CHAPTER I

INTRODUCTION

1.1 Background of Study

Inflation is an economic phenomenon that concerns various parties. Inflation is not only the concern of the society, but also the concern of the business world, the central bank, and the government. Inflation can affect the society and economy of a country. For the society, inflation is a concern because inflation directly affects the well-being of life, and in the business world, the rate of inflation is a very important factor in making decisions. Inflation is also the government's concern in formulating and implementing economic policies to improve people's welfare. Given its enormous influence on people's lives, each country, through the monetary authority or central bank, is constantly trying to control the inflation rate to keep it low and stable. For all countries, both developed and developing, one of the fundamental objectives of macroeconomic policy is economic stability.

High inflation is regarded a problem in the economy. Indonesia experienced economic collapse for failing to control inflation volatility. Indonesia is one of the few countries with a hyperinflationary experience. The regime of the founding President Soekarno fell with the economy reeling when the annual inflation rate rose to 1500% (Chowdhury & Ham, Inflation Targeting in Indonesia, 2009) The consequent untold misery of ordinary Indonesians during 1960– 1966 created an anti-inflationary national psyche. The New Order regime of Soeharto, thus, promulgated legislation enshrining the “balanced budget principle” that prevented government borrowing from the central bank (Bank Indonesia). The economic team of Soeharto was spectacularly successful in

preventing another episode of hyperinflation, until the Asian financial crisis of 1997–98 when inflation shot up close to 70%.

Indonesia is a country that has experienced economic collapse due to not being able to suppress inflation rate. During the years 1958 to 1966, the Indonesian economy on average only grew by 0.18%. At that time the average inflation reached 199%, even touched the level of 636% in 1966. According to Subekti (2011), the main cause of the high inflation of Indonesia in the 1960s was an unbalanced government budget and the closest access to obtain foreign loans, so that all activities involving the government's role must largely fund by the printing of the money. Therefore, it is not surprising that the growth in the money supply (M1) in that era always accompanied the inflation surge with a rapid percentage increase that is an average of 99.57%.

Indonesia's attention to inflation has been seeing as the New Order regime came to power in 1967. The entire New Order bureaucratic cabinets share a common vision that inflation is a major problem in the economy so control considered necessary. To control spending, the government implements a balanced budget system. The program proved to be quite effective. The growth in the money supply (M1) in the period 1967 to 1997 can reduce to an average of 52.7%. Nearly two decades, the economy grew about 7% with an average inflation of 12%.

Inflation control efforts continued throughout the reform period event intensified following the 1998 monetary crisis. In 2005 Indonesia officially began implementing the Inflation Targeting Framework, a policy aimed at achieving stability of inflation at certain levels ranging from 4% to 10% for the short term and 3% up to 5% for the long term (Chowdhury & Ham, Inflation Targeting in Indonesia, 2009).

Based on the aforementioned background, this study models the inflation in Indonesia using the first and second-moment regression, namely conditional mean and conditional variance, respectively. In addition to such model, this study also calculated the threshold of deemed risky inflation, represented as conditional Value-at-Risk.

1.2 Problem Identification

The inflation-growth debate is particularly relevant for Indonesia given the nation's historical experience. The Indonesian economy virtually came to a halt in the 1960s and the average annual inflation rate peaked at 1,500% in mid-1966. At the time, pessimism about the prospects of the Indonesian economy was widespread. The coincidence of extremely high rates of inflation with economic stagnation was powerful evidence for casting inflation as 'enemy number one'. The New Order regime gave top priority to price stability. By 1969, the annual average inflation rate was successfully reduce to around 15% and kept under control. This provided the foundation for a period of sustained and rapid economic growth. Following the first oil price shock, inflation rose to 41% in 1974, but the economic management team was successful in bringing down this figure to less than 20%.

1.3 Problem Formulation

This study focuses on two issues:

1. This study estimates inflation behavior in Indonesia using an empirical model. The candidates for the independent variables are the interest rate, reserve requirement, open market operation policy, base money printing, and gross domestic product. It does not only proving theories concerning the inflation behavior, but it also builds a good empirical model.

2. In addition to the built model, which is a regression model based on conditional mean, it also models the conditional volatility or conditional variance.

Based on the built model, this study calculates the inflation threshold, which considered dangerous to the economy.

1.4 Problem Limitation

The limitations of this study are the researcher cannot fulfill all of the resources we demanded such as the data of Money Printing, and Obligation Price Index. The data for Money Printing is classified and Obligation Price Index data in Indonesia was creating since 2008.

1.5 Research Objectives

From the problem statement, the research objectives are as follows:

1. To estimate inflation behavior in Indonesia, using an empirical model.
2. Model the conditional volatility and conditional variant of inflation.
3. To calculate the inflation threshold that considered as dangerous to the economy.

1.6 Research Contributions

The research will be of benefit to the Central Bank in modeling the behaviors of inflation. The built model can use as one of the considerations to control and combat high inflation, which is one of the main issues in modern macro and monetary economics.

The calculated inflation threshold will be of importance in defining the dangerous situation regarding the inflation situation. Having such threshold, the Central Bank will

be capable of stating whether a certain level of inflation is in need of a special consideration and treatment.

1.7 Systematics of Writing

Chapter I: Introduction

This chapter presents Introduction, Problem Formulation, Problem Limitation, Research Objectives, Research Contribution, and Writing Systematics.

Chapter II: Review of Related Literature

This chapter discusses concepts of inflation along with the definition, factors, relationship between variables and references to research problem being examine. By the end of this chapter, hypotheses analysis is present based on the literature of journal review.

Chapter III: Research Method

This chapter describes the type and objective of this study, sample data, data collection method, research variables, and analysis technique.

Chapter IV: Data Analysis and Discussions

This chapter discusses and analyses the data in hypotheses testing, and research findings.

Chapter V: Conclusions and Recommendations

This chapter shows the result and presents the conclusions, research limitations, and recommendations for institution and future researchers.

CHAPTER II

THEORETICAL FRAMEWORK AND LITERATURE

2.1 Theoretical Framework

Inflation knows as a major variable in macroeconomic. Inflation defined as the increase in common price in the end. It is usually formulate as the growth in price. The following formulae can used to calculate the inflation.

$$INF_t = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \times 100\%$$

Or

$$INF_t = \ln\left(\frac{CPI_t}{CPI_{t-1}}\right) \times 100\% = \left(\ln CPI_t - \ln CPI_{t-1}\right) \times 100\%$$

Both formulae represent the growth in CPI, which is consumer price index, to measure the common price in an economy. The first formula possesses the possibility of being non-stationarity, since it is a ratio between difference in CPI and CPI. While difference in CPI might be stationary, the CPI itself might be non-stationary. In total, it is possible the inflation based on this formula is non-stationary. The second formula has greater potential to be stationary.

The study of causes of inflation has probably given rise to one of the most significant macroeconomic debates in the field of economics. In practice; however, it is not always easy to decompose the observed inflation into its monetary, demand-pull,

cost-push and structural components. The process is dynamic, and the shocks to prices are mixed. Furthermore, inflation itself may also cause future inflation

There are two groups of economists with different views of inflation, monetarists, and structuralizes. According to monetarists, inflation is associated with monetary variables, the money supply is the “dominate, though not exclusive” determinant of both the level of output and prices in the short run, and of the level of prices in the end. The long- run level of output is not influence by the money supply, while structuralizes suggest that inflation is the result of the unbalanced economic system, structural analysis attempts to recognize how economic phenomena and finding the root of the permanent disease and destruction such as inflation that evaluates lawful relationship between the phenomena.

There are three main theories of inflation, namely cost-push inflation, demand-pull inflation, and structural theories of inflation.

2.1.1 Cost-Push Inflation

This theory suggests that due to an increase in wages, say because of trade unions. The rise in money wages more rapidly than the productivity of labor. The labor unions press employers to grant wage increases considerably, thereby raising the cost of production of commodities. Employers in turn, raise prices of their products. Higher wages enable workers to buy as much as before in spite of higher prices. On the other hand, the increase in prices induces unions to demand still higher wages.

Oligopolies and monopolist firms raise the price of their products to offset the rise in labor and cost of production to earn higher profits. There being imperfect

competition in the case of such firms, they are able to administered price of their products can increase the price to any level.

A few sectors of the economy may affected by increase in money wages and prices of their products may be rising. In many cases, their products are using as inputs for the production of commodities in other sectors. As a result, cost of production of other sectors will rise and thereby push up the prices of their products. Thus, wage-push inflation in a few sectors of the economy may soon lead to inflationary rise in prices in the entire economy. Further, an increase in the price of imported raw materials may lead to cost-push inflation. In a way, this increase in price is due to the increase in cost of production.

2.1.2 Demand-Pull Inflation

According to Keynes (1936) emphasized the increase in aggregate demand as the source of demand-pull inflation. When the value of aggregate demand exceeds the value of aggregate supply at the full employment level, the inflationary gap arises. The larger the gap between aggregate demand and aggregate supply, the more rapid is the inflation. The aggregate demand comprises consumption, investment, and government expenditure. The conventional demand-pull theorists suggest the excess of aggregate demand over aggregate supply causes inflation. In full employment equilibrium condition, the economy reaches its maximum production capacity. At such condition, when aggregate demand increase, inflation takes place.

2.1.3 Structural Theories of Inflation

It is relate to the effect of structural factors on inflation. Structural analysis attempts to recognize how economic phenomena and finding the root of the permanent disease and destruction such as inflation that evaluates lawful relationship between the phenomena. The structural theorists suggest that the inflation is a result of structural maladjustments in the county or some of the institutional features of business environment. In the economic structural factor causes, supply increase related to demand-push, even if abundant unemployment production factor is impossible or slow. Therefore, reasoning of less developed countries, until the time not successful to change in the form of lagging behind structure or not to make attempt for immediate self-economic growth or should compromise with the inflation that is very severe sometimes. They have provided two types of theories to explain the causes of inflation, namely markup theory and bottleneck inflation theory:

a. **Mark-up Theory**

   Prof Gardner Ackley proposed this theory. According to him, inflation is the cumulative effect of demand-pull and cost-push activities. When aggregate demand exceeds aggregate supply, there will be inflation, known as demand-pull inflation. This inflation stimulates production as well as demand for factors of production. Therefore, both the cost and price increases.

b. **Bottle-Neck Inflation**

   Prof Otto Eckstein introduced this theory. He suggests that the main cause of inflation is the direct relationship between wages and prices of products. Inflation takes place when there is a simultaneous increase in wages and prices of products. He says that the inflation occurs due to the boom in

capital goods and wage-price spiral. He also believes that during inflation prices in every industry is higher, but few industries show a very high price hike than rest of the industries. These industries are termed as bottleneck industries, which are responsible for increase in prices of goods and services.

2.2 Literature Review

Chowdhury and Ham (2009) in his research, the empirical analysis uses the null hypothesis of a linear vector autoregressive system of equations (VAR) against the alternative hypothesis of a threshold vector autoregressive system of equations (TVAR) to test whether the relationship between inflation and growth in GDP per capita shifts when the level of inflation reaches a certain (threshold) value. Their result is the relationship between inflation and economic growth is positive until the inflation rate rises to a level between 8.5% and 11%. That is, inflation is likely to be harmful when it exceeds a threshold level of around 10%.

In order to examine the issue of the existence of threshold effects in relation between inflation and economic growth Khan and Senhadji (2000) design a new empirical approach by using a range of econometric test. They evaluate the existence of threshold effects and ascertain robustness by estimating the impact of sensitivity to the estimated method, high inflation observation, the location of the threshold, date frequency and the sensitivity to additional explanatory variables. They discovered that the pace at which the rates of inflation significantly slow growth estimate at one to three percent for developed countries and seven to eleven percent for developing countries. The study also reveals some levels of negative but statistically significant relationship between the rates of inflation and the levels of economic growth in the economies studied and the

associated results were robust. Although the estimated thresholds were statistically significant at the one percent level, their stated confidence intervals were relatively wide. This empirical concern cast some levels of doubt over the exact location of the threshold level. Subsequently, with a ninety percent confidence interval, the researchers set an agreed band of one to four percent for developed countries and one to twenty percent for developing countries.

Mubarik (2005) estimated a threshold model of inflation and output growth. He test for Granger Causality and found a unidirectional relationship between the existing rates of inflation and the levels of economic growth. He established that the threshold inflation was at nine percent for economic growth in Pakistan within the period of the observation tested. To justify this result, he introduced sensitivity analysis with more robust outcomes. The result also suggested the same level of threshold inflation for a health domestic output level.

From a broader perspective, Kremer, Bick and Nautz (2009) in other to expository capture the inflation threshold levels of in both developed and developing countries, established a dynamic panel threshold model to confirm the impact of inflation on long-run economic growth. They arrive at the view that developed economies empirical test results confirm the fact that inflation targeting is about 2 percent. Further, they stated that the observed level at which inflation would not affect economic growth for developing countries is below 17 percent. Although below these thresholds, the impact of inflation on economic growth remains insignificant. They suggested that the empirical results did not reveal any indication of growth-enhancing effects of inflation in developing countries.

From these studies on the relationship between the rates of inflation, inflation threshold and economic growth, it notices that the rates of inflation have a significant negative effect on economic growth for developing countries if it exceeds its threshold band (Khan and Senhadji 2000). Relatively, most of these studies did not express any indication in view of positive effects of the rates of inflation on economic growth in situations where the level of inflation is within the specified threshold band. In this light Drukker, Gomis and Hernandez (2005) establish the fact that there are clearly defined relationship between inflation threshold and economic growth but the impact of the rates of inflation notices to be insignificant on economic growth. Subsequently, Lin and Ye (2009) after examining the effect of inflation targeting on economic growth, reveal that the performance of inflation targeting in developing countries can affect positively by these countries specific characteristics, which is due to the behavior and performance of other key macroeconomic variables in these economies. Furthermore, they stated that the inflation thresholds in developing countries and the appropriate levels of the inflation target are most likely country specific.

According Widaryoko (2013) in his research used Khan and Senhadji (2000) also Hansen (1997, 2000) as a two-regression model threshold multivariate. He chooses Hansen model for a proper model for Indonesia cases. In his result, the threshold is 9.53% suggested by Hansen model. When inflation less than 9.53%, every 1% of inflation increased, encourage economic growth as big as 0.34% ceteris paribus. Every 1% inflation increase can affect the weaknesses in economic growth performance as big as 2.48% ceteris paribus, when the inflation more than 9.53%.

Frimpong and Oteng-Abayie (2010) looked for inflation threshold values in Ghana from 1960 to 2008. Through the Khan and Senhadji (2001) and OLS and TSLS analysis tools, it was found that the inflation threshold value in Ghana was 11%. Inflation

has a positive effect on economic growth when the value is below 11% and will have a negative impact if the value exceeds 11%. Variables used to consist of inflation, economic growth of investment growth, the growth of money supply, the growth of the labor force, and terms of trade growth.

First research that stated there is a non-linear relationship between inflation and economic growth are Fischer (1993) and Sarel (1996). They found structural break point. After that, other researchers start to explore this study with estimate the value of the structural break point. The term structural break point knows as inflation threshold. The study, among others Khan and Senhadji (2001) found threshold inflation for developed country is 1-2% and developing country is 11-12%. Espinoza, Prasad, Leon (2010) found for all group country (except for advance countries) is 10%. Kremer, Bick, and Nautz (2013) found 2% for industrialize countries and 17% for non-industrialize countries. Vinayagathasan (2013) found 5.43% for 32 Asian countries. Baglan and Yoldasz (2014) found 12% threshold inflation for developing countries. Then, Ayyoub (2016) found 13.48%, 14.48%, 15.37%, and 40% for aggregate GDP, industrial, services and agriculture sectors respectively.

The study included Indonesia as an observation by Khan and Senhadji (2001), Espinoza, Prasad, and Leon (2010) found that as a developing country, Indonesia has a level of threshold inflation above 10%. Baglan, and Yoldasz (2014) found 12% threshold inflation for developing countries. In that study, the hypothesis is non-linear relationship between inflation and economic growth in Indonesia. From these study, Khan and Senhadji (2001), Espinoza, Prasad, and Leon (2010), Baglan and Yoldasz (2014), they found that as developing country Indonesia have threshold inflation above 10%, but Thanh (2015) found threshold level for developing countries in Asia region lower than those for other developing countries. Thanh (2015) stated threshold inflation for ASEAN-

5 (include Indonesia) is 7.84%. Vinayagathasan (2013) also found threshold inflation for Asian countries is 5.43% where Indonesia includes as observation. From these study is suspected Indonesia level threshold inflation may be lower again with current economic condition tend to be stable and low inflation policy.

Furthermore, four studies examine relationship between inflation and economic growth in Indonesia. Chowdhury and Siregar (2004) using the quadratic equation and find the threshold value of inflation in Indonesia at 20.50%. The interpretation is inflation positive effect on economic growth when its value is below 20% and will have a negative impact if the value exceeds 20%. While the results of the estimation using threshold vector auto-regression (TVAR) conducted by Chowdhury and Ham (2009) concluded threshold inflation in Indonesia is between on 8.50 to 11%. Widaryoko (2013) using a model of Hansen in 2000 found that inflation threshold in Indonesia at 9.53%. Winarno (2014) uses a dynamic panel threshold models found inflation threshold value exists for Indonesia and the estimated threshold regression model shows the threshold value is 4.62%. Different level threshold inflation may have caused by the range data observed, because in 1970-1997 Indonesia was not applied low inflation policies and after 1999, Indonesia started using low inflation policy.

The Opinions by Sepehri and Moshiri (2004), Kremer, Bick and Nautz (2013) stated that the study of inflation and economic growth should be the focus in the country, because the economic structure of each country is different. In addition, there are studies examining the same country but get different results for different period. That is likely due to economic structure of the country has changed over time. Therefore, this paper will use different method and up-to-date data for estimate threshold inflation in Indonesia in newest condition.

A natural starting point for the empirical analysis of inflation thresholds is the panel threshold model introduced by Hansen (1999) which is design to estimate threshold values instead of imposing them. Yet, the application of Hansen's threshold model to the empirical analysis of the inflation–growth nexus is not without problems. The most important limitation of Hansen's model is that all repressors are required to be exogenous. In growth regressions with panel data, the exogeneity assumption is particularly severe, because initial income as a crucial variable is endogenous by construction. Caselli et al. (1996) already demonstrated for linear panel models of economic growth that the endogeneity bias could be substantial. So far, dynamic versions of Hansen's panel threshold model have not been available.

Munir and Mansur (2009) found that inflation threshold value in Malaysia during 1970 to 2005 was 3.89%. The method used is conditional least squares with the variability of inflation, economic growth, Money supply growth (M2), the growth of PMTB, FDI, and growth export.

Different from existing research, our research use monetary transmission policy instrument such as; Reserve Requirements, Money Supply, Bank Indonesia Certificate, and Overnight Bank Rates. In addition, Exchange Rate as represent outside factor may influence inflation.

2.3 Hypothesis

There is an influence from Reserve Requirements, Money Supply, Bank Indonesia Certificate, Rates and Exchange Rate to Inflation in Indonesia. The rising oil price can give highest pressure to inflation in Indonesia and the average value at risk of inflation threshold in Indonesia not more than 10%.

Chapter III

METHODS

From the above discussion, this study models inflation uses some independent variables namely; interest rate, reserve requirement, open market operation policy, base money printing, and gross domestic product.

To avoid estimating a spurious regression, this study will conduct unit root tests to test the presence of non-stationary variables. Based on the status of the stationarity levels, this study takes into considerations two model candidates, namely short run, and long run models. The chosen model could be the combination of both, generally known as an Error Correction Model (ECM). This ECM can be built from two different situations, namely all variables are of I(1), namely integrated into the first difference, or the variables are the combination of both I (1) and I (0), where I (0) states that the variables are stationary in level.

If all of the variables are of I (1), a co-integration based on Engle-Granger test will be conducted. If the variables are the combination of I (1) and I (0), an ARDL (Autoregressive Distributed Lag) model will be estimated, which will be followed by a bounds test to test for the presence of co-integration.

As discussed, this study models the inflation using both conditional mean and conditional variance. The conditional variance is then employee to calculate the VaR. Different from non-conditional VaR, where the value is calculate as the mean plus or minus the distribution value times the standard deviation, this study uses conditional VaR since the standard deviation (volatility) is a conditional volatility, modeled by a family of GARCH model. Some possible second-moment models to estimate are ARCH, GARCH,

GJR, and EGARCH models. The ARCH, GARCH, GJR, and EGARCH models create by Engle (1982), Bollerslev (1986), Glosten, Jagannathan and Runkle (1993), and Nelson (1991), respectively.

The conditional mean model can write as follows:

$$INF_t = \theta_0 + \theta_1 MS_t + \theta_2 RR_t + \theta_3 GDP_t + \theta_4 RATE_t + \theta_5 ER_t + \theta_6 BIC_t + \varepsilon_t \quad (1)$$

$$\varepsilon_t = \eta_t \sqrt{h_{t-1}} \quad (2)$$

The conditional variance can modeled as follows:

The ARCH model $h_t = \omega + \sum_{j=1}^{r} \alpha_j \varepsilon_{t-j}^2$, (3)

The GARCH model $h_t = \omega + \sum_{j=1}^{r} \alpha_j \varepsilon_{t-j}^2 + \sum_{j=1}^{s} \beta_j h_{t-j}$, (4)

The GJR model $h_t = \omega + \sum_{j=1}^{r} (\alpha_j \varepsilon_{t-j}^2 + \gamma_j I_{t-j} \varepsilon_{t-1}^2) + \sum_{j=1}^{s} \beta_j h_{t-j}$, (5)

Where $I_t \begin{cases} 0, & \varepsilon_t \geq 0 \\ 1, & \varepsilon_t < 0 \end{cases}$. If $r = s = 1$, $\omega > 0$, $\alpha_1 \geq 0$, $\alpha_1 + \gamma_1 \geq 0$, and $\beta_1 \geq 0$ are sufficient condition to ensure that the conditional variance $h_t \geq 0$. The short-persistence of positive (negative) shock is given $\alpha_1 (\alpha_1 + \gamma_1)$. When the conditional shocks, η_t follow a symmetric distribution, the expected short-run persistence is $\alpha_1 + \gamma_1 / 2$, and the contribution of shocks to expected long-run persistence is $\alpha_1 + \gamma_1 / 2 + \beta_1$ (see McAleer (2005)).

The EGARCH model $$\ln(h_t^2) = \omega + \beta \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}^2}} + \gamma \ln(h_{t-1}^2) + \xi_t \quad , \quad (6)$$

Where $\eta_t \sim iid(0,1)$, and F_{t-1} is the past information which is available at the time t . The VaR can construct as:

$$VaR_t = E(y_t | F_{t-1}) - z\sqrt{h_t} \quad , \quad (7)$$

Where z is the statistical value from the ε_t distribution.

Since the introduction of Engle's (1982), Autoregressive Conditional Heteroscedasticity (ARCH) and Bollerlsev's (1986) Generalized ARCH (GARCH) models, a plethora of models proposed to investigate conditional variance (or volatility).

Test the stationarity of the data

This test is intended to find out whether the data are I(0) or *I*(1) or *I*(*n*). Various tests can be used such Dickey-Fuller test, Augmented Dickey-Fuller test, or Phillipps-Perron test.

Test of Co-integration

If the test reveals that the data are I (1), then a test on co-integration will conducted. This test is basic intended to analyze whether the non-stationary in level variables have a long run relationship, famous as co-integrated.

ECM Estimation

If the co-integration does exist, then following the Granger Theorem, we will build an Error Correction Model to tie the short-run equilibrium on the relationship between variables, and the long run situation, reflected in the regression model in level.

3.1 Variable of Research and Definition of Variable Operations

3.1.1 Variable of Research

The dependent variable of this study, namely the focus of the research, is the inflation of Indonesia. The independent variables include interest rate, reserve requirement, open market operation policy, base money printing, and gross domestic product.

3.1.2 Definition of Variable Operation

Interbank Overnight (O/N) Rates (Interest rate)

To achieve the overriding monetary policy objective, Bank Indonesia has implemented a monetary policy framework for management of interest rates (interest rate target). The policy rate, commonly known as the BI 7DDR, adopted in the Board of Governors Meeting at Bank Indonesia. At the operational level, the BI 7DDR reflected in movement in the Interbank Overnight (O/N) Rate.

The interbank money market is the activity of lending and borrowing money between one bank and another bank. An interbank rate represents the price formed in a deal between parties lending and borrowing funds. Activity on the interbank conducted over the counter (OTC) through deals between borrowers and holders of funds arranged without passing through an exchange floor. Interbank tenors range from one working day (overnight) to one year.

The interest rate is a strong candidate that might influence inflation. The theory said that as interest rate increases, people save their money into banks and delay consumption spending. This will reduce the money supply, and decreases inflation.

Statutory Reserve Requirement (*Giro Wajib Minimum, GWM*)

In Indonesia called as *Giro Wajib Minimum* (*GWM*), is the minimum amount required to maintain by a bank, the amount of which determined by Bank Indonesia at a certain percentage of third party funds. Since 24 October 2008, statutory reserve requirement in Indonesia has two type of statutory reserve requirement: GWM primary and secondary GWM. The primary GWM shall be the minimum deposit required by the bank in the form of a demand deposit account balance at Bank Indonesia. The amount of which determined by Bank Indonesia at a certain percentage of third party funds, and the secondary GWM shall be the minimum reserves required to be maintained by banks in the form of Bank Indonesia Certificates, Government Bonds and / or Excess Reserve, at a rate determined by Bank Indonesia at a certain percentage of third party funds.

The reserve requirement is another strong candidate that might influence inflation. The theory said that as the central bank increases reserve requirement, common banks have less money to be lent, that will eventually reduce the money supply, and decreases inflation.

***Bank Indonesia Certificates* (Open Market Operation)**

Securities denominated in Rupiah currency issued by Bank Indonesia in recognition of short-term debt. In this study, use daily, average number of sales of Bank Indonesia Certificate published by Bank Indonesia.

The open market operation is a policy held by the Central Bank to control inflation. It works by selling and buying government or central bank's bonds. If the

central bank wishes to reduce inflation, it can sell its bonds to the people. As the people buy the central bank bonds, their money flows from the circulation into the central bank, and it will reduce the money supply, and reduce inflation.

Gross Domestic Product

One of the important indicators to oversight economic condition in a country during certain period time, whether based on actual price or constant price, in this study use current prices GDP based on current price displays the additional values of goods and services calculated using the price in the current year. GDP based on current price displays the additional values of goods and services calculated using the price in the current year. Currently, GDP data published by Statistics Indonesia calculated using production approach and expenditure approach.

Different from the other candidate of independent variables in this study, which influence money supply to influence inflation, GDP influences the money demand in its way to influence inflation. As GDP increases, the need for liquidity increases. This will increase money demand and increases inflation.

Data

All the data are secondary data in nature. The researcher wishes to be able to find the data from various sources, namely from *Badan Pusat Statistik*, *Bank Indonesia*, Ministry of Finance, and some other possible sources.

CHAPTER IV

RESULT AND DATA ANALYSIS

Dependent Variable: INFLATION
Method: ARDL
Selected Model: ARDL(5, 5, 5, 5, 5, 5, 5)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFLATION(-1)	5.563135	0.073993	75.18457	0.0085
INFLATION(-2)	-0.238816	0.034057	-7.012162	0.0902
INFLATION(-3)	-1.976820	0.045662	-43.29212	0.0147
INFLATION(-4)	8.554466	0.123317	69.36999	0.0092
INFLATION(-5)	-6.316263	0.087766	-71.96697	0.0088
M2	0.002216	3.16E-05	70.23656	0.0091
M2(-1)	-0.004369	6.11E-05	-71.48273	0.0089
M2(-2)	-0.002753	4.42E-05	-62.32189	0.0102
M2(-3)	-0.000778	1.79E-05	-43.55969	0.0146
M2(-4)	0.002530	3.64E-05	69.56267	0.0092
M2(-5)	0.003392	4.92E-05	68.94108	0.0092
GWM1	-13.26170	0.212070	-62.53450	0.0102
GWM1(-1)	-1.808876	0.049810	-36.31519	0.0175
GWM1(-2)	22.00652	0.261915	84.02160	0.0076
GWM1(-3)	9.902550	0.138793	71.34785	0.0089
GWM1(-4)	2.691718	0.056552	47.59729	0.0134
GWM1(-5)	3.170784	0.061690	51.39834	0.0124
GDP	-0.003650	4.87E-05	-74.97728	0.0085
GDP(-1)	-0.000799	1.91E-05	-41.81386	0.0152
GDP(-2)	-0.000597	1.22E-05	-49.15216	0.0130
GDP(-3)	0.002701	4.28E-05	63.14761	0.0101
GDP(-4)	0.005173	8.03E-05	64.42936	0.0099
GDP(-5)	-0.004155	4.86E-05	-85.47957	0.0074
RATE2	-14.11192	0.195031	-72.35727	0.0088
RATE2(-1)	6.621513	0.164107	40.34865	0.0158
RATE2(-2)	-44.66601	0.588847	-75.85334	0.0084
RATE2(-3)	-16.39659	0.256499	-63.92458	0.0100
RATE2(-4)	-5.838201	0.098801	-59.09028	0.0108
RATE2(-5)	13.05059	0.192763	67.70270	0.0094
ER	0.000335	4.74E-06	70.62999	0.0090
ER(-1)	0.000115	1.83E-06	62.61399	0.0102
ER(-2)	0.000392	5.72E-06	68.61645	0.0093
ER(-3)	-0.000217	2.97E-06	-73.17003	0.0087
ER(-4)	2.36E-05	4.56E-07	51.81984	0.0123
ER(-5)	-3.89E-05	1.20E-06	-32.35473	0.0197
SBI	0.002045	2.97E-05	68.75427	0.0093
SBI(-1)	-0.001708	2.20E-05	-77.63315	0.0082
SBI(-2)	0.006065	7.91E-05	76.70830	0.0083
SBI(-3)	0.001552	2.45E-05	63.38129	0.0100
SBI(-4)	0.001915	2.89E-05	66.26629	0.0096

SBI(-5)	0.000809	1.23E-05	65.70911	0.0097
C	-2.292454	0.033468	-68.49659	0.0093

Table 4.1: ARDL

4.1 ARDL

From 43 observation after adjustment, 42 data have probability value below 0.05 of standards error, is mean 42 data have significant result to influence inflation, only variable inflation in lag two not significant because have probability value above 0.05 of standard error, 0.0902 . The data processed use Hannan-Quinn criterion (HQ) model selection method; the data have automatic selection to looking for best result. The data processed five of maximum dependent lags and five of dynamic regression, automated selection. The Selected model select by ARDL are in lag five.

The dependent variable Inflation, in lag five has probability value 0.0088; does statistically significant to influence inflation with coefficient level -6.316263, mean previous inflation negatively influence current inflation by 6.3%, strengthen the result that found by Larasati & Amri (2017). This indicate inflation in Indonesia well controlled and managed by Bank Indonesia as central bank to maintain inflation keep on track by implementing a policy mix with an enhanced inflation-targeting framework.

Independent variable M2, in lag five has probability value 0.0092, does statistically significant to influence inflation with coefficient value 0.003392, mean Money Supply (M2) positively give influence to inflation by 0.003%. The finding is in line with Sutawijaya (2012),Nguyen (2015), and Langi, Masinambow, & Siwu (2014), they found that the money supply has a positive and significant effect on inflation.

Independent variable GWM, Statutory Reserve Requirements, in lag five has probability value 0.0124, does statistically significant to influence inflation with

coefficient value 3.170784, mean GWM positively give influence to inflation by 3.17%. This finding is not in line with Setyawan (2010), his found GWM negatively influence inflation.

Independent variable GDP, Gross Domestic Product, in lag five has probability value 0.0074, does statistically significant to influence inflation with coefficient value -0.004155, mean GDP negatively influence inflation by 0.004%. Negative relationship between GDP as economic growth indicator and inflation is important, as it quite often occurs in practice, as ascertained by empirical literature.

Independent variable Interest Rate in lag five has probability value 0.0094, does statistically significant to influence inflation with coefficient value 13.05059, mean Interest Rate influence inflation by 13.05%. Independent variable ER, exchange rate, in lag five has probability value 0.0197, does statistically significant to influence inflation with coefficient value -3.89E-05, mean exchange rate negatively influence inflation by 3.89%. Variable SBI, Bank Indonesia's Certificate, in lag five have probability value 0.0097, does statistically significant to influence inflation with coefficient value 0.000809, mean.

4.2 Bound Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2680.786	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Table 4.2: Bound Test

The value of F-statistic is 2680.7866, is greater than any value of bound at any significant level, mean the data have long-run relationship between the variables.

4.3 Error Correction Model (ECM)

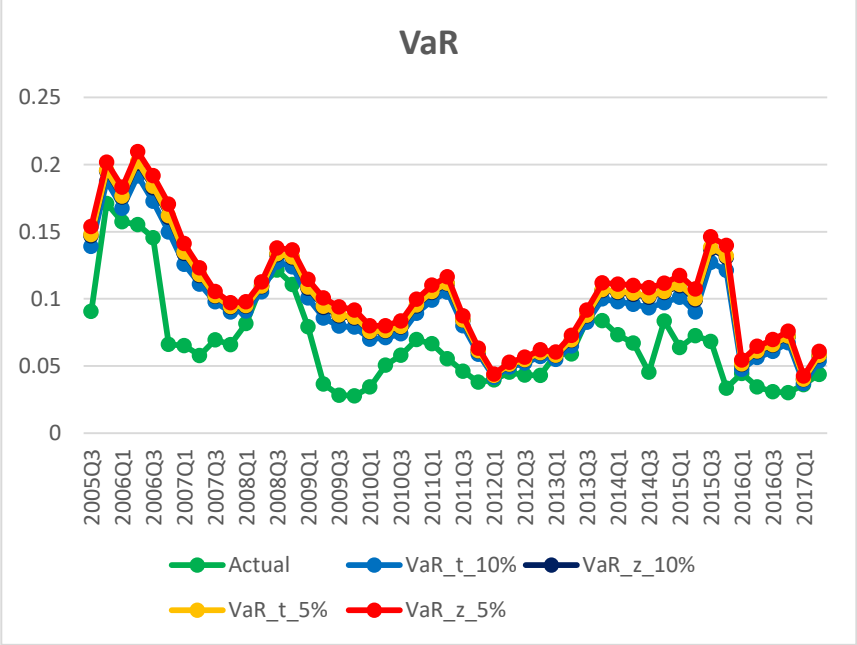
ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.022566	0.003546	-6.363707	0.0992
D(INFLATION(-2))	-0.261382	0.003531	-74.02732	0.0086
D(INFLATION(-3))	-2.238203	0.005029	-445.0184	0.0014
D(INFLATION(-4))	6.316263	0.016145	391.2101	0.0016
D(M2)	0.002216	5.62E-06	394.4847	0.0016
D(M2(-1))	-0.002391	5.97E-06	-400.2343	0.0016
D(M2(-2))	-0.005144	1.26E-05	-409.8383	0.0016
D(M2(-3))	-0.005921	1.46E-05	-406.9608	0.0016
D(M2(-4))	-0.003392	8.04E-06	-421.9570	0.0015
D(GWM1)	-13.26170	0.032907	-403.0038	0.0016
D(GWM1(-1))	-37.77157	0.091447	-413.0443	0.0015
D(GWM1(-2))	-15.76505	0.038457	-409.9443	0.0016
D(GWM1(-3))	-5.862502	0.014980	-391.3468	0.0016
D(GWM1(-4))	-3.170784	0.008222	-385.6595	0.0017
D(GDP)	-0.003650	8.85E-06	-412.2647	0.0015
D(GDP(-1))	-0.003122	7.90E-06	-394.9720	0.0016
D(GDP(-2))	-0.003719	8.91E-06	-417.4859	0.0015
D(GDP(-3))	-0.001018	3.03E-06	-336.2257	0.0019
D(GDP(-4))	0.004155	1.07E-05	388.9413	0.0016
D(RATE2)	-14.11192	0.038358	-367.8999	0.0017
D(RATE2(-1))	53.85021	0.133567	403.1694	0.0016
D(RATE2(-2))	9.184202	0.020489	448.2484	0.0014
D(RATE2(-3))	-7.212389	0.019710	-365.9289	0.0017
D(RATE2(-4))	-13.05059	0.032709	-398.9908	0.0016
D(ER)	0.000335	8.07E-07	414.6145	0.0015
D(ER(-1))	-0.000160	3.68E-07	-434.2847	0.0015
D(ER(-2))	0.000232	5.81E-07	400.0723	0.0016
D(ER(-3))	1.53E-05	9.45E-08	161.5502	0.0039
D(ER(-4))	3.89E-05	1.09E-07	357.3612	0.0018
D(SBI)	0.002045	5.68E-06	360.1967	0.0018
D(SBI(-1))	-0.010339	2.47E-05	-418.3348	0.0015
D(SBI(-2))	-0.004275	1.03E-05	-413.2025	0.0015
D(SBI(-3))	-0.002723	6.51E-06	-418.3745	0.0015
D(SBI(-4))	-0.000809	1.87E-06	-432.5694	0.0015
CointEq(-1)*	4.585701	0.011071	414.2105	0.0015

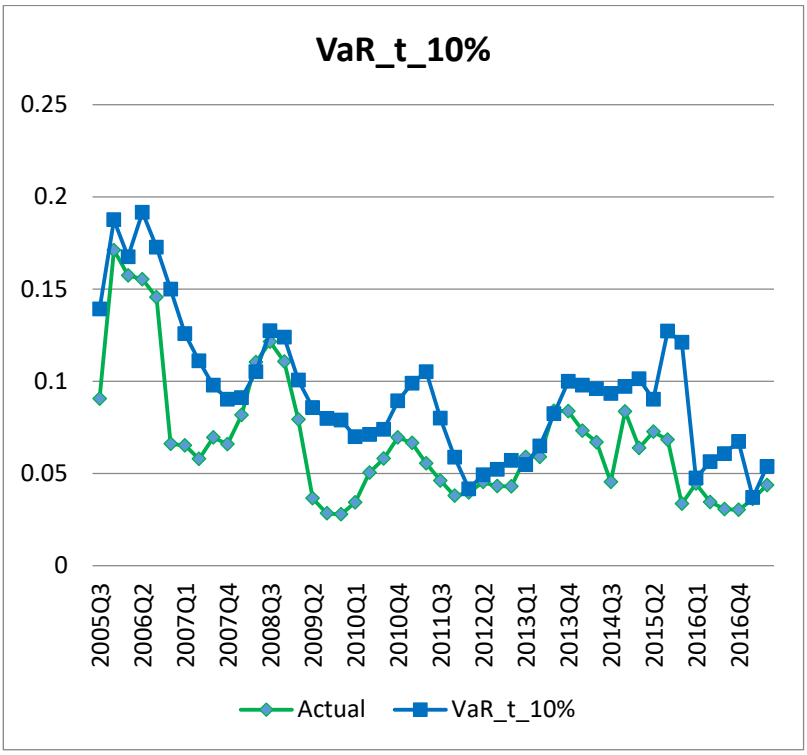
Table 4.3: Error Correction Model (ECM)

Interestingly in Error Correction Term show the model have positive coefficient (4.585701) and have significant result (0.0015), the model does not have co-integration in long run. In Durbin-Watson stat result 3.497113 is greater than two but less than four, mean the model have negative autocorrelation.

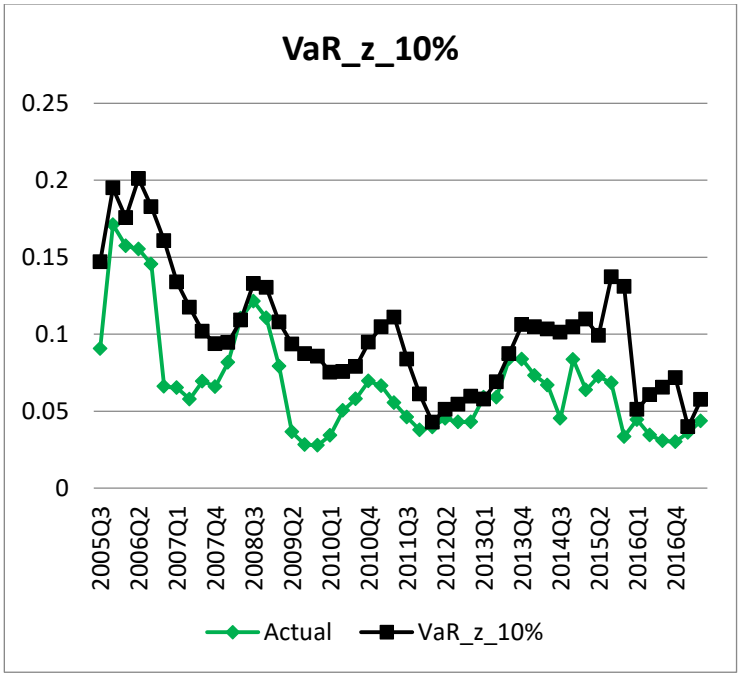
4.4 Value at Risk of Inflation Threshold



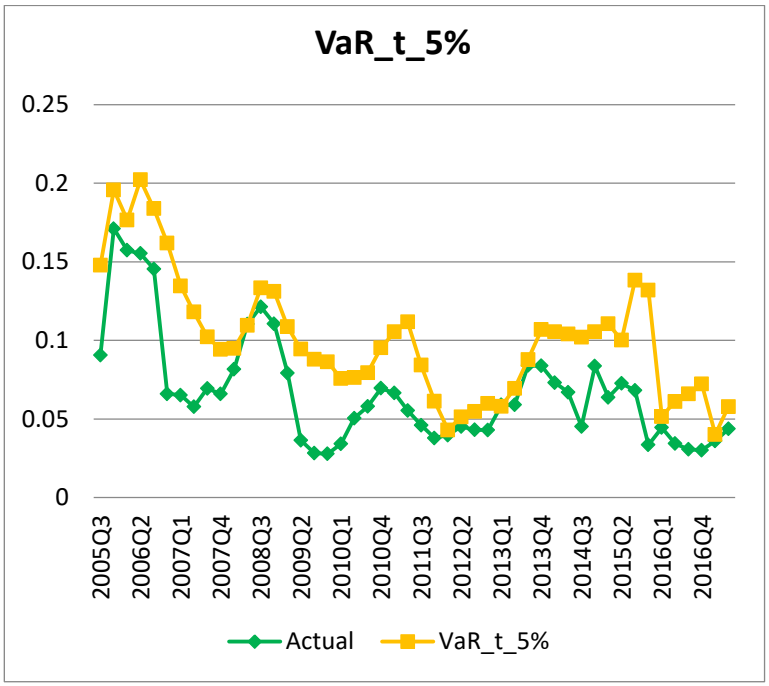
Graphic 4.4: VaR



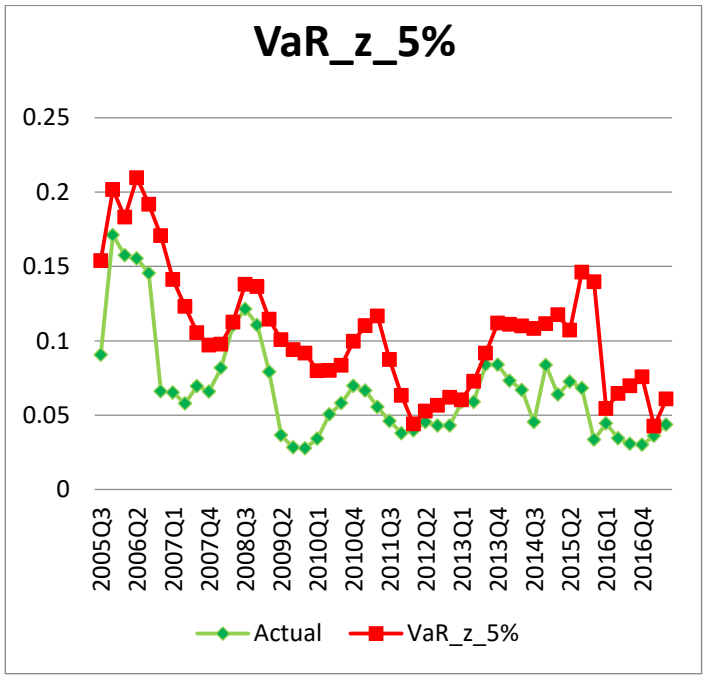
Graphic 4.5: VaR_t_10%



Graphic 4.6: VaR_z_10%



Graphic 4.7: VaR_t_5%



Graphic 4.8: VaR_z_5%

From the thresholds graphic lines result (Graphic 1), can see when the inflation value touched the value of the threshold. The moments when the value of inflation touched, the threshold is mean the inflation has a pressure. In the graphics, researcher made four possibilities of threshold indicate three different indicators of pressure for inflation. The high pressure indicated in Threshold VaR_t_10%, the higher pressure indicated in Threshold VaR_z_10% and Threshold VaR_t_5%, and the highest pressure indicated in VaR_z_5%. Every time the values of Inflation reach the threshold or the value of inflation closer to the threshold, there would had a something happened in that time. Therefore, the researcher will correlate the reach value of inflation and the threshold with the Indonesia's Economic Annual Report and Indonesia's Monetary Quarterly Report to see what was happening in that time. All of the report published by Bank Indonesia.

4.4.1 Value at Risk of Inflation Threshold in 2008

In the second quarter of 2008, the graphic shown the value of Inflations in level 0.1103, overshoot from the value of Threshold VaR_t_10% in level 0.1050818. The value of Threshold VaR_z_10% in level 0.109048658, the value of Threshold VaR_t_5% in level 0.109474986, and almost reached the value of Threshold VaR_z_5% in level 0.112611577.

According to Board of Governors of Bank Indonesia (2009), the strength of external factors had a significant bearing on inflation in 2008. The sharp rise in global commodity prices, particularly food and energy prices put upward pressure on inflation. The escalation in international oil prices even forced the Government to increase domestic fuel prices in May 2008 (2008 Q2). The intensity of the global factors also reflects in the climbing inflation per category of goods in which transportation,

foodstuffs, and processed food recorded a considerable hike. From the influencing factors, the climb in inflation was mainly the impact of rising inflation in administrated prices as well as a fair increase in inflation.

The inflationary pressure fueled by surging global commodity prices, led by oil and food. High oil prices not only driven up by imported inflation but also brought on higher administered price inflation following the Government decided to raise subsidized fuel prices. These events combined with problems in distribution and supply of key commodities boosted inflation expectations to high levels, which also put highest pressure on inflation in 2008. Higher inflation in the transportation category related primarily to the 28.7% hike in subsidized fuel prices in May 2008 (2008 Q2) caused the rise in the transportation fares.

Inflationary pressure maintained a highest trend in the 2008 Q2. In desegregation of the heightened inflationary pressure, the main contributing categories were administered prices and volatile foods. Strong administered price inflation linked to the decision to raise subsidized fuel prices by an average of 28.7%, while higher volatile food inflation came in response to hefty increases in world food prices (Board of Governors of Bank Indonesia, 2009).

Administered prices inflation soared to 15.99% (YoY) from 3.3% (YoY) in 2008 (Board of Governors of Bank Indonesia, 2009). This rise closely linked to the impact of high international oil prices, which forced the Government to exercise cuts in the fuel subsidy. As a result, fuel prices raised by an average of 28.7% on 24 May 2008. The decision to raise fuel prices were a key factor in the significantly higher contributed inflation in 2008 compared to the previous year. Prices for subsidized fuels (premium gasoline and diesel fuel) were not lowered until December 2008 (2008 Q4), when world

oil prices resumed the decline. This price cut had the first-round effect on inflation of -0.54% (Board of Governors of Bank Indonesia, 2009).

Nevertheless, inflationary pressures eased quite significantly in 2008 Q4 as the global commodity prices fell and the slowdown of the world economy deepened. Aside from that, the Government policy to lower domestic fuel prices in December 2008 (2008 Q4) in line with the declining world oil prices alleviated further the inflationary pressure. The graphic shows the value of threshold stay away from the value of inflation.

The less inflationary pressure came mainly in response to falling international commodity prices followed by a comparatively limited easing of domestic commodity prices and the price cuts for premium gasoline and automotive diesel in December 2008 (2008 Q4). Analyzed by influencing factors, mounting inflation in 2008 was explains mainly by heightened inflation in administered prices. Government decisions concerning administered prices, most importantly to raise subsidized fuel prices on 24 May 2008 combined with escalating global foodstuff prices were responsible for escalating inflationary pressure, but subsequently weakened during 2008 Q4.

4.4.2 Value at Risk of Inflation Threshold in 2009

Interestingly, Inflationary pressure in 2009 was generally minimal. The graphics show declining inflation trend and along with the value of inflation stay away from the value of threshold is mean inflation had less pressure. Inflation plunged to 2.78% from 11.06% in 2008. Inflation in 2009 also came below the 2009 inflation target set at 4.5% ± 1% (Board of Governors of Bank Indonesia, 2010).

According to Board of Governors of Bank Indonesia (2010), the minimal inflation in 2009 explain largely by Bank Indonesia policies in restoring market confidence that subsequently paved the way for appreciation in the rupiah. This, in turn,

helped to shape improved inflation expectations. The milder inflation expectations were also explain largely by lower administered prices and volatile foods inflation. Administered prices inflation fell below the trend because of the positive influence of the Government decision to lower subsidized fuel prices in early 2009. At the same time, modest volatile foods inflation below the trend owes much, to successful government measures in securing the supply and distribution of vital food staples and energy. The low inflation in 2009 resulted from the decline across all inflation components and categories of goods. The reduced inflation linked primarily to the effect of the cut in subsidized fuel prices. Even in 2009, the trends of inflation is decline is in line with the slower economic activity and effected on slowing economic growth because of slowing Indonesia's export performance and domestic consumption.

4.4.3 Value at Risk of Inflation Threshold in 2012

In the first quarter of 2012, the value of inflation is in level 0.0397; nearly reach the value of Threshold VaR_t_10% in level 0.0416411. According to Board of Governors of Bank Indonesia (2013), in 2012 Q1 inflation expectations have increased due to the expected changes in policies related to subsidized fuel. At that time, government had a plan to increased subsidize fuel, was rejected by parliament. The uncertainty decision from government for increased subsidize fuel, effected to the people to creating expectation and resulted almost high-pressure inflation because of expectations inflation among the people.

4.4.4 Value at Risk of Inflation Threshold in 2013

In the first quarter of 2013, the value of inflation is in level 0.059, overshoot the value of Threshold VaR_t_10% in level 0.054845073, the value of Threshold

VaR_z_10% in level 0.05772979, the value of Threshold VaR_t_5% in level 0.058039818, and nearly reach the value of the Threshold VaR_z_5% in level 0.0603208.

According to Board of Governors of Bank Indonesia (2014), High of inflationary pressures in 2013 attribute by rising prices of food and subsidized fuel. In the first quarter of 2013, inflationary pressures largely driven by the rising food prices brought about by policy restrictions on imports of horticultural products and climatic anomalies. Inflationary pressures intensified since 2013 Q2 when the government raised subsidized fuel prices as part of its effort to maintain fiscal resilience. The subsidized fuel price hikes also led to the second round effects, on prices for other commodities such as transport fares. At the same time, volatile food inflation during third quarter of 2013 also increased due to the lingering impact of the subsidized fuel price hike and disruptions to domestic production because of the delayed harvest. The price increases of these two groups subsequently continued to impact core inflation, which then pushed overall inflation upwards to 8.4% in 2013 Q3 (YoY) (Board of Governors of Bank Indonesia, 2014).

These developments in 2013 inflation also raised a number of structural issues that eventually contributed to increased inflationary pressures. Volatile food inflationary pressure also cause by a relatively fragile of food security, thereby causing domestic food prices vulnerable to the shocks of global prices and supply of imports. In addition to this, distribution problems resulting from inadequate infrastructure also added to the price pressure, particularly in areas that are less accessible. Price pressures that resulted from the impact of rising fuel prices also raised issues concerning domestic energy security and its management system. This is associated with domestic production that continued to decline, amidst growing energy demand driven by relatively low prices due to the significant amount of fuel subsidies. The impact of food and energy security on inflation

became increasingly evident as other issues pertaining to the market structure for a number of items that tends to be oligopolistic both in terms of production and distribution

Volatile food inflation pressures were high in 2013, reaching 11.8%, mainly occurring in the first quarter of 2013 (Board of Governors of Bank Indonesia, 2014). The first quarter of 2013, volatile food inflation hike was influence by the increase in the price of spices as well as various vegetables and fruits due to reduced supply brought about by climatic disruptions, minimal domestic production, and policy on horticultural imports. The increase in volatile food inflation in the first quarter of 2013 also drives by the continued rise in the price of beef due to limited import quota amidst inadequate domestic production. During third quarter of 2013, the pressure of volatile food price soared for the second time caused by the second round effect of fuel price hike.

Volatile food inflation in 2013 continued to generally influence by numerous structural issues. First, it influence by the limited domestic supply to meet demand. Domestic supply constraints later addresses by imports as occurred with commodities such as shallots and garlic. In this condition, the constraints for the implementation of policies regulating imports such as horticulture and beef will push domestic prices higher. The second factor relates to the lack of infrastructure support that subsequently increases distribution costs such as transportation costs as well as loading and unloading costs, which occurred with red chilies. The third factor relates to the price setting mechanism due to the lack of transparency that, among others, sparked by market structure, which tend to be oligopolistic. Bank Indonesia's identification showed that this third factor widened the disparity between the prices set by the producer and consumers, as occurred with commodities such as shallots and red chilies.

Based on commodities, inflationary pressures mainly derived from price increases for shallots, red pepper, beef, rice, oranges, and chicken meat. Prices for shallots and red chilies respectively grew by 90.0% and 113.4%, with each respectively contributing 0.4% and 0.3% to inflation in 2013 (Board of Governors of Bank Indonesia, 2014). The high inflation for these two commodities caused by horticultural import restriction policies, amidst minimal domestic production due to unfavorable climatic conditions in the first half of the year

In the third quarter of 2013, the value of inflation is in level 0.084, overshoot the value of Threshold VaR_t_10% in level 0.082431402, but doesn't reach others value of the threshold. Pressure brought by the increase in beef prices rose by 11.1%, with contribution to inflation amounting to 0.1% (Board of Governors of Bank Indonesia, 2014). The increase in beef prices have started to ease in the third quarter of 2013 due to government policies. The government applied, to stabilize beef prices, policy measures through the Joint Decree between the Ministry of Agriculture and the Ministry of Commerce, which comprises releasing of import quotas for some types of meat, accelerating the realization of imports, and assigning Logistics Agency to take participation in efforts to stabilize prices. In due course, the Government continued to refine these regulations by, among others, changing the procedures for the import mechanism of beef and horticultural products

Inflationary pressures that eased in the third quarter of 2013 pushed overall inflation in 2013 under two-digit level, lower than inflation during periods of rising subsidized fuel prices in 2008. Based on its components, the increase in inflation was mainly cause by the high inflation in administered prices and volatile food inflation, which respectively reach 16.7% and 11.8% (Board of Governors of Bank Indonesia, 2014).

However, volatile food inflation resumed a waning trend at the end of the year in line with the positive impact brought about by various policy responses taken by Bank Indonesia and the government. The decline in shallots and red chili prices was cause by the Government's policy response to relax restrictions on horticultural imports. This is in line with Inflation Controlling Team's recommendations in the need to relax regulations and accelerate the realization of imports given the limited domestic supply. The impact of the relaxation of policies on horticultural imports was also evident in commodity prices for garlic that continued to deflate in the fourth quarter of 2013.

4.4.5 Value at Risk of Inflation Threshold in 2017

In the first quarter of 2017, the value of inflation is in level 0.0361 reach the value of Threshold VaR_t_10% in level 0.036949983. According to Board of Governors of Bank Indonesia (2017), Inflationary pressures stemmed from administered prices, primarily the implementation of several tariff policies at beginning of 2017. In the first quarter of 2017, the high inflationary pressure drove by the higher administration fees on vehicle registration renewals and higher electricity tariffs. Inflationary pressures on administered prices driven by phase II adjustments to electricity rates for nonsubsidised 900VA subscribers as well as higher airfares as seasonal demand continued to spike during the long holidays.

4.4.6 Average Value at Risk of Inflations Threshold

The average value at risk of inflation threshold in this study is 10% (0.100038). Similar result that found by Espinoza, Prasad and Leon (2010), and closer with Widaryoko (2013) using a model of Hansen in 2000 found that inflation threshold in Indonesia at 9.53%, also Chowdhury and Ham (2009) using threshold vector auto-regression (TVAR) concluded threshold inflation in Indonesia is between on 8.50 to 11%.

CHAPTER V

CONCLUSIONS AND RECOMENDATIONS

5.1 Conclusions

This study aimed to examine the effect of the money supply, statutory reserve requirement, GDP, interest rates, exchange rate, and Certificate of Bank Indonesia, to describe the threshold of inflation in Indonesia during the period 2005 Q3 to 2013. This study founds two variables as monetary transmission, rates and statutory reserve (GWM), positively influence inflation by 13.05% and 3.17%. This indicate Bank Indonesia monetary policy give enough impact to inflation and the decision to change the monetary policy can do more carefully remind the impact will affected to inflation. Seen from the negative impact of previous inflation to inflation, indicate Bank Indonesia as central bank managed and controlled well to keep inflation keep on track. Moreover, this found negative relationship between GDP and inflation by only 0.004%, indicate economic growth in Indonesia closer to the inflation threshold because the coefficient level is below 0.0% is mean close to positive relationship with the inflation. All significant data justify hypothesis that there is an influence from Reserve Requirements, Money Supply, Bank Indonesia Certificate, Interest Rates and Exchange Rate to Inflation in Indonesia.

From the correlation between threshold and the value of inflation, Indonesia has inflation trend caused by administered prices and volatile food. With 10% threshold, indicate central government and central bank should keeping inflation low, stable, and predictable, thus providing a climate that is more favorable to sound, sustained economic growth and job creation and more carefully if want to raise the administered prices. The administered prices can give highest inflationary pressure when the government decreased subsidy and creating raise in administered price. For the volatile foods, usually

the problem came from the supply cannot fulfill the demand side, the problem typically came from the climate, harvest season, the distribution, and the infrastructure can triggers high inflation in volatile food. From the cause of inflation happens in Indonesia can conclude that inflation pressure in Indonesia caused by several things, among others:

1. Administered prices;

   The rising prices of goods are regulated by the government toward some of the goods and services, especially subsidized, leads to an increase in the price of other goods, which then triggers the increase in inflationary pressures because government-subsidized goods that are very basic needs in Indonesian society such as fuel oil, and electricity. Therefore, public expenditures will increase because of the removal of subsidies on both goods. As happened in 2008 Q2, 2013 Q3, and 2017 Q1.

2. Volatile foods

   Unable to fulfill the domestic market demand for foodstuffs in particular, can cause considerable inflationary pressures. This caused by the occurrence of failed harvests caused by weather factors, and distribution of goods that are not smooth to the consumer, which is then followed by the disappearance of some commodities in the market, resulting in price increases in these commodities also lead to inflation. Inflationary pressures are getting worse when the government issues a policy of banning imports on some core commodities such as onion, garlic, beef, chili, and other staple foods. Due to limited domestic production of foodstuffs, so that cannot meet the domestic market demand so much. This has led to volatile foods can create inflationary pressure is high enough, as happened in 2013 Q1 and Q3 2013

3. Expectation

Expectation inflation can also create quite high pressures, as happened in the 1st quarter of 2012, when the fuel price hike became a hot issue of national news. This has an impact on the people of Indonesia, which then make them speculate about the fuel price hike, thus making inflation pressure almost high enough. Some of the issues developing in society often lead to panic, which then have resulted in rising prices of goods.

5.2 Recommendations

Therefore, if the government wants to raise the price of goods regulated by the government, the government should coordinate with Bank Indonesia as the central bank first to minimize the pressures that will occur in administered prices increase. In this case, the central bank of Indonesian bank is in charge of tackling or minimizing inflationary pressures from the monetary side so that inflationary pressures are less likely to affect domestic economic performance. In the event of pressure, Bank Indonesia may update or adjust monetary policy measures to minimize inflationary pressures, which may occur, so as not to overstate or exceed the predetermined inflation target.

Given the domestic demand for staple foods commodity is enormous, even greater than the production capacity that can produce domestically, so the frequent occurrence of scarcity of staple foods commodity as well as uncertain whether factors can exacerbate the situation that can making crop failure. This causes the government to import food into the country considering the amount of domestic demand that cannot meet without the help of imported foodstuffs. However, this should reconsider, as the government must coordinate with the relevant ministries, since improper import decisions can affect the rupiah exchange rate and can raise core inflation. The recommendation from the researcher is that the government should pay more attention and increase the

production capacity and invest long-term in the improvement of research and development to the field of horticulture, agriculture, and animal husbandry, because these three sectors are very important in national food security.

As happened in the first quarter of 2012, the people of Indonesia shock by the news about the planned increase in fuel prices made by the government at that time. This price hike plan becomes a national issue and makes Indonesians speculate on the fuel price hikes. This makes the sellers in the market began to raise the price of goods in order to prepare the fuel price increase that be done by the government. The discourse of fuel price hike by the government, has been heard by the public, this is what causes inflation expectations in the wider community, and make the prices of goods on the market go up, whereas this fuel price increase is just a discourse.

Estimating inflation threshold is interesting issue for economics since many researchers always had different: method, variables, and results for estimating inflation threshold. The fluctuation of inflation came from fluctuate economic activities. Doing an estimating threshold inflation is challenging, because sometimes the inflation is caused by a volatile economic conditions, which is not only one factor that can influence but also an unexpected thing such as inflations expectations can creates major effect on Inflation.

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APPENDICES

Appendix 1 Inflation, M2. Reserve Requirement (GWM), Rate, Exchange Rate (ER), Bank Indonesia's Certificate (SBI)

Date	Inflation	M2	GWM	GDP	Rate	ER	SBI
2005 Q3	9.06%	1154	5.00%	713	10.00%	10310	50
2005 Q4	17.11%	1203	5.00%	758	12.75%	9830	69
2006 Q1	15.74%	1199	5.00%	783	12.75%	9075	1317
2006 Q2	15.53%	1258	5.00%	813	12.50%	9300	168
2006 Q3	14.55%	1295	5.00%	870	11.25%	9235	183
2006 Q4	6.60%	1382	5.00%	873	9.75%	9020	209
2007 Q1	6.52%	1379	5.00%	920	9.00%	9118	244
2007 Q2	5.78%	1455	5.00%	964	8.50%	9054	260
2007 Q3	6.95%	1517	5.00%	1031	8.25%	9137	263
2007 Q4	6.59%	1650	5.00%	1035	8.00%	9419	274
2008 Q1	8.17%	1594	5.00%	1110	7.96%	9217	261
2008 Q2	11.03%	1703	5.00%	1221	8.52%	9225	165
2008 Q3	12.14%	1778	5.00%	1328	9.40%	9378	136
2008 Q4	11.06%	1896	5.00%	1291	9.49%	10950	169
2009 Q1	7.92%	1917	5.00%	1315	8.22%	11575	234
2009 Q2	3.65%	1978	5.00%	1381	6.84%	10225	231
2009 Q3	2.83%	2019	5.00%	1458	6.37%	9681	217
2009 Q4	2.78%	2141	5.00%	1451	6.50%	9400	254
2010 Q1	3.43%	2112	5.00%	1604	6.19%	9115	298
2010 Q2	5.05%	2231	5.00%	1705	6.28%	9083	270
2010 Q3	5.80%	2275	5.00%	1786	6.26%	8924	252
2010 Q4	6.96%	2471	8.00%	1770	5.78%	8991	200
2011 Q1	6.65%	2451	8.00%	1834	6.17%	8709	230
2011 Q2	5.54%	2523	8.00%	1928	6.37%	8597	186
2011 Q3	4.61%	2643	8.00%	2054	5.34%	8823	149
2011 Q4	3.79%	2877	8.00%	2015	4.57%	9068	120
2012 Q1	3.97%	2914	8.00%	2061	3.78%	9180	94
2012 Q2	4.53%	3053	8.00%	2162	4.14%	9480	90
2012 Q3	4.31%	3128	8.00%	2224	4.19%	9588	68
2012 Q4	4.30%	3308	8.00%	2169	4.49%	9670	79
2013 Q1	5.90%	3323	8.00%	2235	4.30%	9719	92
2013 Q2	5.90%	3413	8.00%	2343	4.59%	9929	82
2013 Q3	8.40%	3584	8.00%	2491	5.83%	11613	65
2013 Q4	8.38%	3730	8.00%	2477	6.74%	12189	91
2014 Q1	7.32%	3653	8.00%	2506	6.27%	11404	104

2014 Q2	6.70%	3858	8.00%	2619	6.19%	11969	110
2014 Q3	4.53%	4010	8.00%	2747	5.91%	12212	79
2014 Q4	8.36%	4173	8.00%	2698	6.32%	12440	89
2015 Q1	6.38%	4246	8.00%	2728	6.52%	13084	87
2015 Q2	7.26%	4359	8.00%	2869	5.75%	13332	64
2015 Q3	6.83%	4509	8.00%	2993	7.96%	14657	43
2015 Q4	3.35%	4549	7.50%	2942	7.66%	13795	32
2016 Q1	4.45%	4562	6.50%	2931	5.08%	13276	68
2016 Q2	3.45%	4737	6.50%	3075	5.35%	13180	79
2016 Q3	3.07%	4738	6.50%	3205	5.46%	12998	107
2016 Q4	3.02%	5005	6.50%	3195	6.04%	13436	95
2017 Q1	3.61%	5018	6.50%	3227	4.54%	13321	67
2017 Q2	4.37%	5224	6.50%	3367	5.25%	13319	37

Appendix 2 ARDL

Dependent Variable: INFLATION
Method: ARDL
Date: 10/11/17 Time: 14:23
Sample (adjusted): 2006Q4 2017Q2
Included observations: 43 after adjustments
Maximum dependent lags: 5 (Automatic selection)
Model selection method: Hannan-Quinn criterion (HQ)
Dynamic regressors (5 lags, automatic): M2 GWM1 GDP RATE2 ER SBI
Fixed regressors: C
Number of models evalulated: 233280
Selected Model: ARDL(5, 5, 5, 5, 5, 5, 5)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFLATION(-1)	5.563135	0.073993	75.18457	0.0085
INFLATION(-2)	-0.238816	0.034057	-7.012162	0.0902
INFLATION(-3)	-1.976820	0.045662	-43.29212	0.0147
INFLATION(-4)	8.554466	0.123317	69.36999	0.0092
INFLATION(-5)	-6.316263	0.087766	-71.96697	0.0088
M2	0.002216	3.16E-05	70.23656	0.0091
M2(-1)	-0.004369	6.11E-05	-71.48273	0.0089
M2(-2)	-0.002753	4.42E-05	-62.32189	0.0102
M2(-3)	-0.000778	1.79E-05	-43.55969	0.0146
M2(-4)	0.002530	3.64E-05	69.56267	0.0092
M2(-5)	0.003392	4.92E-05	68.94108	0.0092
GWM1	-13.26170	0.212070	-62.53450	0.0102
GWM1(-1)	-1.808876	0.049810	-36.31519	0.0175
GWM1(-2)	22.00652	0.261915	84.02160	0.0076
GWM1(-3)	9.902550	0.138793	71.34785	0.0089
GWM1(-4)	2.691718	0.056552	47.59729	0.0134
GWM1(-5)	3.170784	0.061690	51.39834	0.0124
GDP	-0.003650	4.87E-05	-74.97728	0.0085
GDP(-1)	-0.000799	1.91E-05	-41.81386	0.0152
GDP(-2)	-0.000597	1.22E-05	-49.15216	0.0130
GDP(-3)	0.002701	4.28E-05	63.14761	0.0101
GDP(-4)	0.005173	8.03E-05	64.42936	0.0099
GDP(-5)	-0.004155	4.86E-05	-85.47957	0.0074
RATE2	-14.11192	0.195031	-72.35727	0.0088
RATE2(-1)	6.621513	0.164107	40.34865	0.0158
RATE2(-2)	-44.66601	0.588847	-75.85334	0.0084
RATE2(-3)	-16.39659	0.256499	-63.92458	0.0100
RATE2(-4)	-5.838201	0.098801	-59.09028	0.0108
RATE2(-5)	13.05059	0.192763	67.70270	0.0094
ER	0.000335	4.74E-06	70.62999	0.0090
ER(-1)	0.000115	1.83E-06	62.61399	0.0102
ER(-2)	0.000392	5.72E-06	68.61645	0.0093
ER(-3)	-0.000217	2.97E-06	-73.17003	0.0087
ER(-4)	2.36E-05	4.56E-07	51.81984	0.0123
ER(-5)	-3.89E-05	1.20E-06	-32.35473	0.0197
SBI	0.002045	2.97E-05	68.75427	0.0093
SBI(-1)	-0.001708	2.20E-05	-77.63315	0.0082
SBI(-2)	0.006065	7.91E-05	76.70830	0.0083
SBI(-3)	0.001552	2.45E-05	63.38129	0.0100
SBI(-4)	0.001915	2.89E-05	66.26629	0.0096
SBI(-5)	0.000809	1.23E-05	65.70911	0.0097

C	-2.292454	0.033468	-68.49659	0.0093

R-squared	0.999995	Mean dependent var	0.058660
Adjusted R-squared	0.999801	S.D. dependent var	0.022763
S.E. of regression	0.000321	Akaike info criterion	-15.05814
Sum squared resid	1.03E-07	Schwarz criterion	-13.33790
Log likelihood	365.7500	Hannan-Quinn criter.	-14.42377
F-statistic	5152.318	Durbin-Watson stat	3.497113
Prob(F-statistic)	0.011048		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 3 Bound Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(INFLATION)
Selected Model: ARDL(5, 5, 5, 5, 5, 5, 5)
Case 2: Restricted Constant and No Trend
Date: 01/22/18 Time: 00:25
Sample: 2005Q3 2017Q2
Included observations: 43

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.292454	0.033468	-68.49655	0.0093
INFLATION(-1)*	4.585701	0.053605	85.54618	0.0074
M2(-1)	0.000238	9.78E-06	24.35490	0.0261
GWM1(-1)	22.70099	0.265344	85.55299	0.0074
GDP(-1)	-0.001328	1.63E-05	-81.27955	0.0078
RATE2(-1)	-61.34062	0.775654	-79.08241	0.0080
ER(-1)	0.000609	8.10E-06	75.26032	0.0085
SBI(-1)	0.010676	0.000154	69.42027	0.0092
D(INFLATION(-1))	-0.022566	0.042802	-0.527216	0.6911
D(INFLATION(-2))	-0.261382	0.016544	-15.79924	0.0402
D(INFLATION(-3))	-2.238203	0.039660	-56.43520	0.0113
D(INFLATION(-4))	6.316263	0.087766	71.96692	0.0088
D(M2)	0.002216	3.16E-05	70.23651	0.0091
D(M2(-1))	-0.002391	2.61E-05	-91.59293	0.0070
D(M2(-2))	-0.005144	6.82E-05	-75.47287	0.0084
D(M2(-3))	-0.005921	8.50E-05	-69.64104	0.0091
D(M2(-4))	-0.003392	4.92E-05	-68.94104	0.0092
D(GWM1)	-13.26170	0.212070	-62.53446	0.0102
D(GWM1(-1))	-37.77157	0.500780	-75.42552	0.0084
D(GWM1(-2))	-15.76505	0.245453	-64.22829	0.0099
D(GWM1(-3))	-5.862502	0.112775	-51.98419	0.0122
D(GWM1(-4))	-3.170784	0.061690	-51.39830	0.0124
D(GDP)	-0.003650	4.87E-05	-74.97723	0.0085
D(GDP(-1))	-0.003122	6.80E-05	-45.91936	0.0139
D(GDP(-2))	-0.003719	7.90E-05	-47.08550	0.0135
D(GDP(-3))	-0.001018	3.74E-05	-27.20134	0.0234
D(GDP(-4))	0.004155	4.86E-05	85.47952	0.0074
D(RATE2)	-14.11192	0.195031	-72.35723	0.0088
D(RATE2(-1))	53.85021	0.740636	72.70806	0.0088
D(RATE2(-2))	9.184202	0.166313	55.22236	0.0115
D(RATE2(-3))	-7.212389	0.101364	-71.15303	0.0089
D(RATE2(-4))	-13.05059	0.192763	-67.70266	0.0094
D(ER)	0.000335	4.74E-06	70.62994	0.0090
D(ER(-1))	-0.000160	1.74E-06	-91.92714	0.0069
D(ER(-2))	0.000232	4.27E-06	54.47192	0.0117
D(ER(-3))	1.53E-05	1.49E-06	10.23743	0.0620
D(ER(-4))	3.89E-05	1.20E-06	32.35471	0.0197
D(SBI)	0.002045	2.97E-05	68.75423	0.0093
D(SBI(-1))	-0.010339	0.000144	-71.69380	0.0089
D(SBI(-2))	-0.004275	6.56E-05	-65.13242	0.0098
D(SBI(-3))	-0.002723	4.12E-05	-66.14883	0.0096
D(SBI(-4))	-0.000809	1.23E-05	-65.70906	0.0097

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2	-5.20E-05	2.27E-06	-22.84665	0.0278
GWM1	-4.950386	0.030644	-161.5427	0.0039
GDP	0.000290	3.52E-06	82.30596	0.0077
RATE2	13.37650	0.089132	150.0751	0.0042
ER	-0.000133	1.00E-06	-132.3590	0.0048
SBI	-0.002328	2.08E-05	-111.8248	0.0057
C	0.499914	0.004459	112.1227	0.0057

EC = INFLATION - (-0.0001*M2 -4.9504*GWM1 + 0.0003*GDP + 13.3765
*RATE2 -0.0001*ER -0.0023*SBI + 0.4999)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2680.786	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
			Finite Sample: n=45	
Actual Sample Size	43			
		10%	2.188	3.254
		5%	2.591	3.766
		1%	3.54	4.931
			Finite Sample: n=40	
		10%	2.218	3.314
		5%	2.618	3.863
		1%	3.505	5.121

Appendix 4 Error Correction Model

ARDL Error Correction Regression
Dependent Variable: D(INFLATION)
Selected Model: ARDL(5, 5, 5, 5, 5, 5, 5)
Case 2: Restricted Constant and No Trend
Date: 01/22/18 Time: 00:29
Sample: 2005Q3 2017Q2
Included observations: 43

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.022566	0.003546	-6.363707	0.0992
D(INFLATION(-2))	-0.261382	0.003531	-74.02732	0.0086
D(INFLATION(-3))	-2.238203	0.005029	-445.0184	0.0014
D(INFLATION(-4))	6.316263	0.016145	391.2101	0.0016
D(M2)	0.002216	5.62E-06	394.4847	0.0016
D(M2(-1))	-0.002391	5.97E-06	-400.2343	0.0016
D(M2(-2))	-0.005144	1.26E-05	-409.8383	0.0016
D(M2(-3))	-0.005921	1.46E-05	-406.9608	0.0016
D(M2(-4))	-0.003392	8.04E-06	-421.9570	0.0015
D(GWM1)	-13.26170	0.032907	-403.0038	0.0016
D(GWM1(-1))	-37.77157	0.091447	-413.0443	0.0015
D(GWM1(-2))	-15.76505	0.038457	-409.9443	0.0016
D(GWM1(-3))	-5.862502	0.014980	-391.3468	0.0016
D(GWM1(-4))	-3.170784	0.008222	-385.6595	0.0017
D(GDP)	-0.003650	8.85E-06	-412.2647	0.0015
D(GDP(-1))	-0.003122	7.90E-06	-394.9720	0.0016
D(GDP(-2))	-0.003719	8.91E-06	-417.4859	0.0015
D(GDP(-3))	-0.001018	3.03E-06	-336.2257	0.0019
D(GDP(-4))	0.004155	1.07E-05	388.9413	0.0016
D(RATE2)	-14.11192	0.038358	-367.8999	0.0017
D(RATE2(-1))	53.85021	0.133567	403.1694	0.0016
D(RATE2(-2))	9.184202	0.020489	448.2484	0.0014
D(RATE2(-3))	-7.212389	0.019710	-365.9289	0.0017
D(RATE2(-4))	-13.05059	0.032709	-398.9908	0.0016
D(ER)	0.000335	8.07E-07	414.6145	0.0015
D(ER(-1))	-0.000160	3.68E-07	-434.2847	0.0015
D(ER(-2))	0.000232	5.81E-07	400.0723	0.0016
D(ER(-3))	1.53E-05	9.45E-08	161.5502	0.0039
D(ER(-4))	3.89E-05	1.09E-07	357.3612	0.0018
D(SBI)	0.002045	5.68E-06	360.1967	0.0018
D(SBI(-1))	-0.010339	2.47E-05	-418.3348	0.0015
D(SBI(-2))	-0.004275	1.03E-05	-413.2025	0.0015
D(SBI(-3))	-0.002723	6.51E-06	-418.3745	0.0015
D(SBI(-4))	-0.000809	1.87E-06	-432.5694	0.0015
CointEq(-1)*	4.585701	0.011071	414.2105	0.0015

R-squared	0.999994	Mean dependent var	-0.002367
Adjusted R-squared	0.999967	S.D. dependent var	0.019692
S.E. of regression	0.000113	Akaike info criterion	-15.38372
Sum squared resid	1.03E-07	Schwarz criterion	-13.95018
Log likelihood	365.7500	Hannan-Quinn criter.	-14.85508
Durbin-Watson stat	3.497113		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	2680.786	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Appendix 4 GARCH

Dependent Variable: INFLATION
Method: ML - ARCH
Date: 10/11/17 Time: 14:23
Sample: 2005Q3 2017Q2
Included observations: 48
Failure to improve likelihood (non-zero gradients) after 57 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(8) + C(9)*RESID(-1)^2 + C(10)*RESID(-1)^2*(RESID(-1)<0) +
C(11)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.054823	0.000178	-307.7224	0.0000
M2	-3.02E-06	9.39E-06	-0.321390	0.7479
GWM1	0.734629	0.171894	4.273733	0.0000
GDP	1.02E-05	1.46E-05	0.698682	0.4848
RATE2	1.728349	0.020440	84.55772	0.0000
ER	-4.65E-06	6.15E-07	-7.557484	0.0000
SBI	-2.14E-05	8.93E-06	-2.395842	0.0166
Variance Equation				
C	1.04E-05	1.82E-05	0.570017	0.5687
RESID(-1)^2	0.260015	0.379177	0.685737	0.4929
RESID(-1)^2*(RESID(-1)<0)	-0.568354	0.411018	-1.382798	0.1667
GARCH(-1)	1.112377	0.064896	17.14087	0.0000

R-squared	0.752593	Mean dependent var	0.067548
Adjusted R-squared	0.716387	S.D. dependent var	0.035209
S.E. of regression	0.018751	Akaike info criterion	-5.083218
Sum squared resid	0.014415	Schwarz criterion	-4.654401
Log likelihood	132.9972	Hannan-Quinn criter.	-4.921167
Durbin-Watson stat	1.221563		

Appendix 5 VaR

Date	Actual	Fitted	GARCH	SD	VaR_z_5%	VaR_z_10%	VaR_t_5%	VaR_t_10%	t5%	t10%
2005Q3	0.0906	0.109565766	0.000512422	0.022636731	0.1539338	0.14691637	0.1477561	0.1391034	-1.68709	-1.30485
2005Q4	0.1711	0.159227856	0.000469456	0.021666933	0.201695	0.1949783	0.195782	0.18750005	1.687094	1.304854
2006Q1	0.1574	0.136317026	0.00056922	0.023858338	0.1830794	0.17568328	0.1765683	0.16744868		
2006Q2	0.1553	0.155645661	0.000759122	0.027552167	0.2096479	0.20110674	0.2021287	0.19159723		
2006Q3	0.1455	0.134511465	0.000854753	0.029236153	0.1918143	0.18275112	0.1838356	0.17266039		
2006Q4	0.066	0.10877798	0.000992563	0.031504971	0.1705277	0.16076118	0.1619298	0.14988738		
2007Q1	0.0652	0.095101944	0.000550218	0.023456718	0.1410771	0.13380553	0.1346756	0.12570955		
2007Q2	0.0578	0.086638168	0.000346715	0.018620287	0.1231339	0.11736164	0.1180523	0.11093493		
2007Q3	0.0695	0.082362553	0.00013961	0.011815688	0.1055213	0.10185844	0.1022967	0.0977803		
2007Q4	0.0659	0.076145911	0.000114646	0.010707278	0.0971322	0.09381292	0.0942101	0.09011735		
2008Q1	0.0817	0.077605918	0.00010552	0.010272286	0.0977396	0.09455519	0.0949362	0.09100975		
2008Q2	0.1103	0.090084736	0.000132096	0.011493286	0.1126116	0.10904866	0.109475	0.1050818		
2008Q3	0.1214	0.106081298	0.000263557	0.016234431	0.1379008	0.13286811	0.1334703	0.12726487		
2008Q4	0.1106	0.09889371	3.65E-04	0.01909319	0.1363164	0.13039747	0.1311057	0.12380754		
2009Q1	0.0792	0.072841768	4.52E-04	0.021248725	0.1144893	0.10790216	0.1086904	0.10056826		
2009Q2	0.0365	0.055806038	5.23E-04	0.022871789	0.1006347	0.09354449	0.0943929	0.08565039		
2009Q3	0.0283	0.051173075	0.00047734	0.021848109	0.0939954	0.08722245	0.0880329	0.07968167		
2009Q4	0.0278	0.053504086	0.000380025	0.019494242	0.0917128	0.08566959	0.0863927	0.07894123		
2010Q1	0.0343	0.05017181	0.000229372	0.01514502	0.079856	0.07516109	0.0757229	0.06993386		
2010Q2	0.0505	0.053149913	0.000187832	0.013705191	0.0800121	0.07576348	0.0762719	0.07103319		
2010Q3	0.058	0.054627524	0.000217135	0.01473549	0.0835091	0.07894108	0.0794877	0.07385519		

2010Q4	0.0696	0.068402774	0.000254852	0.015964099	0.0996924	0.094074354	0.0953357	0.0892336
2011Q1	0.0665	0.076532043	0.000294224	0.017152967	0.1101519	0.104083444	0.1054707	0.09891417
2011Q2	0.0554	0.082197988	0.000306616	0.017510456	0.1165185	0.111009024	0.1117398	0.10504658
2011Q3	0.0461	0.065049431	1.30E-04	0.011401934	0.0873972	0.083086262	0.0842856	0.0799273
2011Q4	0.0379	0.050134736	4.43E-05	0.006652402	0.0631734	0.0611112	0.061358	0.05881515
2012Q1	0.0397	0.036858821	1.34E-05	0.003665005	0.0440422	0.042090608	0.043042	0.04164112
2012Q2	0.0453	0.04239896	2.74E-05	0.005234515	0.0526586	0.05103591	0.0512301	0.04922924
2012Q3	0.0431	0.043623845	4.30E-05	0.006559504	0.0564805	0.05444703	0.0546903	0.05218304
2012Q4	0.043	0.047096497	5.81E-05	0.007624778	0.0620411	0.05967738	0.0599602	0.05704572
2013Q1	0.059	0.043939136	6.99E-05	0.008357972	0.0603208	0.05772979	0.0580398	0.05484507
2013Q2	0.059	0.049012934	1.47E-04	0.012126194	0.0727803	0.06902115	0.069471	0.06483585
2013Q3	0.084	0.063984302	2.00E-04	0.014137286	0.0916934	0.08731082	0.0878352	0.0824314
2013Q4	0.0838	0.075885269	3.37E-04	0.018353525	0.1118582	0.10616859	0.1068494	0.09983395
2014Q1	0.0732	0.071683857	4.01E-04	0.020033821	0.1109501	0.10473966	0.1054828	0.09782508
2014Q2	0.067	0.068068357	0.0004057414	0.021387245	0.1099874	0.10335731	0.1041506	0.0959756
2014Q3	0.0453	0.063604444	0.0005018825	0.022777726	0.1082488	0.10118769	0.1020326	0.09332606
2014Q4	0.0836	0.068429317	0.0004884179	0.022004059	0.1115573	0.10473601	0.1055522	0.09714141
2015Q1	0.0638	0.069020001	0.0006008791	0.024673695	0.1173804	0.1097316	0.1106468	0.10121558
2015Q2	0.0726	0.056147149	0.0006779163	0.026060761	0.1072262	0.0991474	0.1001141	0.09015265
2015Q3	0.0683	0.08946332	0.00083623	0.028931765	0.1461419	0.13717744	0.1382501	0.12719664
2015Q4	0.0335	0.084192048	0.0008002463	0.028302777	0.1397145	0.13093287	0.1319836	0.12115566
2016Q1	0.0445	0.033765402	0.0001010667	0.010519836	0.0543843	0.05112313	0.0515133	0.04749226
2016Q2	0.0345	0.039578543	0.0001063425	0.012783774	0.0646347	0.06067177	0.061146	0.05625951

2016Q3	0.0307	0.043038287	0.000184197	0.013571921	0.0696393	0.06543196	0.0659354	0.06074767
2016Q4	0.0302	0.050387531	0.000168317	0.01297369	0.075816	0.07179412	0.0722754	0.06731631
2017Q1	0.0361	0.025883177	7.19E-05	0.008481257	0.0425064	0.03987725	0.0401919	0.03694998
2017Q2	0.0437	0.039602959	1.18E-04	0.01084048	0.0608503	0.05748975	0.0578919	0.05374821