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MACROECONOMIC LINKAGE OF CONSUMER CONFIDENCE IN INDONESIA

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INFO ARTIKEL	ABSTRAK
	This study investigated macroeconomic linkage of consumer confidence in Indonesia, whether consumer confidence index in Indonesia can be explained by macroeconomic indicators in the past and owns predictive power of future state of Indonesian economy. The study used macroeconomic variables including Consumer Confidence Index (CCI), Inflation, GDP growth, Currency rate, Policy rate and Stock Price in monthly period during January 2001 – December 2015. The model was constructed by Vector Autoregression (VAR) approach. The result shows that without holding other variables constant, CCI is co-integrated with inflation and stock price. Accordingly, it was found that CCI causes inflation, policy rate and stock price. However, when all variables interact together in one single equation, only causality from CCI at lag two against policy rate remain exists. The model result shows that consumer confidence index is unable to be explained by macroeconomic variables in the past but has predictive power toward future change of policy rate. However, although the index owns predictive power, but its magnitude of contribution to policy rate dynamics is only modest. Studi ini meneliti mengenai hubungan makroekonomi kepercayaan konsumen di Indonesia, yaitu untuk mengetahui apakah kepercayaan konsumen dapat dijelaskan oleh variabel makroekonomi di masa lalu serta memiliki kemampuan prediksi terhadap kondisi ekonomi Indonesia di masa depan. Studi ini dilakukan dengan menggunakan variabel makroekonomi meliputi Indeks kepercayaan konsumen (CCI), inflasi, pertumbuhan GDP, nilai tukar, BI rate, dan harga saham gabungan dengan periode bulanan selama Januari 2001 – Desember 2015. Data diolah dengan menggunakan metode Vector Autoregression (VAR). Hasil penelitian menunjukkan bahwa tanpa menganggap variabel lain konstan, CCI terkointegrasi dengan inflasi dan harga saham. Hasil juga menunjukkan adanya hubungan kausalitas CCI terhadap inflasi, BI rate dan harga saham. Namun saat seluruh variabel berinteraksi bersama-sama, hanya hubungan kausalitas CCI pada lag 2 terhadap BI rate yang tetap bertahan. Model menunjukkan bahwa kepercayaan konsumen di Indonesia tidak mampu dijelaskan oleh variabel makroekonomi di masa lalu namun memiliki kemampuan prediksi terhadap perubahan BI rate di masa depan. Akan tetapi besarnya kontribusi indeks kepercayaan konsumen terhadap dinamika dari BI rate tidak begitu besar.

1. INTRODUCTION

It is no doubt that global economy is getting challenging nowadays, especially for a developing country like Indonesia. Amid slowdown and rebalancing economy of China, IMF predicts global economy outlook 2016 to increase only 0.2%, from 3.2% in 2015 to 3.4% in 2016 while economic risks are shifting to emerging market countries as the consequence of the recovery in advanced economic countries (IMF, 2016). One of the signs is when the United States shifts up its policy rate from zero lower bound as its exit policy from global financial crisis 2008. This situation is a bad news for emerging market countries, as foreign investors may be more interested to draw their money and invest to advanced countries' financial assets than to emerging market countries. In addition, China's economy slowdown also contributes significantly to the contraction of global growth. The slowdown has forced this world's second largest

economy to change its currency regime from fix pegged against US dollar to float regime that determined by global financial markets. This volatility of China's currency is most likely affecting other emerging market countries holding business with China.

Many ways are conducted by emerging market countries, including Indonesia, to retain its confidence in the global economy. Expanding bank credit, lowering policy rate, tax reform and foreign exchange intervention are some examples of the efforts. However, above of all, none of policy will be effective if households lost their confidence, especially for Indonesia, where consumption contributes the biggest part of its GDP. Simple example is what happens in Greece, no investors were attracted to step in no matter its bond interest rate was increased since their confidence has been devastated. On the other hand, expanding bank credit to push growth through

consumptions and services is also vulnerable in the sense that it accumulates non-performing loan risk in the future. Therefore, growth will keep sustainably growing only if economic agents still own strong confidence toward future economy of their country.

Consumer confidence is a crucial indicator to represent market confidence, particularly from the perspective of household. In Indonesia, Consumer Confidence Index (CCI) measures consumer confidence. The index is based on a survey of around 4600 middle class households in major cities that constitute 78% of GDP. Widely studies have focused on the use of CCI either as explanatory variable of the economy in the past or as predictive variable to estimate future economy condition. Most studies assert that CCI has predictive ability toward future consumer expenditures (Grenier at al, 1999; ECB, 2012). Achieving positive confidence amid this global economic slowdown is crucial for Indonesia. Thus, it is also crucial for Indonesia to understand its consumer behavior such that policy formulation can be more efficacious to stimulate output growth.

This research is interested to investigate the role of consumer confidence in Indonesia in the framework of macroeconomic perspective. This study is curious to comprehend the behavior of consumer confidence in Indonesia. That is, to investigate if consumer confidence in Indonesia can be explained by macroeconomic variables in the past and owns predictive power toward future state of economic condition. The result of this research will be very useful for market agents, analysts and policy makers in generating economic decision and formulating economic policies.

2. THEORETICAL FRAMEWORK

2.1. Consumer Confidence Theory

Consumer sentiment, or widely known as consumer confidence, is one of macroeconomic variables that tracked by policymakers. This variable explains consumer psychological perspective about past, current and future economic condition. Consumer confidence is defined as the degree of optimism of the state of the economy that consumers are expressing through their activities of saving and spending (McWhinney, 2016, p.1-2).

Federal Reserve (2012) explains that consumer confidence is important because this variable reflects economic condition particularly reflects consumers' behavior in spending their income. Confidence is a psychological concept that describes agents' perception toward current and future economic situation about a particular country. Since this is a judgment variable from consumers, it is hard to measure confidence indicators and very vulnerable to bias. However, confidence indicator has become an important variable to estimate future economic condition nowadays. Studies show that consumer confidence has a stronger predictive power and align

more closely with consumer expenditures when the economy is weak. Besides for policymakers, consumer confidence also receives full attention from business agents and companies. Firms traded goods generally exhibit more concern that trends in economic variables and changes in government policies may affect them.

There are two primary perspectives regarding the model of confidence. The first is called as *information model*, which explains that confidence indicator contains useful information about future state of economy. The second one is called *animal spirit view*, which explains that confidence indicator has the ability to change the direct of business cycle. On another view, some other even suggest that confidence indicator has no role in macroeconomics. Fuhrer (1993) proposed some theories about sentiment behavior based on various shocks occur in the economy. He explained consumer sentiment as a fundamental driving force in the economy. That is, when consumers are confident, the economy is boom, but when consumers are not confident, the economy is getting weaker. Sentiment is critical for economic recovery. That is, the economy will not be successfully recovered until there is a permanent positive confidence improved in the society.

Furthermore, Fuhrer (1993, p.34-35) reveals five important behaviors of consumer sentiment. First, sentiment independently causes economic fluctuations. Second, sentiment accurately forecasts economic fluctuations. Third, sentiment captures consumers' forecast of economic fluctuations. Fourth, sentiment reflects current, response-specific economic conditions. Lastly, sentiment reflects only current, widely known economic conditions. The degree accuracy of sentiment is primarily statistical rather than economic significant. However, sentiment is not the only economic variable solely determines economic condition. Other variables such as commodity prices, interest rate, stock prices, also influence the economy and its data are produced continually.

The role of confidence in macroeconomics has been subject to debate either in academics or policymakers. The statement that confidence influences business cycle invites critical question about the mechanism of translating the sentiment into economic action. One way of confidence can influence business cycle is when actions of economic agents are influenced by rumors, or the way of other people do. One clear example how confidence dictates the outcome of the economy is a bank runs, when a rumor that one bank is insolvent, one agent will think to withdraw their money before other people do the same thing which eventually causes all people to do the same think and drives the bank to be actually insolvent. If this situation occurs to many banks, then general loss of confidence in the financial sector occurs. Such a crisis of confidence can break up the banking system, degrade economic growth as a whole

and fluctuate business cycles. Thus, the economy settles in a bad equilibrium. Wickens (2012) explains that the economy may experience multiple equilibriums to back to its saddle path. Economists use to call this as multiple equilibriums model, where the economy can settle in different resting points. The level of confidence can be one good variable to determine which one of these points the economy settles in.

2.2. Consumer Confidence Index

Consumer confidence is measured by Consumer Confidence Index (CCI). The CCI was first calculated in 1985. In that year, benchmark of confidence was set to 100. The CCI is adjusted monthly and prepared by conference board based on the survey toward consumers' expectation and perception about past, current and future economic condition. The conference board defines the CCI based on monthly report representing consumer attitudes and buying behavior, with data classification by age, income and region. If the economic expectation is healthy, consumers are willing to increase their spending. On the other hand, if the expectation does not seem promising, consumers are going to save more than consume. Based on the structure of the survey and its questions, the current condition is accounted for 40% of the Index, while the expectation is accounted for 60% of the index.

The CCI is crucial variable to monitor by policymakers, government and business sector. The CCI represents changes of consumers' willingness to pay and hence aggregate demand of consumers. The consensus states that change of less than 5% is considered inconsequential, while the change more than 5% represents considerable changes. McWhinney (2016, p.1) explains that decreasing trends of CCI suggests negative outlook of consumers toward future economy and hence their pessimism to gain secure occupancy. Amid this situation, various economic decisions may follow such as manufacturers can delay their investment decision until the economy is recovering, banks needs to be more cautious or even decrease in lending their money, central bank can lower policy rate to stimulate growth and government can impose expansionary fiscal policy to prevent further contraction. On the other hand, if the opposite holds i.e. if the CCI increases, opposite economic decisions may occur.

One important property of the CCI is that the CCI is a lagging indicator, meaning that this indicator only responds after the overall economy has already changed. In other words, the variable is actually incapable of informing what is going to happen but what has happened and what can be expected to continue. This property also implies that consumers require lag time to absorb and comprehend changes in the economy and to construct expectation about future prospect of the economy. Thus, an increase in spending today may reflect impact of the economy few months ago and a decrease in spending today may

confirm an ongoing recession. However, the CCI is very important since it may contain the information about shocks whose its effects cannot be directly estimated from past experiences of data. Another property of the CCI is timeliness that is this indicator has no rigid time boundary. The CCI includes past, present and future economics expectation of consumers since it is based on forward-looking questions. Thus, the CCI may contain valuable information that other economic variables cannot provide.

The CCI is one of the most accurate economic indicators. In Indonesia, the CCI measures consumer's expectation about current income and job availability 6 months ago, appropriate time to buy durable goods, general economic conditions and job availability expectation in the next 6 months. The index is based on a survey of around 4600 middle class households in major cities that constitutes 78% of GDP. Data is collected through phone interviews and direct visit. The two main components of the index are current economic index and consumer expectation index. The CCI is computed as a net balanced obtained from the difference between percentages on 'increase' answer and 'decrease' answer. An index above 100 indicates an improving outlook and below 100 indicates deteriorating outlook. (Trading economics, 2016).

2.3. Consumer Confidence and Consumption Behavior

As mentioned above, the CCI is considered as an important variable since it is believed to have predictive power toward future consumption spending behavior. The question whether confidence indicator has predictive power toward future consumption expenditure has been studied through many literatures. Although the results are mixed, most authors found significant statistical relationship between consumer confidence and some current and future economic variables. The results show that consumer confidence has strong relationship with some economic variables that can affect consumption such as income.

Various studies investigate the role of confidence indicator in terms of its relationship with consumption expenditure. The modern theories of consumption suggest that the statement explaining that consumer confidence explains future consumption only holds in the state of frictionless capital market. With frictions in capital market, an increase in confidence corresponds to higher expectation of future income but not necessarily higher consumption today as borrowing constraint hampers consumer to consume more today. In case of actual future income does actually occur, then confidence indicator has a predictive power toward future increase in consumption. Moreover, the other theory of confidence called animal spirit explains that information received by consumers can change their current consumption decisions. Having information that their future income will raise, consumers will adjust to increase their

current consumption behavior. That is, if positive confidence regarding future economic situation holds then consumers will increase their current consumption expenditures.

European Central Bank (2013, p.51-52) estimates that in Euro area, consumer confidence shows co-movement with households' consumption expenditures. A simple regression shows positive relationship between changes in consumption and lagged changes in consumer confidence in Euro area, without holding other factors constant. However, the relationship becomes less significant when some additional control variables such as income, unemployment, stock prices and interest rate were added into the model.

Furthermore, ECB also assessed empirically the link between consumer sentiment and consumption expenditures for the United States and the Euro Area. The results show that the CCI is a good predictor of consumption in situation when it has large volatility such as recession or crisis. During this situation, predictive power of the CCI increases. The result also shows international transmission of shock as U.S. CCI affects the CCI in Euro area.

Abb and Taylor (1999) study about indicators linked to GDP and business cycle by using under-utilized data set on consumer and business confidence indicator in the United Kingdom, France, Italy and the Netherlands. The result shows that in general consumer and business indicators are leading indicators of business cycle. There are also some evidences about causality between the indicators and GDP. The study also concludes that confidence indicators have good predictive power toward business cycle.

Lahiri, Monokroussos and Zhao (2012) study the role of survey of consumer sentiment to forecast real consumption expenditure. The study models consumption and consumer confidence by using quarterly and monthly data in real time. The study also conducts forecasting of consumer expenditure with and without consumer confidence. The result shows that consumer confidence improves the accuracy of consumption forecast.

Garret, Hernandez-Murillo and Owyang (2004) studies the power of consumer confidence indicator to predict retail expenditure at state level. The result shows that there is a significant relationship between consumer confidence and sales growth, but the predictive power is very modest. The result concludes that consumer confidence has limited power to forecast at state level, but has better predictive power in predicting retail sales growth.

Beery and Davey (2013, p.282) study that consumer confidence shows co-movement with annual real consumption expenditure over the past 30 years in the United Kingdom. Also, consumer confidence shows predictive power to forecast future consumption in the UK. The study found that income, wealth and interest rate are major determinants of co-movement between consumer confidence and consumption expenditure. There is also unexplained component that represents the potential incremental information for consumption in the consumer confidence indicator. The result also shows that consumer confidence only has modest ability to explain past consumption series, but unable to be harnessed as a predictive indicator since it can be misleading.

2.4. Consumer confidence and Business Cycle

The idea that macroeconomic activity might be driven in part by changes in sentiment and expectation is not new in economics. Mendicino and Punzi (2013) study the role of sentiment indicator toward business cycle in the Portuguese economy. Using Vector Autoregression, the study involves some variables in addition to the data of survey including inflation, nominal interest rate, industrial production and unemployment rate. The result shows that unexpected increase in consumer confidence increases industrial production and increase inflation.

Beside its role in predicting future consumption, various studies also stress on the importance of confidence indicator toward business cycles. Beveridgein European Central Bank (2013, p.47) explains that any change in expectation can change agents' economic behavior to production and consumption such that affecting business cycle in the end. Furthermore, another study from Clark in European Central Bank (2013, p.47) explains that any factor that influences consumer demand can also create changes in business cycle. Pigouin European Central Bank (2013, p.47) explained that optimism and pessimism influence economic agents to create errors in forming their future expectation about future profit and hence generate business cycles.

The relationship between confidence and economic activity is not direct depending on current economic situation faced. Amid normal economic activity, confidence indicators may have less predictive power as it can reflect agents' misperception toward future economic state. However, confidence indicators may have strong predictive power during crisis or recession state as its fluctuation reflects significant changes of agents' behavior.

Beside its relationship with consumption related variables, some authors also emphasize that confidence indicators have stronger predictive power in special economic situation such as recession, crisis or recoveries. During such periods, confidence indicators usually experience high volatility. For example, large swings in consumer confidence could be very useful in explaining consumption behavior during economic recession.

Beaudry and Portier (2013) study the economic impact of news toward productivity growth. The result

shows that positive sentiment affect substantial impact toward future productivity growth. Positive sentiment of higher productivity stimulates current consumptions, investment, stock market prices and real GDP. Moreover, it is also found that news influence business cycle fluctuation accounting for more than 40% of changes in consumption, investment and work hours. Another study by Beaudry and Portier (2006) shows that business cycle in the data are primarily driven by changes of expectation about future technological growth.

Jaimovich and rebelo (2006) study the business cycle implications of expectation shocks, optimism and overconfidence. The result of study shows that both optimistic agents and overconfidence create biased from optimal outcome. The result also shows that optimism is not a useful source of volatility in the model. Both expectations shocks and overconfidence are in support of business cycle.

European Central Bank (2013, p.53) explains that the relationship between confidence and uncertainty has often led persistent weakness in economic activity. Household tends to increase precautionary savings and reduce their consumption expenditure when facing high uncertainty. Low confidence can induce economic recessions and changes in sentiment can drive large part of economic development. Moreover, high uncertainty and low confidence have some impact on business cycle fluctuation. Low confidence can pull down output growth due to higher uncertainty causing firms to suspend their investment. Finally, it is also concluded that higher uncertainty affects government policy to be less effective in the short run.

2.5. Variables affecting consumer confidence

Leduc (2010) study the impact of *unemployment rate* expectations, *inflation* and three-month *treasury bill rate* toward current economic fluctuations. The result shows that unemployment rate expectation affects significantly to current economic fluctuations. Moreover, Barsky and Sims (2011) study determinants affecting future economic conditions including *GDP*, *real consumption* and *survey data*. The result shows that confidence indicator affect significantly toward future economic activity.

Fuhrer (1993) asserts that market specific information on future economy is one of primary data harnessed by financial markets. Hence, updated information about economic situation is represented by the movement in short and long term interest *rates* and *other financial asset yields*. Therefore, financial data has strong relevancy with consumer sentiment.

European Central Bank (2013, p.50) study factors influencing confidence in Euro area. The result shows that most volatility of confidence is driven by change in *unemployment expectation* during 1990-2008. The correlation between unemployment rate and confidence index is highly positive. Other variables

are savings and financial situation only contribute less to the index. The study also finds rather high positive correlation between confidence index and stock market price. However, compared to unemployment rate, the correlation between confidence index and stock price is less important. However, during financial crisis, the correlation between confidence index and stock market is higher, reflecting that stock market becomes a leading indicator during financial distress.

Toussaint-Comeau and DiFranco (2009, p.2) indicates that consumer ability to pay strongly predicts consumer expenditure. The measures of income in the study include some macroeconomic indicators such as *unemployment rate*, *changes in stock market* and *inflation*. The results show that an increase in unemployment rate or recession period is likely to generate an increase of uncertainty. Stock market index may affect consumer confidence in two ways. That is, an increase in stock market price may increase wealth and rise up consumer confidence. Raising stock market also function as an indicator of higher labor income expectation. Moreover, the results shows that an increase in inflation lower the confidence index

Sergeant, Lugay and Dookie (2011) examines the causal link between consumer confidence and GDP in Jamaica and Trinidad and Tobago by using Vector Autoregression methodology. The model includes interest rate and exchange rate as control variables. The result shows that consumer confidence index is useful in economic forecasting, policymaking and business planning in Jamaica, Trinidad and Tobago. Hence, the study concludes that consumer confidence index affect macroeconomic variables.

Jansen and Nahuis (2002) study the short run relationship between stock market development and consumer sentiment in eleven European countries. The result shows that stock returns and changes in consumer sentiment are positively correlated in nine countries, except for Germany. Moreover, the result also shows that stock returns reveals causalities toward consumer confidence at very short period from two weeks to one months, but not vice versa. The result also shows that change in consumer sentiment significantly affects stock market price. The study suggests that sentiment is not part of conventional wealth effect, but a separate transmission channel.

Christiano, Motto and Rostagno (2006) study the relationship between consumer confidence and inflation. The result shows that central banks that focus heavily on inflation may end up stoking confidence-driven booms. The result confirms that inflation tends to fall if nominal wages adjust slowly. In other words, the study shows that inflation is a significant determinant of consumer sentiment.

Oloweofeso and Doguwa (2013) study the relationship between consumer confidence and selected macroeconomic variables in Nigeria. Macroeconomic variables involved in the model include consumer confidence index, short-term

interest rate, and monetary policy rate. The result shows that consumer sentiment is useful to forecast some macroeconomic variables that are useful for monetary policy formulation.

Lachowska (2011) study whether consumer sentiment is useful in stimulating economic behavior. The result shows that expenditures respond significantly toward consumer sentiment. The shocks results in displacement of spending that last for about 30 days, which is consistent with consumers acting on precautionary saving motive. The result also shows that spending reacts strongly and positively to a shock of stock market prices.

3. RESEARCH METHODOLOGY

3.1. Data

The data in this study are monthly secondary data from period January 2001– December 2015 (15 years). Thus, total observation used in the study is 180 observations. The variables include Consumer Confidence Index (CCI), GDP growth, Inflation, Currency rate, Policy rate and Stock price.

a. Consumer Confidence Index (CCI)
   CCI measures consumer's expectation about current income and job availability against those 6 months ago, appropriate time to buy durable goods, and general economic conditions and job availability expectation in the next 6 months. This indicator is measured by the Central Bank of Indonesia. The index is based on a survey of around 4600 middle class households in major cities that constitute 78% of GDP. Data is collected through phone interviews and direct visits. The two main components of the index are the current economic condition index and the consumer expectation index. The CCI is computed as a net balanced obtained from the difference between percentages on 'increase' answer and percentage on 'decrease' answer. An index above 100 indicates an improving outlook and below 100 a deteriorating outlook. The data available for this variable is monthly data. Source of data is from the *Central Bank of Indonesia*.

b. GDP growth
   Output growth is defined as GDP growth (yoy,%) that measures the quarterly change of GDP based on expenditures including private and public consumption, gross domestic investment, fixed investment, export of goods and non-factor service receipts, import of goods and non-factor service payments. The data are basically in the form of quarter data. In consumer confidence model, the data is transformed from quarter into monthly by taking same values for three months in a row constituting a quarter. This adjustment is conducted by the assumption that consumer confidence index at time t corresponds to the last officially released GDP growth. The data was taken from *Asian Development Bank.*

c. Inflation rate
   In Indonesia, the consumer price index is based on a survey conducted in 66 cities. The indicator consists of 774 commodities classified into seven major groups: Housing, water, electricity, gas and fuel account for 25.5% of total weight; food stuff accounts for 19.5% percent and transportation, communication and financial services account for 19%; prepared food, beverage, cigarette and tobacco account for 16.5%; education, recreation and sports account for 8%; clothing accounts for 7% and medical care accounts for 4.5%. The source of data is *Indonesian national statistic agency* (Biro Pusat Statistik).

d. Policy rate
   Policy rate is interest rate set by the central bank of Indonesia called Bank of Indonesia rate (BI rate) since the implementation of Inflation Targeting Framework (ITF) monetary policy regime in July 2005. The interest rate is used as an anchor in overnight money market among banks in Indonesia as well as indirectly influence as government bonds rate and rate of central bank's certificate. BI rate is announced by Board of Governor in Central Bank of Indonesia every month through board of governor's meetings and implemented in monetary operation through liquidity management. BI rate is remained until newer update is officially released through board of governor's meeting. Considering ITF has been implemented since July 2005, thus the number of observation is automatically reduced from 180 (Jan 2001 – Des 2015) to 126 (July 2005 – December 2015) observations when policy rate is included in the model. Data of BI rate is monthly and taken from *the Central Bank of Indonesia.*

e. Currency Rate
   Exchange rate used in this study is the currency rate between Indonesian Rupiah and US dollar. The value of IDR/USD of particular month is calculated by averaging of end day closing currency rate of whole days in a month. The data of exchange rate is gathered from *the Central Bank of Indonesia.*

f. Stock Price
   Variable stock price in this study represents adjusted closed price of Jakarta stock exchange market (JKSE). The data is gathered from Yahoo finance. In this study every term of stock price refers market capitalization i.e. the product between stock price and its volume.

3.2. Methodology

We are interested to develop the model of consumer confidence in the framework of macroeconomic variables. The model that is used in the study includes Vector autoregression model (VAR) and Vector Error Correction Model (VECM).

3.2.1 Vector Autoregression

In an N-variable vector autoregression of order p, of VAR(p), we estimate N equations. In each equation, we regress the relevant hand-side variable on p lags of itself and p lags of every other variables. Trends, seasonal and other exogenous variables may also be included, as long as they're all included in every equation. The key point is that, in contrast to the univariate case, VAR allows for cross-variable dynamics. Each variable is related not only to its own past but also to the past of all other variables in the system (Diebold, 2003). In case of two variables and one lag, we derive equations as follows:

$$y_{1,t} = \delta_{11} y_{1,t-1} + \delta_{12} y_{2,t-1} + \varepsilon_{1,t}$$

$$y_{2,t} = \delta_{21} y_{1,t-1} + \delta_{22} y_{2,t-1} + \varepsilon_{2,t}$$

$$\varepsilon_{1,t} \sim WN(0, \sigma_1^2)$$

$$\varepsilon_{2,t} \sim WN(0, \sigma_2^2)$$

$$Cov(\varepsilon_1, \varepsilon_2) = \sigma_{12}$$

Each variable depends on one lag of the other variable in addition to one lag of itself. That is one obvious source of multivariate interaction captured by the VAR that maybe useful for forecasting. In addition, the disturbances may be correlated, so that when one equation is shocked, the other will typically be shocked as well (Diebold, 2006, p. 283). VAR is also used when the variables in the study hare not sure being placed as dependent or independent variable. In that case, we should make all variables as endogenous variables.

3.2.2 Vector Error Correction Model

VECM is a restricted VAR and this model is used when cointegration among variables are found or there is long run equilibrium between the variables. The cointegration can be tested by Johansen cointegration test. The general VECM with deterministic trend is:

$$\Delta Y_t = \emptyset + \Pi Y_{t-1} + \alpha t + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \epsilon_t$$

Where the value of $\emptyset$ and α depends on the scenario, that is:

$\emptyset \neq 0$ deterministic trend in Y_t
$\alpha \neq 0$ Quadratic trends in Y_t

The intuition of this expression is that a change in Y_t can come from the time trend, of the error correction part of the expression. The last part of the expression with a summation from i=1 to p-1 of lagged values of the differenced dependent variables is used to eliminate serial correlation (Thomsen et al, 2013).

3.2.3 Model Criteria

Two the most famous models criteria in selecting the best fitted model are used, namely Akaike Information Criterion and Schwartz Information Criterion. Akaike Information Criterion (AIC) is effectively an estimate of the out-of-sample forecast error variance, like standard error, but it penalizes degrees of freedom more harshly. It is used to select among competing forecasting models (Diebold, 2006, p.28). The formula is:

$$AIC = e^{\left(\frac{2k}{T}\right)} \frac{\sum_{i=1}^{T} e_i^2}{T}$$

The Schwartz Information Criterion (SIC) is an alternative to the SIC with the same interpretation but a still harsher degrees-of-freedom penalty (Diebold, 2006, p.28). The formula is:

$$SIC = T^{\left(\frac{k}{T}\right)} \frac{\sum_{i=1}^{T} e_i^2}{T}$$

As SIC penalizes the model more harshly, we use the lowest SIC value as the criteria to select the best fitted model.

3.2.4 Classical statistical assumption

We use three classical assumptions to investigate the optimality of the model that must be satisfied including normality, autocorrelation and heteroskedasticity. Autocorrelation is the condition where residuals in the model are serially correlated. We investigate serial correlation by using Breusch-Godfrey LM test, Ljung Box Q statistics and residuals plot. Moreover, Heteroskedasticity is the condition where the model suffers from non-constant variance on its residuals. We investigate heterokedasticity by Bresuch-Pagan-Godfrey Heteroskedasticity test. Finally, we investigate residuals normality by Jarque Berra test.

4. RESULTS AND ANALYSIS

4.1. Current situation

Economic situation in Indonesia dynamically fluctuates, tumbled in some periods and reached peak points in some others as shown in figure 12 in the appendix. During 2005 and 2006, oil shocks and early negative sentiment of global financial crisis pulled down output growth. Furthermore, period of 2007-2009 is the darkest period in global financial system, when subprime financial crisis in the US hit some countries including Indonesia. Indonesia's output growth as well as Jakarta's stock market in this period declined significantly. Indonesia experienced recovery from financial crisis as output growth rebounded in 2009. Moreover, Indonesia experienced strong growth and experienced positive sentiment during 2010 – 2011, also considered as one of safe havens among other countries experiencing growth contraction and considered as one of biggest economy as it's included in G20. Indonesian economy was considerably solid during that period although its output declined significantly during 2012 – 2013. During this period, Indonesia's rating was categorized as safe investment grade.

During the crisis and its recovery in the period 2009 – 2013, Indonesia's monetary policy reduced policy rate (BI rate) to stimulate growth. However, period 2014-2015 challenges Indonesian economy

quite a bit. Global economic slowdown, particularly driven by China's economic rebalancing, and economic recovery in some industrial countries including the United States, challenged Indonesia with capital outflow, deep currency depreciation, tumbled stock price and hence declined output growth. Although world's crude oil price experienced decreasing rate, but the cut-off of oil subsidy in Indonesia prevented oil price to decrease.

4.2 Co-Movement Analysis

We firstly analyze the behavior of consumer confidence index with each macroeconomic variable. That is, how the relationship between consumer confidence index and one single macroeconomic indicator, without holding other variables constant.

4.2.1. CCI and Inflation
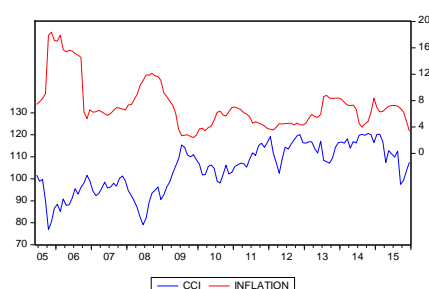
Figure 1 Comovement between CCI and Inflation

The relationship between CCI and Inflation, without adding other variables, exhibits inverted co-movement. As shown in figure 1, CCI tends to increase when inflation decreases and vice versa. Although the co-movement seems doesn't hold during 2015, the correlation between these two variables is relatively high by 68,11%. Moreover, we also conduct cointegration test by Johansen test to investigate whether or not the cointegration between these two variables exists. The result shows that up to lag 2, there exists 1 cointegration between CCI and inflation. That is, there exists long run equilibrium between these two variables.

Table 1 Granger Causality lag 2 test: CCI and Inflation

Null Hypothesis	p-values
CCI doesn't Granger cause Inflation	0.240
Inflation doesn't Granger cause CCI	0.648

However, Granger causalities test between these two variables up to lag 2 results in no causality effect from CCI to Inflation and vice versa, at 5% significance level. This implies that when households only rely on inflation in constructing their confidence, there will exist co-movement between the two variables. Given these two variables are cointegrated, any shock occurs in one of these variable will shift back the co-movement back to its equilibrium.

4.2.2. CCI and Policy rate

The relationship between CCI and policy rate also exhibit inverted co-movement. In addition, CCI at

lag two also exhibits more fitted inverted co-movement between these two variables. Figure 2 shows this co-movement. That is, when CCI and CCI at lag two increases, policy rate tends to decrease and vice versa. The degree of co-movement between CCI and policy rate is also considerably high. The correlation between the two achieves 70.29%. Moreover, the correlation between CCI at lag two and policy rate reveals higher value by 83%. However, although the correlation is high, but Johansen cointegration test up to lag 2 doesn't reveal any cointegration in any test scenario. Hence, no long run equilibrium is formed between these two variables.
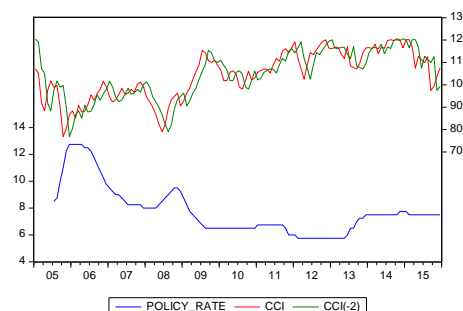
Figure 2 Comovement between CCI and Policy Rate
Table 2 Granger Causality lag 2 test: CCI and Policy Rate

Null Hypothesis	p-values
CCI doesn't Granger cause Policy rate	0.085
Policy rate doesn't Granger cause CCI	0.265

Granger causality between CCI and policy rate up to lag 2 exhibits one directional causality at 10% significance level. That is, with p value 0.085, null hypothesis that CCI doesn't Granger cause Policy rate is rejected at 10% significance level, but not vice versa. This causality relationship indicates that given the policy rate alone, CCI is able to influence the policy rate.

4.2.3. CCI and GDP growth
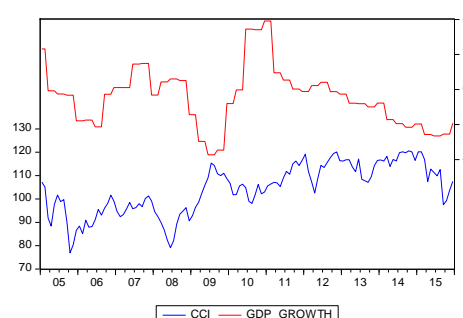
Figure 3 Comovement between CCI and GDP growth

The relationship between CCI and GDP growth also exhibits inverted co-movement. Figure 3 shows that GDP growth tends to increase when CCI decreases and vice versa, but the dynamics doesn't hold in some periods such as in period 2005. The correlation between these two variables is relatively low, only 20%.

Table 3 Granger Causality lag 2 test: CCI and GDP

Null Hypothesis	p-values
CCI doesn't Granger cause GDP growth	0.719
GDP growth doesn't Granger cause CCI	0.120

Also, Granger causality test exhibits no causality between these two variables at 5% significance level. Moreover, Johansen cointegration test exhibits no cointegration exists between these two variables. Based on these tests, given only GDP growth as solely information, households' confidence index neither causes nor caused by the information of GDP growth.

4.2.4. CCI and Currency

The relationship between CCI and currency also exhibits inverted co-movement. In addition, the co-movement between CCI at lag two and inflation also exhibits more fitted inverted co-movement. That is, currency tends to increase when CCI or CCI at lag two decreases and vice versa.
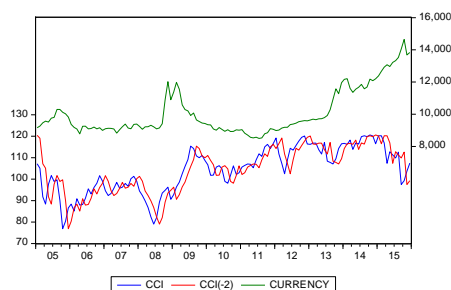
Figure 4 Comovement between CCI and Currency

The correlation between CCI and currency is relatively low, only 30%. On the contrary, the correlation between CCI at lag two or two months ago and currency is much higher by 83.43%. However, although the correlation of the latter is considerably high, Johansen test reveals no cointegration between the two variables. Thus, no long run equilibrium exists between CCI and currency rate. Furthermore, there is also no Granger causality between these two variables at 5% significance level.

Table 4 Granger Causality lag 2 test: CCI and Currency

Null Hypothesis	p-values
CCI doesn't Granger cause Currency	0.506
Currency doesn't Granger cause CCI	0.365

4.2.5. CCI and Stock Price
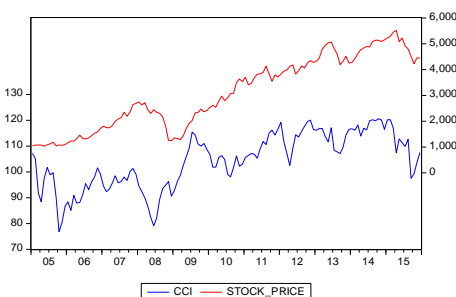
Figure 5 Comovement between CCI and Stock price

The relationship between CCI and stock price exhibits positive co-movement. As shown in figure 5, CCI tends to increase when stock price increases and vice versa. The correlation between these two variables is relatively high by 76.7%. Also, Johansen cointegration test reveals 1 cointegration exists between the two variables, meaning that there is long run equilibrium between CCI and stock price. Furthermore, Granger causality test reveals bi-directional causality between these two variables. That is, null hypothesis that CCI doesn't Granger cause Stock price is rejected at 5% significance level, while null hypothesis that stock price doesn't Granger cause CCI is also rejected at 10% significance level.

Table 5 Granger Causality lag 2 test: CCI and Stock Price

Null Hypothesis	p-values
CCI doesn't Granger cause Stock Price	0.023
Stock Price doesn't Granger cause CCI	0.057

The economic insight of these causalities is that households are rational in harnessing stock price trends to construct their confidence. On the other hand, stock market participants also incorporate households' confidence in constructing their market decision.

In conclusion, without adding other variables, CCI exhibits co-movement with each single macroeconomic variable in various levels of correlation. Specifically, cointegration is established between CCI and inflation, and CCI and stock price. Meaning that any economic shock will bring these two relationships back to its equilibriums depending on speed of adjustment. Moreover, Granger causality test also shows that CCI reveals causal effect on inflation and policy rate. Also, CCI granger causes inflation and vice versa. The summary of each relationship is given in table 6.

Table 6 Relationship of Consumer Confidence

Relationship	Corr.	Coint.	Causality
CCI and Inflation	68.11%	Yes	No
CCI and Policy rate	83%	No	1 direction
CCI and GDP growth	20%	No	No
CCI and Currency	83.43%	No	No
CCI and Stock Price	76.7%	Yes	2 directions

4.3. Trend and Intercept fits

Table 7 Trend and Intercept Regression

Variable	*p-values*			
	Intercept	Trends	Trends^2	Adj.R^2
CCI	0.000	0.000	0.000	65.1%
Inflation	0.000	0.000	0.000	45.7%
Policy rate	0.000	0.000	0.000	78.4%
GDP growth	0.000	0.013	0.000	22.9%
Currency	0.000	0.000	0.000	69.5%
Stock Price	0.000	0.000	0.855	89.7%

We conduct regression by using intercept and trend to each variable to have the most fitted dynamics. We test intercept and linear trend by ordinary least squared method. The result shows that intercept and trends are significant at 5% significance

level in all variables. Intercepts and trends together are able to explain quite high variance of each variable, except for GDP growth with relatively low adjusted R^2 by 22.9%. Thus, the scenarios chosen to test data stationary are primarily considering intercept and trend, except for currency and oil price that have low goodness of fit.

4.4. Data Stationary

We conduct Augmented Dickey Fuller (ADF) test to investigate stationary (and hence, unit root) in each variable. Investigating unit root is important to check stationary of the dynamics. ADF test is conducted to all variables with scenarios following table 7 by following hypotheses:

H_o : Variable has unit root

H_1: Variable has no unit root

The result of ADF test indicates that all variables, except consumer confidence index, have p-value that larger than 0.05 on data level, which means that we fail to reject null hypothesis and conclude that dynamics of those variables contain unit root or not stationer at 5% significance level.

Table 8 Augmented Dickey Fuller Test Results

Variable	Intercept Trend		Unit root level	Unit root diff
	Level	1st Diff		
CCI	0.000	0.000	No	No
Inflation	0.109	0.000	Yes	No
Policy rate	0.256	0.003	Yes	No
GDP growth	0.368	0.000	Yes	No
Currency	0.936	0.000	Yes	No
Stock Price	0.718	0.000	Yes	No

On the other side, p-values of all variables in first differenced form are lower than 0.05, which means that we have sufficient evidence to reject null hypothesis that variable has unit root and conclude that variables do not contain unit root or have been stationer at 5% significance level. To avoid unit root in the model, we construct the model in the form of first differenced. For the sake of convenience, we use notation *d(variable name)* to reflect the first differenced of the variable.

4.5. Lag Length Criteria

Table 9 Lag Length Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.52E+14	49.7	49.8	49.7
1	1714	55141688	34.9	35.8*	35.2*
2	65*	5449293*	34.8*	36.7	35.6
3	47.3	62924999	35.0	37.6	36.1
4	46.7	71673329	35.1	38.6	36.5
5	41.9	84544211	35.2	39.6	37.0
6	24.3	1.22E+08	35.5	40.7	37.6
7	50.1	1.24E+08	35.5	41.5	37.9
8	42.2	1.39E+08	35.5	42.4	38.3

Considering that variable of consumer confidence index has no unit root on data level, and all variables are stationer at first differenced, Vector Autoregression is eligible to be implemented. Based on

lag length criteria generated through unrestricted VAR, the result shows lag 2 is preferred as most criteria suggest to use this lag.

4.6. Cointegration

Given not all variables are stationary in data level but all are stationer in first differenced, we are interested to investigate cointegration among variables. Cointegration test is conducted by Johansen cointegration test. The test sticks on the scenario of involving intercept and trend in the dynamics. The result shows differently between based on trace and on maximum Eigen value.

Table 10 Johansen Cointegration Test Result

Lag	Number of Cointegration	
	Trace	Max. Eigen
2	1	0

Given the calculation from trace and maximum Eigen value derives different result, it is inconclusive to say that neither there is a cointegration among the variables nor none. Thus, we conduct both VAR in differenced and VECM approach to build the model.

4.7. Consumer Confidence in VAR

4.7.1. The Model

The VAR model is developed by using lag 2. Various combination of VAR results in using policy rate as dependent variable as the best model.

Table 11 VAR summary models

DV	SIC	A*	B*	C*
CCI	5.89	No	Yes	Yes
Currency	14.76	No	Yes	No
Inflation	3.47	No	Yes	Yes
Policy rate	-0.65	Yes	Yes	Yes
GDP growth	0.99	No	Yes	Yes
Stock price	13.4	No	Yes	Yes

DV : Dependent Variable

*A :residuals are normally distributed, **B** : Residuals are serially not correlated, **C** : Residuals are homoscedastic.*

$$d(Policy\ rate) = C + \sum_{i=1}^{2} a_i d(CCI(-i)) +$$
$$+ \sum_{i=3,j=i-2}^{4} a_i d(Currency(-j)) + \sum_{i=5,j=i-4}^{6} a_i d(GDP\_growth(-j)) + \sum_{i=7,j=i-6}^{8} a_i d(Inflation(-j))$$
$$+ \sum_{i=9,j=i-8}^{10} a_i d(Policy\ rate(-j)) + \sum_{i=11,j=i-10}^{12} a_i d(Stock\ price(-j))$$

Table 12 Chosen Model Regression Summary

Lag	LR
R-squared	0.692
Adjusted R-squared	0.659
F-statistic	20.664
Prob(F-statistic)	0.000
Akaike info criterion	-0.951
Schwarz criterion	-0.654
Durbin-Watson stat	2.174

where:

Table 13 Parameter Statistical Values

Param.	Coeff.	Std. Error	t-Stat	Prob.
C	-0.020	0.013	-1.469	0.144
a_1	-0.004	0.004	-1.136	0.258
a_2	-0.010	0.004	-2.531	0.013
a_3	0.000	0.000	0.374	0.709
a_4	0.000	0.000	0.424	0.672
a_5	-0.001	0.043	-0.014	0.989
a_6	0.029	0.042	0.701	0.485
a_7	0.037	0.013	2.913	0.004
a_8	-0.011	0.013	-0.869	0.387
a_9	0.561	0.079	7.090	0.000
a_{10}	0.089	0.076	1.169	0.245
a_{11}	0.000	0.000	1.561	0.121
a_{12}	0.000	0.000	1.286	0.201

The result shows that only a_2, a_7 and a_9 that are significant at 5% significance level. These parameters correspond to d (CCI(-2)) or change in consumer confidence index 2 months ago, d(Inflation(-1)) or change in inflation one month ago and d(Policy rate(-1)) or change in policy rate one month ago, respectively.

This result shows that there is negative relationship between consumer confidences two months ago with change in policy rate this month. That is, holding other variables constant, 1 point increase in the confidence index corresponds to 1% decrease of policy rate (or 1 basis point).

Moreover, there also exists positive relationship between changes in inflation last month with change in policy rate this month. That is, 1% increase in inflation last month corresponds to 3.7 basis point increase of policy rate. This result is nice to know since we are interested in the behavior of CCI.

Finally, change in policy rate one month ago turns out positively corresponds to change in policy rate this month. That is, 1 basis point increase in policy rate one month ago positively corresponds to 56 basis point increase in policy rate this month. However, although this value is significant, the central bank is practically rare in making its policy rate too dynamics. Hence, we decide not paying attention to the relationship between policy rate and its lagged values.

4.7.2. Granger Causality

The test of VAR Granger causality shows that there is causality relationship among the variables. That is, change in consumer confidence index has causality impact to change in policy rate at 5% significance level, but not vice versa. Moreover, change in inflation and change in policy rate exhibit bi-directional causalities at 5% significance level.

Table 14 VAR Granger Causalities Test Result

Null Hypothesis	p-values
d(CCI) doesn't cause d(Policy rate)	0.023
d(Policy rate) doesn't cause d(CCI)	0.135
d(Policy rate) doesn't cause d(Inflation)	0.000
d(Inflation) doesn't cause d(Policy rate)	0.006

4.7.3. Impulse Response Function

Impulse response function is generated to comprehend the response of change in policy rate due to positive shock in consumer confidence index by one standard deviation. Figure 2 shows the function. The function reveals that positive shock by one standard deviation in the confidence index decreases the policy rate up to three months ahead. This adjustment can be interpreted from economic perspective as positive shock of consumer confidence by 1 standard deviation influence the central bank to reduce its policy rate for three months ahead. After three months, the policy rate rebounds and start to increase. This rebound can be interpreted economically as the period of economic heating. That is, it is the period when the Central Bank considers the economy runs very fast above its potential.

As shown in figure 6, shock in the confidence index remains up to month 12. That is, it is required 12 months until shock in the confidence does not further affect policy rate. Beyond month 12 and afterwards, policy rate is stabilized and the impact of shock is no longer exist.

Response of D_POLICY_RATE to Cholesky
One S.D. D_CCI Innovation
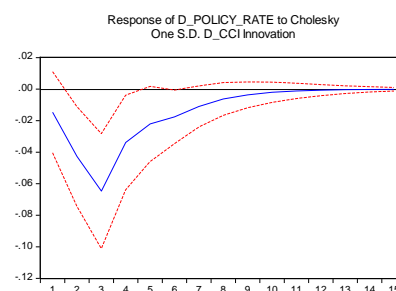
Figure 6 Impulse Response Function change of Policy rate due to Change in CCI

4.7.4. Variance Decomposition

Variance decomposition is given to reveal the magnitudes of response due to positive shock in the consumer confidence.

Table 15 Variance Decomposition

Month	d(CCI)	d(Inflation)	d(Policy rate)
1	1.046	9.325	87.721
2	6.365	17.887	72.787
3	14.369	15.652	65.603
4	15.348	14.712	64.467
5	15.778	14.310	63.947
6	16.138	14.134	63.569
7	16.275	14.073	63.426
8	16.317	14.049	63.382
9	16.331	14.041	63.366
10	16.336	14.038	63.361

The result of decomposition shows that consumer confidence only contributes small part of variance in change of policy rate compared to other two significant variables, change in inflation and change in policy rate itself. However, although it contributes the smallest among the three, but the CCI has greater contribution to the dynamics of policy rate

rather than other independent variables such as GDP growth, currency and stock price.

In the first month, consumer confidence only contributes 1.045% of policy rate dynamics due to one positive shock in the residual by one standard deviation. The contribution then increases to 6.364%, 14.369% and 15.348% in the second, third and fourth month, respectively. Finally, the contribution of the index converges to 16.3% afterwards, surpasses the impact of change in inflation. The decomposition table shows that the dynamics of policy rate is mostly contributed by itself. For example, in the first month change in policy rate contributes 87.721% to its own but then gradually decreases and converge to 63% afterwards.

4.7.5. Normality

Jarque-berra test is implemented to investigate the residuals distribution in the model, We test the hypothesis as follows:

H_0 : Residuals are normally distributed

H_1 : Residuals are not normally distributed
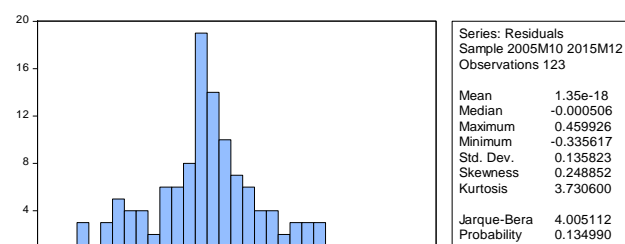
Figure 7 Histogram and Normality Test of Residuals

The result shows that residuals in the model have been normally distributed with 0.24 and 3.73 on its skewness and kurtosis, respectively. The JB test has value of 4.005 with p-value 0.130 such that we fail to reject null hypothesis and conclude that residuals in the model are normally distributed at 5% significance level. Histogram of the residuals is given below.

4.7.6. Serial Correlation

Breusch-Godfrey serial correlation LM test is implemented to investigate whether residuals in the model are serially correlated. We test the hypotheses as follows:

H_0 : Residuals are not serially correlated

H_1 : Residuals are serially correlated

The result shows that both p-value based on F statistic and Chi-quared values 0.163 and 0.131, respectively. Thus, we fail to reject null hypothesis and conclude that residuals in the model are not serially correlated at 5% significance level.

Moreover, the investigation of serial correlation is also conducted through p-values of Q-stat on its residuals autocorrelation and partial autocorrelation function. We test the hypotheses as follows:

H_0 : Residuals are white noise

H_1 : Residuals are not white noise

Figure 8 Residual Correlogram

The result shows that all p-values of Q-stat in the correlogram up to lag 36 are higher than 0.05 meaning that we conclude that residuals in the model have been white noise at 5% significance level. Hence, we conclude that there is no serial correlation in the residuals. The plot of correlogram is given in the appendix. The plot between residual and itself at lag 1 also depict no typical pattern.
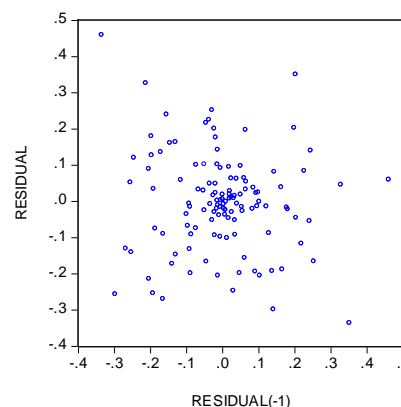
Figure 9 Scatter Plot Residuals with its own lag

4.7.7. Heteroskedasticity

Breusch-Pagan-Godfrey heteroskedasticity test is implemented to check error variance in the model, That is, to check whether residuals in the model have constant variance, we use the hypotheses as follows:

H_0 : Residuals are homoskedastic

H_1: Residuals are heteroskedastic

The result shows that p-values based on F statistic and Chi-Square value by 0.091 and 0.097, respectively. That is, we fail to reject null hypothesis

and conclude that residuals in the model have been homoskedastic at 5% significance level. Residuals' homoskedasticity are also reflected from the unforecastability of its residuals graph as depicted in the appendix.
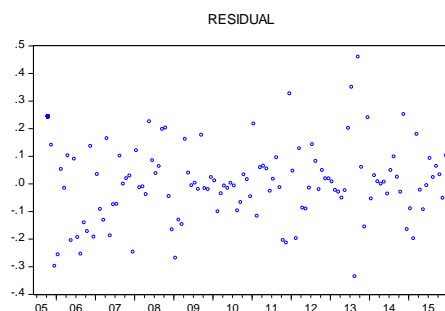
Figure 10 Residual Plot

4.7.8. Recursive Estimate

Recursive estimate is conducted to investigate the stability of the model. That is, whether the stability of the model is guaranteed in case of shocks exist. We derived recursive residuals and cumulative sum test (CUSUM) to comprehend the stability as given in figure 3.
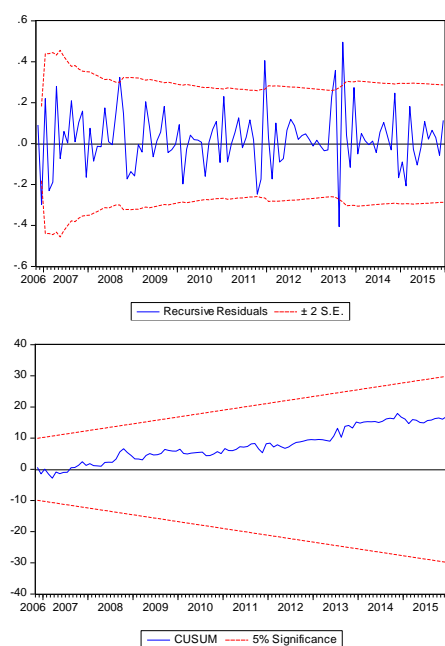
Figure 11 Recursive Residual and CUSUM test

The outcome shows that most recursive residuals are withink2 standard deviations, except shocks occur in some particular months. However, these shocks in fact do not affect the stability of the model as CUSUM test shows that the model is stable in all sample period at 5% significance level. Thus, the model derived has been satisfactorily shows stability.

4.7.9. Validity of the Model

Validity of the model is a crucial part to guarantee the credibility of mathematical model developed. Considering that this model is constructed primarily based on various literature studies focusing on variables affecting consumer sentiment, i.e. do not have similar reference model, hence validity is required to ensure the model has derived preferred result.

Validity is defined as how useful the model in estimating real values of variable. We refer to Sinaga and Hendranata (2003, p.8) that using Theil's U statistic to see mode validity with criteria that the lower Theil's U inequality reflects that model is better than guessing.

Figure 12 Model Evaluation
Table 16 Theil's U Statistics

Theil Inequality Coeff	p-values
Theilcoeff	0.384
Bias proportion	0.000
Variance proportion	0.253
Covariance proportion	0.746

As shown above, Theil'U statistic from the model is relatively far from 1 and closer to zero. This implies that the model offers stronger method in predicting dependent variable than guessing. In other words, the model has been valid as a prediction instrument.

### 4.8. Consumer Confidence in VECM

Using optimal lag derived from VAR and 1 cointegration derived by Trace, VECM approach fails to construct the optimum models. That is, all models derived by VECM suffer from serial correlation as its p-value in LM test is less than 0.05 such that we reject null hypothesis and accept the alternative hypothesis that residuals are serially correlated. The detail of best lowest SIC model with VECM estimation is given in the appendix. Hence, it is not conclusive to derive more analysis from VECM and we claim that there are no cointegration exists among the variables.

5. ANALYSIS

5.1. General Analysis

The study derives interesting results. As we have seen, without putting all variables altogether in one equation, consumer confidence exhibits co-movement with some macroeconomic variables. That is, CCI reveals co-movement with inflation and stock price. However, different result occurs when all variables are put together in the same model. When

households are constrained by all macroeconomic variables at the same time, the result shows that no cointegration exists, meaning that no long run equilibrium occurs once all variables interact together.

Furthermore, once all variables interact in one equation, the interaction only derives an optimal model when policy rate acts as dependent variable as it's given by the lowest SIC value. The interesting result is that VAR Granger causality test only retain one direction causal effect from CCI to Policy rate that remain exists, while the causality between CCI toward inflation and stock price are disappeared. This condition implies how monetary policy regime has been successfully working to incorporate household future expectation about future state of economy. That is, the causality from CCI to policy rate remain exists because policy rate has been sufficient enough to take over the expectation toward future inflation and stock price.

As shown, model estimation derives negative significant relationship between change of CCI two months ago and change of policy rate at 5% significance level. This analysis part focuses on the relationship between these two variables. The result is consistent with co-movement analysis showing how these two variables are negatively moving together. Figure 11 depicts the co-movement between policy rate and CCI at lag 2. The figure clearly shows how inverted co-movement between these two variables exists. That is, when CCI two months ago increases, policy rate tends to decrease and vice versa. The relationship between these two variables is also considerably high by 72.42%.
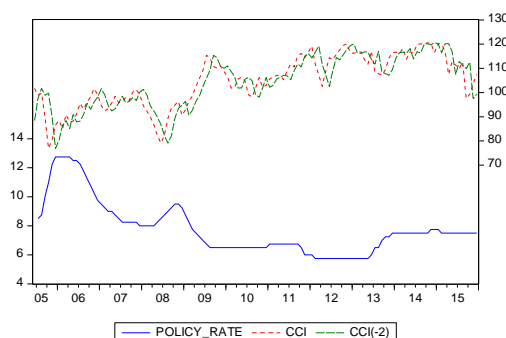

Figure 13 Policy rate CCI at lag two

Recall that the result of Granger causality shows that CCI Granger causes policy rate at 10% significance level. This causality means that Policy rate has incorporated the information about consumer confidence in previous months. That is, when consumer confidence two months ago decreases, policy rate tends to increase.

The economic insight behind this behavior is that when consumer confidence increases, household's money demand increases as well. This is due to high economic activity that must be supported by high money supply. In doing so, bank must guarantee to provide sufficient liquidity to support the demand. One

way to do this is by selling bonds or Indonesian central bank certificate. Also, in supporting the economy with sufficient money supply, the Central Bank must inject more money in the economy by reducing policy rate. Thus, lower policy rate will higher yield for existing bonds and hence increase money supply in the society. Since it requires lag for the money market operation to shape the policy rate in the market, then the impact of policy rate is statistically formed in the following two months.

The ability of consumer confidence in the past to affect policy rate in the future is in accordance with Inflation Targeting Framework, monetary policy regime that the Central Bank applies in Indonesia. It is very important to note that the ITF uses inflation as nominal anchor to direct public's expectation toward future economy. Recall that co-movement analysis shows that, without holding other variables constant, CCI and inflation are co-integrated in the long run. Moreover, the model shows positive significant relationship between change of inflation at lag 1 and change of policy rate. These findings indicate how the central bank is able to formulate policy rate by incorporating information of inflation and consumer confidence in the past.

Although policy rate incorporates past consumer confidence, but the opposite relationship doesn't hold. VAR shows that consumer confidence is unable to be explained by past macroeconomic variables. This index has stronger role to predict future change in policy rate rather than explaining past economic condition. This result may be conflictive with the property of CCI that supposed to be constructed by both past economic perception and future economic expectation. One insight triggering the result would be about quality of the survey, the ability of consumers to recall past economic situation or the quality of answer the respondents gave. Moreover, although own predictive power, but the contribution of CCI toward the dynamics of future policy rate is only small, it only accounts for 16% variance of future policy rate.

5.2. Policy Recommendation

The result of this study shows how macroeconomic variables are unable to explain consumer confidence when consumers analyze variables together. On the other hand, when single variable is assessed individually, the result shows how co-movement exists between consumer confidence and each macroeconomic variable. This result implies some policy implication.

The inability of macroeconomic variables together in explaining consumer confidence implies how not all macroeconomic variables are efficacious in affecting consumer confidence. In other words, consumers only harness some macroeconomic variables in constructing their sentiment toward future state of economy. Given the model shows significant relationship between policy rate and consumer confidence, and how inflation alone granger

causes future consumer confidence, hence the credibility of Indonesian Central Bank in implementing Inflation Targeting Framework is very crucial. Therefore, it is recommended for the policy rate to be more accurately in incorporating past consumer sentiments, for instance incorporating more past lags of sentiment instead of only two months. Other efforts can be conducted to treat policy rate more credibly. For example, given policy rate in Indonesia today (BI rate) roles as an anchor for interbank lending rate, the possibility to use policy rate as government bonds rate like the Fed implements could be furthered research such that consumers are more certain that rely on single interest rate will have greater impacts to their economic decisions.

Coherence and policy harmonization between government and the central bank is must also guaranteed to derive stable and credible inflation as well as policy rate. This is because when government and the central bank policies are conflictive, this will trigger bias between consumer expectation and the true state of future economy, which finally decrease the credibility of policy rate and hence erode consumer confidence and the economy itself.

6. CONCLUSION

Consumer confidence index in Indonesia is unable to be explained by macroeconomic dynamics in the past in terms of GDP growth, inflation, policy rate, currency and stock price. None model can be derived to extract the Index's macroeconomic determinants either by VAR or VECM model. However, this variable has predictive power toward policy rate in the future. That is, based on VAR model, the change of index at lag two significantly and negatively corresponds to the change in policy rate this month. In other words, the increase of the index by 1 point this month corresponds to the decrease of policy rate by 1 basis point two months later. Moreover, there also exists causality between change in consumer confidence index and change in policy rate. That is, change in consumer confidence index Granger causes the change in policy rate at 5% significance level, but not vice versa. Moreover, there is no cointegration exists among the variables as VECM fails to derive free statistical error models.

Positive shock in consumer confidence by 1 standard deviation affects policy rate as policy rate will adjust to decrease during first three months and rebounds to increase since then up to month 12. Beyond a year, the shock in consumer confidence has been disappeared and policy rate is back to its equilibrium. However, although own predictive role toward future change of policy rate, the contribution of this variable is relatively small. The contribution of this index converges to 16.33% of policy rate dynamics after one semester. Most dynamics of policy rate due to shock is caused by itself in the past, which is variance contribution converges to 63% after one semester.

The result of study also shows that only causality from consumer confidence to future policy rate that remain exists although all variables are interacting in the same equation. Furthermore, once all variables interact altogether, the cointegration between the confidence index and inflation, and also between the indexes with stock price, are disappeared. In effect, no cointegration exists in the chosen model.

In conclusion, the result of this study implies that consumer confidence index in Indonesia only has predictive power toward future policy rate but its ability is also modest. Also, the result has been in support of the monetary policy regime that Indonesia implements, which is Inflation Targeting Framework, in the sense that household have been able to rationally influence future policy rate and the Central Bank is also able to incorporate confidence dynamics within its policy rate.

7. IMPLICATION AND LIMITATION

This study has some areas that can be improved particularly due to data availability. Not all variables as many literatures suggest can be accommodated by this study such as unemployment rate or monthly GDP growth. Should monthly data of these variables are available and incorporated in the model, it is expected that better models can be derived. Also, it is more interesting to add the study with the relationship between the index real consumption expenditure and the index. Again, due to limitation of data availability about monthly consumption expenditure, this linkage cannot be generated in this study. This can create opportunity for separate research studying specifically about the role of consumer confidence index toward future consumption expenditure.

Moreover, the implication of this model may be opposite with the nature of the variable of consumer confidence index itself. As described in the data section, the index is defined as the perception of household toward last 6 months economic condition and expectation toward future 6 months of economic conditions. As the result of this study reveals, the index only exhibits predictive power without deriving macroeconomic determinants in the past. Hence, it should become a big opportunity for consumer confidence index survey to make sure that the respondents answer the survey accurately and comprehensively such that the usage of this variable is widened in the future and can be harnessed effectively to predict more Indonesian macroeconomic variables in the future.

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APPENDIX
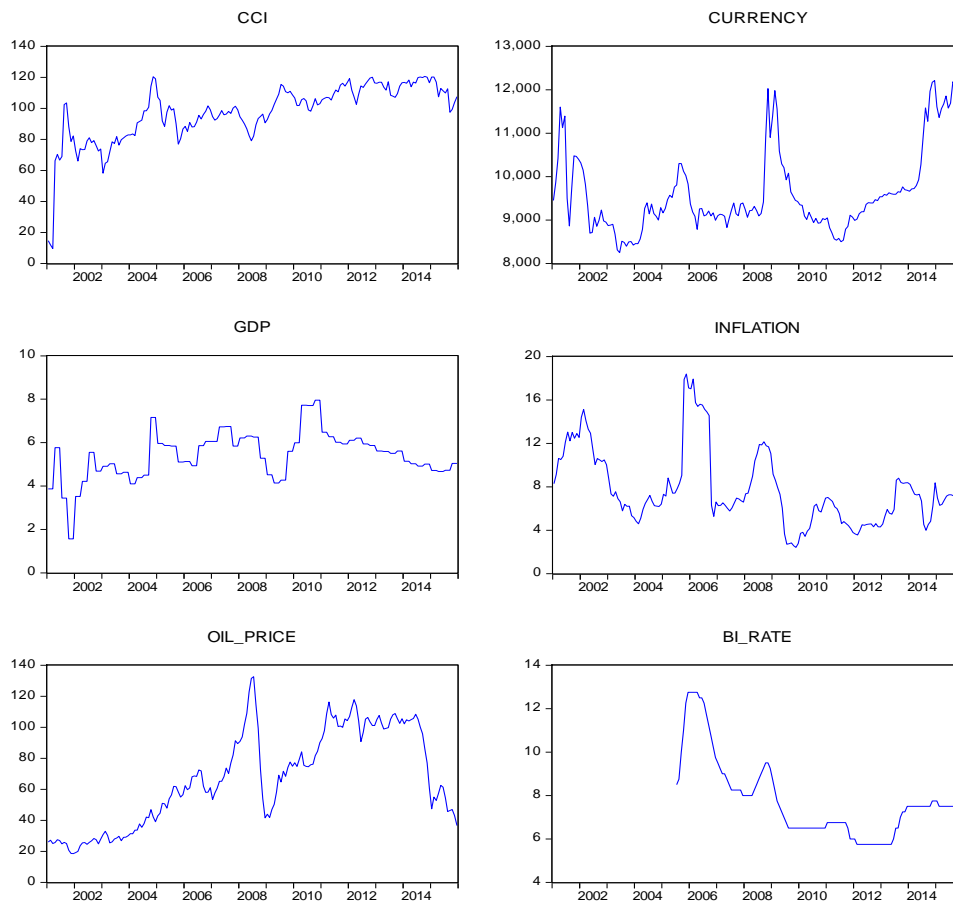
Figure 14 Macroeconomic Dynamics

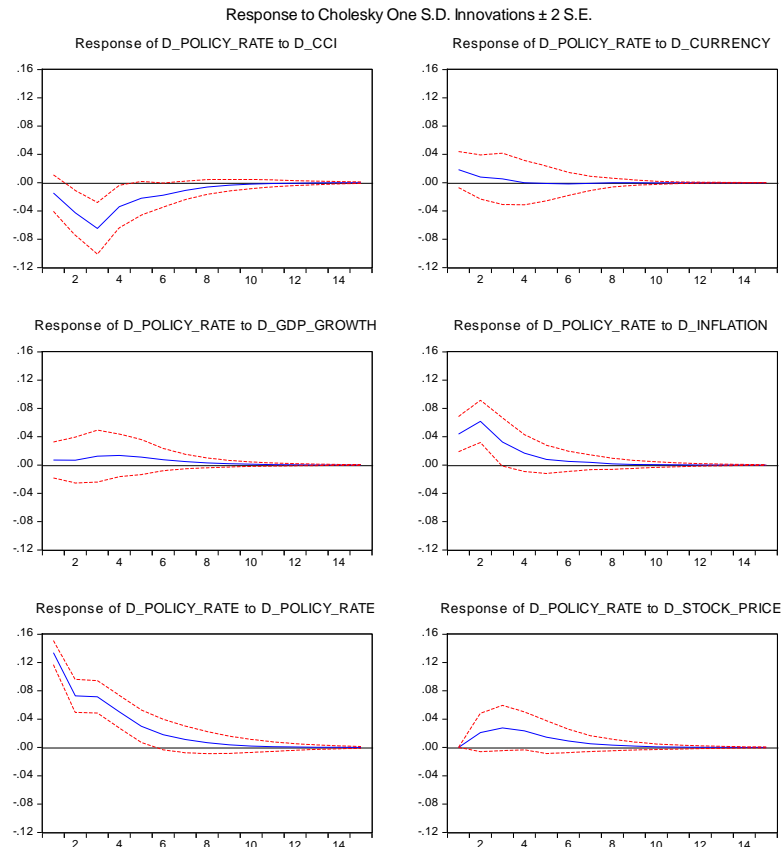**Figure 15 Actual, Fitted and Residuals Graph of Chosen Model**

Response to Cholesky One S.D. Innovations ± 2 S.E.

Figure 16 Complete Impulse Response FUnction of Chosen Model
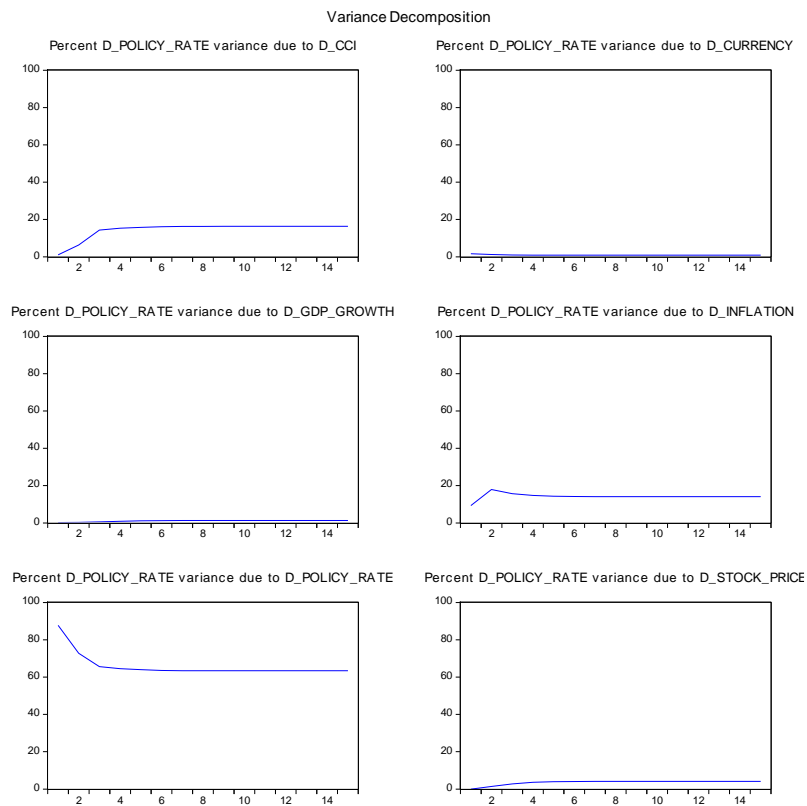
Variance Decomposition

Figure 17 Complete Variance Decomposition of Chosen Model

COMPLETE BEST VAR MODEL

Dependent Variable: D_POLICY_RATE
Method: Least Squares
Date: 03/10/16   Time: 17:01
Sample (adjusted): 2005M10 2015M12
Included observations: 123 after adjustments
D_POLICY_RATE = C(53)*D_CCI(-1) + C(54)*D_CCI(-2) + C(55)
    *D_CURRENCY(-1) + C(56)*D_CURRENCY(-2) + C(57)
    *D_GDP_GROWTH(-1) + C(58)*D_GDP_GROWTH(-2) + C(59)
    *D_INFLATION(-1) + C(60)*D_INFLATION(-2) + C(61)
    *D_POLICY_RATE(-1) + C(62)*D_POLICY_RATE(-2) + C(63)
    *D_STOCK_PRICE(-1) + C(64)*D_STOCK_PRICE(-2) + C(65)

	Coefficient	Std. Error	t-Statistic	Prob.
C(53)	-0.004327	0.003807	-1.136491	0.2582
C(54)	-0.009724	0.003842	-2.530985	0.0128
C(55)	1.62E-05	4.33E-05	0.374452	0.7088
C(56)	2.05E-05	4.82E-05	0.424114	0.6723
C(57)	-0.000598	0.042703	-0.014015	0.9888
C(58)	0.029304	0.041801	0.701039	0.4848
C(59)	0.037301	0.012806	2.912775	0.0043
C(60)	-0.011249	0.012947	-0.868851	0.3868
C(61)	0.560571	0.079063	7.090197	0.0000
C(62)	0.089206	0.076290	1.169299	0.2448
C(63)	0.000140	8.96E-05	1.560803	0.1214
C(64)	0.000108	8.38E-05	1.286247	0.2011
C(65)	-0.020256	0.013784	-1.469488	0.1446

R-squared	0.692712	Mean dependent var	-0.020325
Adjusted R-squared	0.659190	S.D. dependent var	0.245019
S.E. of regression	0.143039	Akaike info criterion	-0.951714
Sum squared resid	2.250631	Schwarz criterion	-0.654492
Log likelihood	71.53044	Hannan-Quinn criter.	-0.830983
F-statistic	20.66425	Durbin-Watson stat	2.174358
Prob(F-statistic)	0.000000		

COMPLETE BEST VECM MODEL

Dependent Variable: D(POLICY_RATE)
Method: Least Squares
Date: 03/10/16   Time: 18:51
Sample (adjusted): 2005M10 2015M12
Included observations: 123 after adjustments
D(POLICY_RATE) = C(65)*(CCI(-1) - 33.8354151064*INFLATION(-1) +
    42.3163268633*POLICY_RATE(-1) - 0.0585830582867
    STOCK_PRICE(-1) - 0.745716345681) + C(66)(CURRENCY(-1) +
    2604.58306363*INFLATION(-1) - 3667.17435313*POLICY_RATE(-1) +
    0.712030202442*STOCK_PRICE(-1) - 2719.69347684) + C(67)*(
    GDP_GROWTH(-1) + 5.51978518854*INFLATION(-1) - 6.45802415485
    *POLICY_RATE(-1) + 0.00956555270022*STOCK_PRICE(-1) -
    26.1892860417) + C(68)*D(CCI(-1)) + C(69)*D(CCI(-2)) + C(70)
    *D(CURRENCY(-1)) + C(71)*D(CURRENCY(-2)) + C(72)
    *D(GDP_GROWTH(-1)) + C(73)*D(GDP_GROWTH(-2)) + C(74)
    *D(INFLATION(-1)) + C(75)*D(INFLATION(-2)) + C(76)
    *D(POLICY_RATE(-1)) + C(77)*D(POLICY_RATE(-2)) + C(78)
    *D(STOCK_PRICE(-1)) + C(79)*D(STOCK_PRICE(-2)) + C(80)

	Coefficient	Std. Error	t-Statistic	Prob.
C(65)	-0.005819	0.003085	-1.886163	0.0620
C(66)	-1.59E-05	7.84E-06	-2.030569	0.0448
C(67)	-0.028721	0.016819	-1.707608	0.0906
C(68)	-0.000727	0.004199	-0.173190	0.8628
C(69)	-0.006596	0.004120	-1.600851	0.1124
C(70)	1.46E-05	4.44E-05	0.328391	0.7433
C(71)	2.63E-05	4.88E-05	0.539252	0.5908
C(72)	0.014156	0.043050	0.328824	0.7429
C(73)	0.039812	0.042523	0.936255	0.3513
C(74)	0.038500	0.013042	2.951981	0.0039
C(75)	-0.011346	0.013203	-0.859325	0.3921
C(76)	0.545306	0.078206	6.972699	0.0000
C(77)	0.082901	0.078724	1.053050	0.2947
C(78)	0.000123	9.09E-05	1.349909	0.1799
C(79)	0.000104	8.58E-05	1.211021	0.2286
C(80)	-0.019957	0.013645	-1.462625	0.1465

R-squared	0.711485	Mean dependent var	-0.020325
Adjusted R-squared	0.671039	S.D. dependent var	0.245019
S.E. of regression	0.140531	Akaike info criterion	-0.965970
Sum squared resid	2.113139	Schwarz criterion	-0.600157
Log likelihood	75.40715	Hannan-Quinn criter.	-0.817378
F-statistic	17.59095	Durbin-Watson stat	2.291633
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	5.547213	Prob. F(2,105)	0.0051
Obs*R-squared	11.75435	Prob. Chi-Square(2)	0.0028