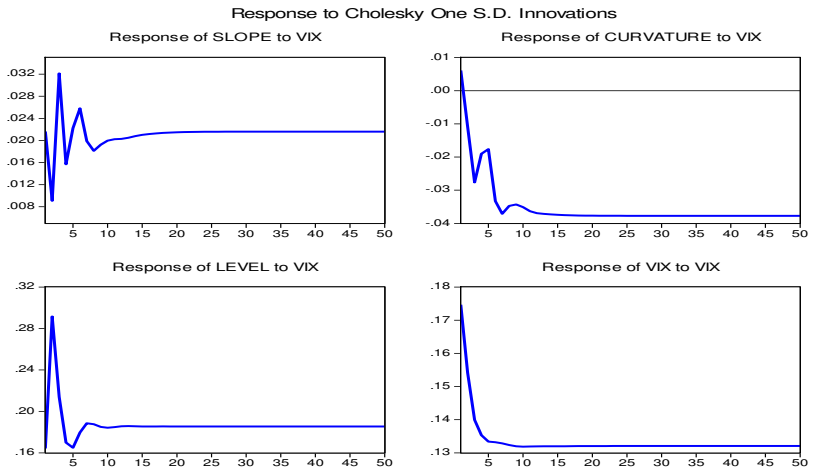

Figure 4 Yield Curve Response to VOLATILITY INDEX Shock

On the other hand, increased global financial market sentiment prompts investors to secure short-term and long-term investments by relocating bonds investment in medium term. This will result in decreased curvature. The result of this research is aligned with the studies conducted by Singleton (2007), Gonzalez-hermosillo (2008), Bellas, Papaioannou and Petrova (2010). According to this study, the volatility index, as the proxy of uncertainty factors in the global financial market, affects the changes in investors' risk appetite which in turn affects the yield curve dynamics.

Oil Price Shock against Yield Curve

Based on the IRF value (see figure 5), the oil price shock on one side causes increase in slope and curvature, in both short and long terms. On the other hand, oil price shock causes decrease in level, in both short and long-terms. This yield curve response occurs when the oil price shock increases oil price. The increase in oil price will then cause an increase in short-term and medium-term global economic risks, and in turn will increase the short-term and medium-term yield curves, namely slope and curvature.

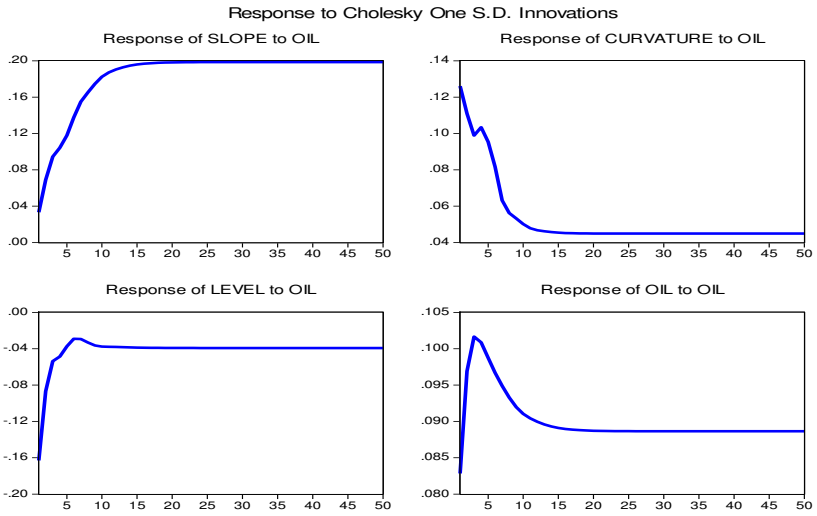

Figure 5 Yield Curve Response to OIL PRICE Shock

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The stability of oil price and global economy will prompt decrease in level, which is thelong-term component of yield curve. The result of this research is aligned with the study conducted by Min (1998) which states that the world oil price, which can be used as proxy for external factors, that reflects the condition of global economic risks, affects the yield curve. In the study, Min (1998) explained that world oil supply shock increased the oil price and resulted in the 1970 and 1980 global recessions. The increase in world oil price in turn will slow down economic growth and bring disadvantages to oil importing countries. Slow economic growth will increase the yield curve. In line with this, Gibson *et al*. (2012) also concluded that the increasing world oil price will result in higher bond yield.

Money Supply Shock against Yield Curve

Result of IRF (see figure 6) shows that money supply shock causes decreased slope as well as increased curvature and level. This yield curve response occurs because money supply shock will increase money supply. Next, the increased money supply will cause higher liquidity in the country and in turn decrease the slope, which is the short-term component of yield curve. On the other hand, increased money supply will encourage increased prices of goods and services in medium and long terms. The increased prices of goods and services will encourage inflation and trigger an increase in curvature and level, which serve as medium-term and long-term yield curve components.

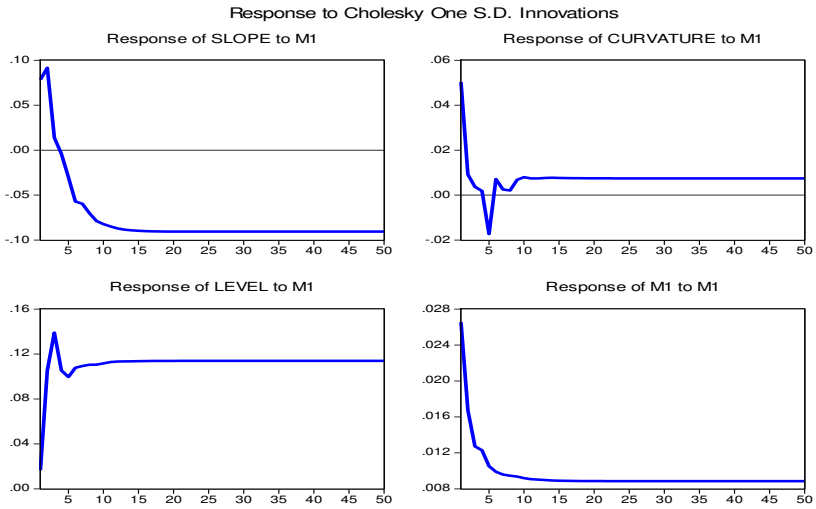

Figure 6 Yield CurveResponse to M1 Shock

The result of this study is aligned with that of Fah and Ariff (2008) which states that an increase in money supply will result in higher liquidity and lower short-term bond yields. This is also aligned with study by Vargas (2005) which states that increased money supply will encourage liquidity in short term and in turn decrease the slope, which is the short-term component of yield curve.

Exchange Rate Shock against Yield Curve

Based on the result of IRF (see figure 7), we can conclude that the exchange rate causes decrease in slope on one sideand increased curvature and level on the other side. This yield curve response occurs because exchange rate shock will result in increased exchange rate or depreciation of domestic currency. The weakened domestic currency will result in increased prices of goods and services and eventually leads to inflation. Inflation will be responded by an increase in curvature and level, both being the medium-term and long-termcomponents of yield curve. The increase in both components will cause investors to divert to short-term investment, causing a downward slope.

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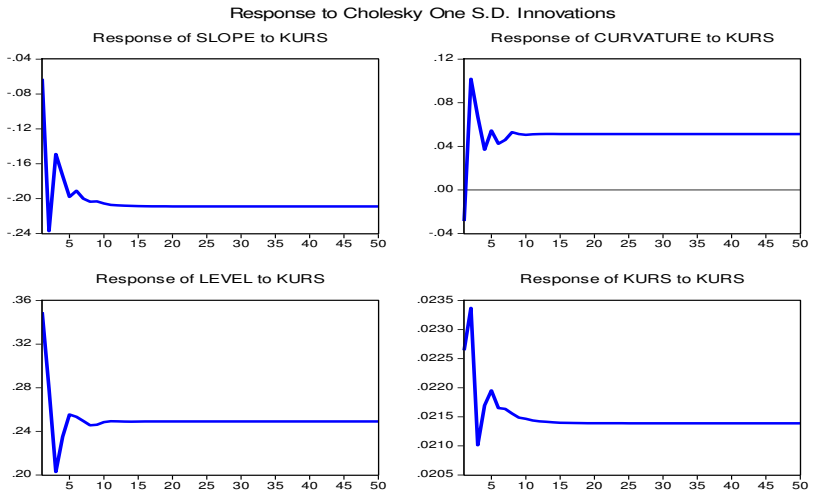

Figure 7 Yield CurveResponse to KURS Shock

The above findings are in accordance with the study conducted by Min (1998) and Baek *et al*. (2005). Their studies state that depreciation of Rupiah signals economic uncertainty which may result in further economic drawbacks. This means that investment in Indonesia will feature higher risks. This results in higher risk encountered by investors. The depreciation of Rupiah will then increase the yield curve due to higher risk premium. Several other researches which support the exchange rate's effect on yield spread were conducted by Vargas (2005), Alexopoulou *et al*. (2009), Budina and Mantchev (2000).

Stock Index Shock against Yield Curve

Result of IRF (see figure 8) shows that stock index will result in the decrease of three yield curve components. Such response occurs because stock index shock will increase stick index, which serves as a proxy for risky assets. Increased stock index will result in lower default probability, which in turn lowers the expectations on the returns of risky assets. The decrease in these expectations lead to a decrease in government bonds as proxy for risky assets. This will finally lower the three components of yield curve: slope, curvature and level.

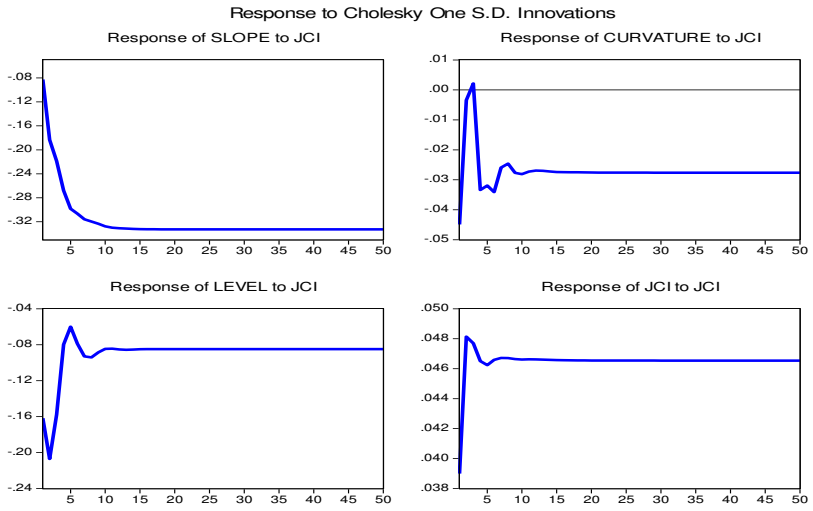

Figure 8 Yield Curve Response to STOCK INDEX Shock

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This finding is in alignment with the study by Batten *et al*. (2006) which states that the stock market affects the yield curve through the rebalancing of share portfolio and bonds by fund managers. Another explanation is that government bonds are less risky assets since they are guaranteed by the Government and therefore decrease in risky assets return rate expectations is followed by lower government bond yield curve.

Industrial Production Index Shock against Yield Curve

Based on the result of IRF (see figure 9), we can see that generally the industrial production index shock does not only cause lower slope and curvature, but also an increase in level. This yield curve response occurs because higher industrial production index will increase the industrial production index, which serves as proxy for domestic economic activities. The increase in industrial production index is an indication of higher capacity of the Government to pay out its bonds. This in turn will lower the short-term and medium-term interest rates, marked with the decrease in slope and curvature.

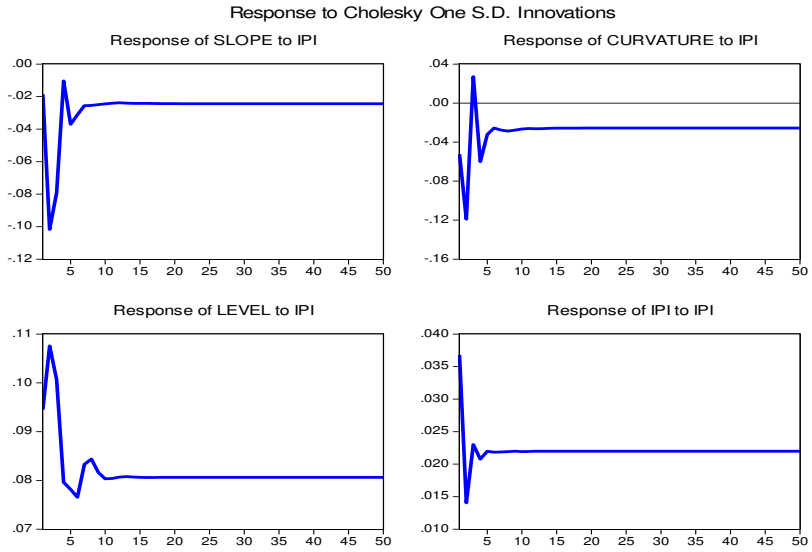

Figure 9 Yield Curve Response to IPI Shock

On the other hand, increase in industrial production index in long term will encourage inflation rise and eventually higher level, which is the long-term componentof yield curve. This is aligned with the study by Rowland and Torres (2004), which states that a country with higher economic growth tends to have stronger fiscal position and faces minor difficulties in paying its liabilities at all times. Several other studies that found the effect of economic growth on the yield curve movement include Ang and Piazzesi (2003), Hordahl *et al*. (2006), Diebold *et al*. (2006), Cherif and Kamoun (2007), and Gibson *et al*. (2012).

Foreign Ownership Shock against Yield Curve

The result of IRF (figure 10) shows that the foreign ownership shock will cause decrease in slope, curvature and level. This yield curve response occurs because foreign ownership shock will increase foreign ownership. Increased foreign ownership will then increase the demand for government bonds, which in turn will lower the three yield curve components.

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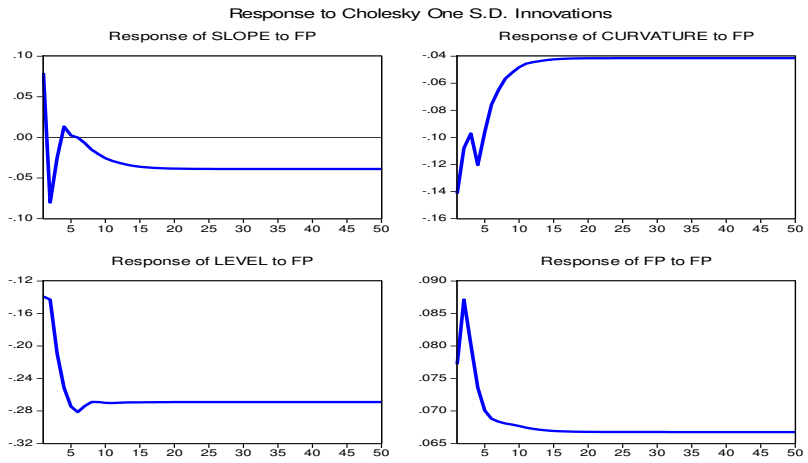

Figure 10 Yield Curve Response to FOREIGN OWNERSHIP Shock

The result of this analysis is aligned with the studies by Bekaert and Harvey (1997) and Henry (1997) which state that liberalization will cause stock market appreciation, followed by foreign cash flow invested in equity. Analogous to this result, Peiris (2010) did not find evidence that increased foreign investor participation in domestic bond market in ten emerging market countries would increase the bonds yield rate's volatility. Peiris (2010) shows that in several periods, foreign investor participation can even lower long-term bond yields significantly and reduce volatility level.

Federal Funds Rate Shock against Yield Curve

Based on the result of IRF (see figure 11), it's concluded that the Federal Funds Rate shock generally causes decrease in level, slope and curvature. This yield curve response occurs because the Federal Funds Rate shock will increase the Federal Funds Rate, which represents the international interest rate. This increase in international interest rate indicates higher economic activities abroad (United States). This in turn encourages investment from United States in Indonesia and higher bond purchase activities. The increase in bond purchase in turn causes the yield curve to decrease.

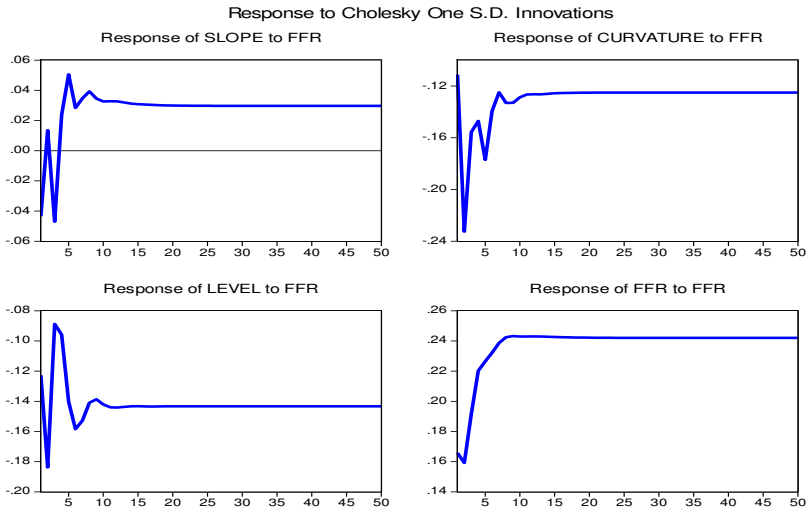

Figure 11 Yield CurveResponse to FFR Shock

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A study by Min (1998) states that changes in the international interest rate are significant factors to the flow of investment to developing countries. Increase in international interest rate does not only increase a new loan's cost of funds, but also the coupon from existing variable bonds. The result of this research is aligned with a study by Vargas (2005) which found that increase in Federal Funds Rate is an indication of growth in the United States, and therefore will increase the expectations for economic growth in developing countries due to increased export performance. Increased economic performance will then lower the yield curve of bonds.

Consumer Price Index Shock against Yield Curve

The result of IRF (see figure 12) shows that the consumer price index shock lowers SLOPE but increases curvature and level. This yield curve response occurs because the consumer price index shock will increase the consumer price index or inflation. Increased inflation rate is an indication of increased domestic economic activities. This is what then encourages bond purchase and lowers the SLOPE.

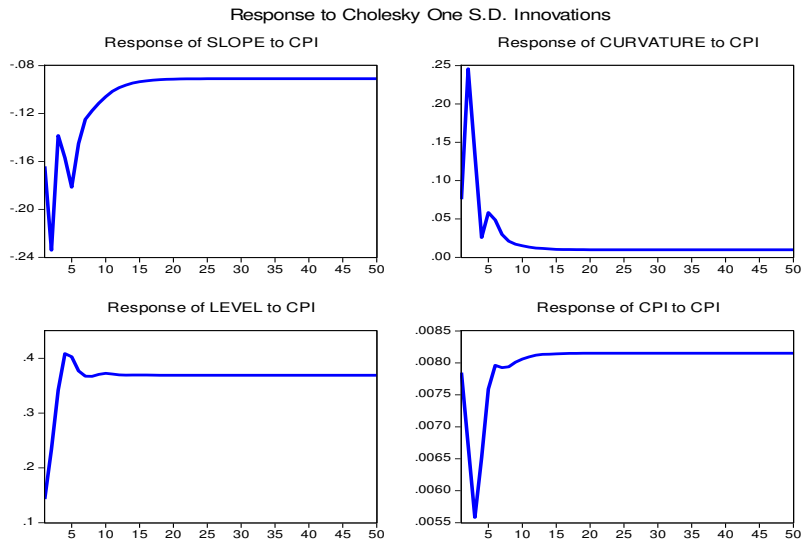

Figure 12 Yield CurveResponse to CONSUMER PRICE INDEX Shock

However, in medium and long terms, increase in inflation will distort asset prices and lower bond investments. This is what then increase the curvature and level, which are the medium-term and long-term components of yield curve. In his study, Min (1998) states that inflation is a reflection of the quality of a country in arranging its economy. Here, the consumer price index is a proxy of the consumption expenditures, where higher consumer price index will increase the consumption expenditure and slow down the economy. Economic sloth will increase risk premium, and in turn increase the yield curve. Other researches that also agree to the effects of inflation on yield spread include those conducted by Alfonso (2002), Baldacci *et al*. (2008), and Alexopoulou *et al*. (2009).

Reserve Shock against Yield Curve

Based on the result of IRF (see figure 13), it's generally obvious that the reserve shock lowers the slope, curvature and level. This yield curve response occurs because reserve shock will increase reserve as a proxy to liquidity, which also reflects the Government's abilities to pay its foreign liabilities. This condition will in turn increase investment flow from foreign countries and increase bondpurchase as well as decrease yield curve.

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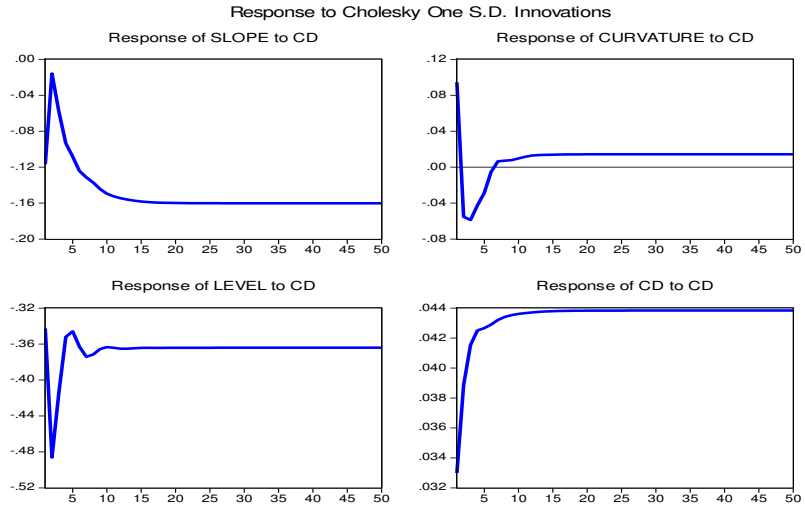

Figure 13 Yield Curve Response to CD Shock

The result of this analysis is in accordance with a study by Min (1998), which states that the foreign exchange reserve is a variable which explains a country's foreign currency liquidity condition. Limited foreign exchange reserve can become a risk in the event of liquidity rarity, and therefore foreign exchange reserve has negative effects on the bond yields. Baldacci *et al*. (2008) states that the amount of foreign exchange reserve in a country signals the country's abilities to pay its debts, and even serves as a buffer during external shock.

Interest Rate Shock against Yield Curve

Based on the result of IRF (see figure 14), the interest rate shock generally causes lower curvature, but on the other hand it causes increased slope and level. This yield curve response occurs because interest rate shock will increase interest rate which then encourages investor bond sales and causes increased yield curve.

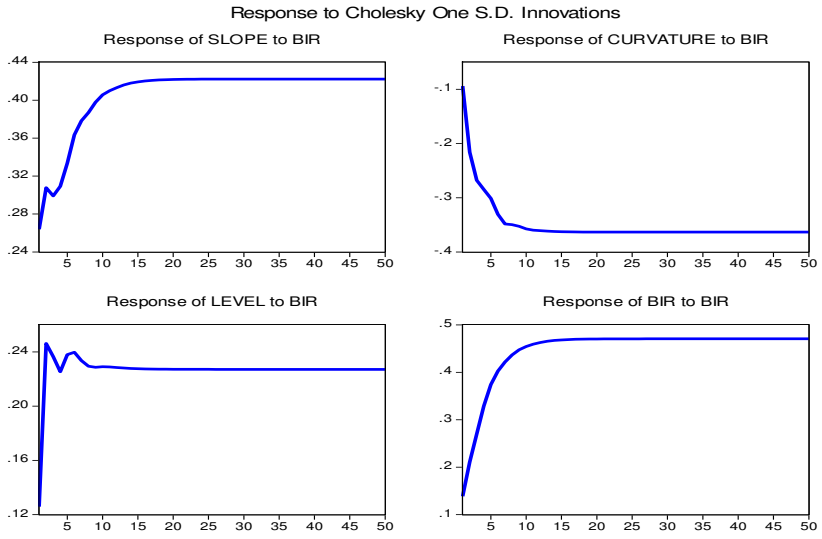

Figure 14 Yield Curve Response to INTEREST RATE Shock

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This finding shows that the bullet portfolio strategy exists in the Indonesian bond market, where in the event of an increase in interest rate, short-term and long-term investors would sell bonds to avoid devaluation due to increased interest rate. Increased interest rate will soon be responded by short-term yield increase to anticipate monetary tightening policy. The monetary tightening policy will have impacts on slow economic growth expectations and increase long-term yield. On the other hand, investors will conduct medium-term bond purchase, thereby decreasing curvature.

CONCLUSION

Fluctuating development of yield curve in the government bonds is affected by the liquidity/solvency factor, macroeconomic fundamentals, external shock factor and market risk factor. The development financing policy which makes use of treasury bills causes the government bond market to grow significantly throughout the research period. This also increases the liquidity of bond market and makes domestic and foreign investors invest in government bonds. The Indonesian economic condition that continues to grow causes the yield curve trend of government bonds to decrease. This condition shows that investors already see the Indonesian economic fundamentals as getting better and investment risks in Indonesia therefore decrease over time.

MANAGERIAL IMPLICATION

To the Government, as the economic authority, it is recommended that the issuance of government securities (SUN) is conducted by taking into account the economic needs to achieve a healthy and sustainable economic growth. Issuance of government bonds may take into consideration the inflation rate, Bank Indonesia interest rate, Rupiah exchange rate and foreign exchange reserve in order to obtain lower cost of funds and efficiency in issuing government bonds. An understanding of factors that affect the yield curve of government bonds is expected to serve as reference for the Government in creating policies to develop the Indonesian bond market by maintaining the stability of inflation rate, Bank Indonesia interest rate, Rupiah exchange rate and foreign exchange reserve.

In terms of monetary policy, Bank Indonesia must take caution in determining the interest rate, since BI rate highly affects investments and economic growth. The Rupiah exchange rate and foreign exchange reserve also highly affect investments and economic growth. The effect of Rupiah exchange rate on long-term interest rate only extends to a certain time, possiblydue to intervention by Bank Indonesia. However, continuous intervention will reduce foreign exchange reserve and affect other macroeconomic factors.

In terms of fiscal policy, the result of this research shows that Rupiah exchange rate and foreign exchange reserve highly affect the long-term interest rate. Therefore, a government policy is required to balance the budget and increase foreign currency income so as not to hamper investment growth due to the high interest rate. The liability management policy and the use of value protection transactions can reduce the yield curve fluctuation risks of government securities (SUN). In addition, domestic government securities (SUN)

Meanwhile, investors will gain profit from selling medium-term government bonds and purchasing short term government bonds upon receiving news regarding shock to inflation rate. Investors can purchase short-term government bonds and sell them within two months because medium-term government bond price may recover soon.

On the other hand, to generate profit from shocks to Rupiah exchange rate and foreign exchange reserve, investors must sell their long-term obligations upon receiving news on shocks to Rupiah exchange rate and foreign exchange reservebecause profits will soon disappear. Investors may opt to purchase short-term government bonds and sell them within three months because long-term government bond price may recover soon. However, risk taker investors may purchase long-term government bonds when Rupiah and foreign exchange reserve grow weaker in order to gain high yields.

For emittents, the yield curve fluctuations of government bonds highly affect the price and yield of bonds to be offered to investors. Errors in

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understanding the development of variables that affect the government bonds' yield curve movements will cause high cost of borrowing. The result of this research may serve as reference in monitoring the yield curve movements of government bonds.

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