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RELATIONSHIP BETWEEN CONSUMER PRICE INDEX AND PRODUCER PRICE INDEX IN INDONESIA WITH LARGE MODEL ECONOMETRICS

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ABSTRACT

Inflation or price level targeting is becoming more popular as a policy objective of the central bank's monetary policy and fiscal policy to guide them. Policy choices calculated price level is as important as the targeted inflation rate due to the different indices can produce different levels of inflation. Price index is a weighted average of the price of each item. Therefore, the selection of the price index can be detrimental to the credibility of the central bank's policy as well as their success.

The purpose of this study was to assess the long-term relationships and short-term between the two indexes are widely used: the Consumer Price Index (CPI) and Wholesale Price Index (WPI) of 2002 to the Year 2012 Quartalan using Root Test test, causality test, cointegration test, and correction model.

Keywords: Test Root, Causality, Cointegration, ECM, CPI, WPI

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I. INTRODUCTION

On the basis of assumptions of economic theory, there is a relationship between the variables to be studied in a state of equilibrium, but at all points in time to be observed, the balance does not apply. Further assume we observe deviations from equilibrium, imbalance error. It is of interest to ask what the nature of those errors imbalance might have if the concept of balance to be used. The main feature of the time series of these errors is used for error to be "small" average and for them to not be continuously larger or smaller over time. One might interpret this, if errors are seen as random variables, a requirement that various errors all have the expected value of zero and the same variance as well. A series of random errors with these characteristics as an example of a stationary time series. The concept of a stationary time series if the basis for the analysis of cointegration and we carefully define and explain the concept.

Although we might expect disequilibrium error for a stationary random variables it is certainly not the case that all the variables of interest to economists is applied is stationary. Consumer spending and disposable income, for example, whether measured in real or nominal, not necessarily stationary series, but showed a trend in the way they from time to time. What is of particular interest here is the case where this trend of a certain type (stochastic trend) is the first difference of the series is trendless and stationary (in the sense hinted above and formally defined in Section 2). In this case the time series is said to have a "unit root". It may happen that the series becomes stationary after differencing more than once, in that it has several unit root. The second objective is to provide a thorough introduction to the concept and importance of roots Unit.

Although economic theory can give one some prior information on whether the series is expected to have one (or more) unit root, it is mainly a matter that must be decided empirically. Therefore, provide an explanation of the framework, which is derived from the work of Dickey and Fuller (1979), for testing the existence of the unit root univariate time series, and concludes by

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presenting a sequential testing procedure which will apply in almost all circumstances faced by researchers applied. This section also motivates and describes an alternative approach to testing for unit root, check the statistics proposed by Phillips and Perron (1988).

Stationarity is important for empirical researchers because, in general, the results of classical econometric theory originated with the assumption that the variables of concern is stationary. The implication of this is that if we are interested in estimating parameters or test the hypothesis in the case where the variable set is not entirely composed of people who are stationary, standard techniques largely invalid and, therefore, inappropriate. Results of regression analysis and subsequent testing in these cases may be entirely "false", as Granger and Newbold (1974) has shown. Throughout this paper, we draw the reader's attention to those circumstances in which the classical regression analysis can not be applied.

If the standard technique of econometric analysis is only applicable where the variables are stationary, how one to proceed in cases where the variable in which we are interested in non-stationary? This is where the concept of a stationary imbalance error comes to the fore. We stated earlier that certain types of non stationarity is of primary importance to us, that is where the stochastic variable is likely to continue (but given stationary after differencing, remember). Now suppose further that we have a set of variables of interest that not only has a stochastic trend, but that in addition to having a common stochastic trend. In this case, some linear combination of these variables will suit silent even though the level of each of the series itself trending over time (and therefore not stationary).

Variables that have a stochastic trend as commonly said to be cointegrated. However, prior to the discussion, we review the idea of "error correction mechanism" (ECM). Specifications realize the ECM has been widely used in macroeconomic analysis applied since the pioneering work on the determination of consumption expenditure by Davidson et al (1978). More recently, Engle

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and Granger (1987) have shown that if the long-term equilibrium relationship exists between a set of variables and error corrected imbalances through ECM (as defined in Section 4), then these variables will be cointegrated. In addition, the reverse is also true. If the cointegration relationship exists, can be estimated using a simple technique, and the estimator will have interesting properties of a large sample.

Formulation of the problem

In accordance with the preliminary exposure that have been raised, then the main problem in this research are: (1) the influence of empirically whether there is a two-way relationship (causality) between the variables CPI and WPI with Granger Causality method; (2) see empirically whether there cointegration in the short term and long term between CPI and WPI macroeconomic variables with cointegration method (Cointegration); (3) look at the empirical relationship of short-term imbalance towards the long-term balance between variable foreign exchange reserves and the exchange rate with the method Error Correction Model (ECM).

II. LITERATURE AND DEVELOPMENT HYPOTHESIS

1.Understanding Inflation

Inflation is the state of the economy that showed an increase in prices of goods and services in general that occur constantly.

a. Inflation based on the cause

1) Pull Inflation Demand (Demand Pull Inflation), namely inflation due to excess demand for goods and services. Excess demand can not be met the producers will certainly push up prices, because demand is greater than supply.

2)Inflation thrust Production Costs (Cost Push Inflation), namely inflation due to rising production costs. The production costs will rise pushing up the prices of goods and services

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3) Inflation others, namely inflation due to various causes other than those already mentioned above. Such as, inflation caused by printing new money and inflation due to the slow production of certain goods.

b.Inflasi Origin Occurrence based

1) Inflation of the Interior (Domestic Inflation), that inflation is caused only by factors of domestic causes.

2) Inflation of Foreign Affairs (Imported Inflation), namely inflation caused by factors that cause from abroad.

2.Teori Inflation

There are several kinds of theories that discuss inflation, namely:

a. Quantity Theory

This theory was proposed by Irving Fisher. The quantity theory discuss the process of inflation caused by two factors, namely:

1) The amount of money in circulation

2) Psychology ◊ community attitudes and expectations (expectations of) the public against rising prices

The quantity theory of Irving Fisher has the following formula:

$$MV = PT$$

M (Money) = The amount of money in circulation

V (Velocity of Money Circulation) = Speed of money circulation

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P (Price) = Cost of goods

T (Trade) = Number of traded goods

a. Theory Keynes

This theory was proposed by economist named Keynes, stating that inflation is caused by people who want to live beyond the limits of its economy.

c. Theory Structuralists

According to this theory, inflation occurs because the rigidity of economic structures, especially in developing countries. There are two main rigidity in the economic structure of developing countries, namely:

1) Stiffness export revenues, namely that export revenue value always increases more slowly than the value of imports, due to the inaction of the state had difficulty financing imports of raw materials and capital goods (machinery)

2) Stiffness offers groceries, generally in developing countries offers food ingredient more slowly than population growth and per capita income, consequently food prices will rise above the price of other goods.

3. Impact of Inflation

a. Inflation Impact on the Economy in General

The impact of inflation on the economy in general can be described as follows:

1) The impact of inflation on production (output)

2) The production increase

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Occurs if the price of goods faster than the increase in salaries or wages that employers are more increases profits.

3) The production decline

Happens if inflation is already too high (hyperinflation).

4) The impact of inflation on the form of capital investment

5) The impact of inflation on international trade

6) The impact of inflation on efficiency

7) The impact of inflation on the cost calculation

b. Inflation Impact on Individuals and Society

1) The impact of inflation on people's income

2) The impact of inflation on savings interest

c. Inflation impact on political life, Nation and State

How to calculate inflation

Characteristic of inflation is an increase in the general price level of goods within a certain period. Most indicators of price increases is commonly known as the Consumer Price Index (CPI) = the Consumer Price Index (CPI)

Indonesia in calculating the CPI typically use incorporation of the kinds of basic necessities such as food, clothing, housing, and other goods and services.

The formula to calculate the consumer price index are:

CPI =H = base year prices of goods and services in the benchmark H given year = price of goods and services in the year sought Application of Statistics in Economics

1. Definition of Index Numbers

The index number is a number that is expressed in a percentage ratio to measure the relative change one or more variables at a particular time or a particular place,

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compared to the same variable at any other time or place. In short, the index figures are comparative figures to measure changes in variables expressed as a percentage.

2. Various Figures Index

There are three kinds of indices, namely:

a. Price index figures, the comparative figures to measure price change from one period to another.

b. The index number value (value), the comparative figures for measuring changes in the value of one period to another. Value is calculated by multiplying the price by the number (quantity). In general, indices values formulated as follows:

Kind of - kind Price Index There are several kinds of price index, namely:

a. Consumer Price Index (CPI), the price index that measures the changes that occur in the retail price of goods and services by customers from time to time.

b. Wholesale Price Index (WPI), the price index measures price changes that occur in raw materials and finished goods in the primary markets.

c. Index Received and Paid Farmers. Index of prices received by farmers is a price index that measures changes in prices received by farmers on the sale of agricultural production. The index of prices paid by farmers is a price index that measures changes in prices paid by farmers for the goods and services needed for consumption and for farmers' agricultural production.

d. Stock Price Index, the price index, which measures the change in the stock price in the stock market.

Role in the Economy Index

The price index has an important role in the economy. Important role price index include:

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a. The price index can be used as a basis for making economic policy such as fiscal and monetary policy.

b. The price index can be used as a basis for determining the pricing policy, so that the price that occurred not harm consumers and producers.

c. Goods index can be used as a tool to measure the level of economic progress.

d. The price index can be used as a tool to investigate the factors that encourage or hamper economic progress.

e. The price index can be used by traders to determine the selling price.

f. The price index can be used as a basis for determining the amount of inventory.

g. Price index, especially the consumer price index can be used as a basis for determining the amount of the salaries or wages of employees.

h. Price index, especially an index of prices received and paid by farmers, able to provide an overview of the level of prosperity of farmers.

i. Price index, stock price index is mainly useful as a basis for consideration in the activities of buying and selling shares.

Calculation method Price Index

Broadly speaking, there are two methods of calculating the price index, the method is not weighted and the weighted method.

a. Weighted method is a method that does not use the weighing factor in calculating the price index. Because it does not use the weighing factor then all items are considered equally important. There are two kinds of methods are not weighted, namely:

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1) simple aggregative method, which is given by the number of price calculated in the index for the number of prices in the base year in multiply by 100.

2) Method of the average relative price, which is defined the same as above except that the formula that is used instead of numbers, but each masingnya divided by n as the number to know:

b. Weighted method, a method that uses the weighing factor in calculating the price index. Weighing factor is the factor used to differentiate the importance of goods against other goods.

In general, the weighted method formulated in the price calculated in the price index for the base year prices, at the same multiply by a factor weighing, multiply 100.

Calculating Inflation Based Price Index

Characteristic of inflation is the increase in the price of goods in general in an economy. To determine the rate of inflation or inflation rate used Consumer Price Index (CPI) as the basis for calculation. Thus, the consumer price index has a close relationship with inflation. By calculating the inflation rate of the consumer price index formula used in the year n at reducing the consumer price index in the previous year, as the consumer price index divisor in the previous year multiplied by 100%.

III. RESEARCH METHODOLOGY

Research Data

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Variables used in this study is the exchange rate and foreign reserves annual quarterly data from December 1984 to December 2012. Once the data is obtained and processed by the author using statistical software assisted.

Research methodology

The research used the data before it is first processed by the author, to estimate the need to do a series of testing stages items, namely: stationary test, Granger causality test; further test the long-term balance with Cointegration methods, and the relationship between CPI and WPI short-term balance with the ECM method period December 1984 to December 2012. The stationary test is Necessary Because in general nonstationary macroeconomic variables (Gujarati, 1995). The purpose of this test is that the mean stationary stable and random error = 0, so the regression models Obtained prediction has the ability to reliably and no spurious (spurious regression).

Tests developed by Granger causality (1969). From Reviews These tests will be known variables roomates indicate causality, the which then included in the analysis Cointegration, ECM. After Granger causality test, the next step is to test the cointegrating and continued with ECM equation. ECM Cointegration actually very sensitive to the long lag (Enders, 1995), Gujarati (1995), as well as Ansari and Gang (1999). However, the authors did not test the long lags.

IV. RESEARCH RESULT

The following test results for a test between variables Consumer Price Index and Wholesale Price Index with the method Unit Roots and cointegrated. The second is because this index typically influential in decision-making in the economy, especially with regard to the problem of forecasting the inflation rate.

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Unit Roots

We begin by defining stationary. Stationary time series if the mean, variance and independent autocovariances time. So, suppose that yt is a time series (or stochastic processes) are set to t = 1,2, ... and for t = 0, -1, -2, ... Formally, yt is the covariance (weakly) stationary if the following conditions are met (see Harvey (1981a, page 22)):

$$E(y_t) = \mu \qquad (1)$$

$$E\left[(y_t - \mu)^2\right] = \mathrm{Var}(y_t) = \chi(0) \qquad (2)$$

$$E\left[(y_t - \mu)(y_{t-\tau} - \mu)\right] = \mathrm{Cov}(y_t, y_{t-\tau}) = \chi(\tau), \text{ for } \tau=1,2,... \qquad (3)$$

Equation (1) and (2) require a process to have an average constant and variance, while (3) requires that the covariance between the two values of the series (a autokovarian) depends only on the time interval between two values (τ) and not at the point time (t). Mean, variance and autocovariances thus required to be independent of time.

Table 1 : Result unit root test

Null Hypothesis: D(RESID01) has a unit root

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.410751	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

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Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01,2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RESID01(-1))	-1.024613	0.159827	-6.410751	0.0000
C	-14.48672	12.48341	-1.160478	0.2529
@TREND(1)	0.423294	0.485050	0.872681	0.3882
R-squared	0.513127	Mean dependent var		-0.010480
Adjusted R-squared	0.488159	S.D. dependent var		52.84057
S.E. of regression	37.80375	Akaike info criterion		10.17144
Sum squared resid	55735.82	Schwarz criterion		10.29556
Log likelihood	-210.6003	F-statistic		20.55152
Durbin-Watson stat	2.005448	Prob(F-statistic)		0.000001

Sources : Proceed by author

At the output of ADF is seen that the value of -6.41075, whereas above the critical value is equal to the value of -3.52707 ADF test, thus we have enough evidence that receive hypothesis or we can infer that the data cut no problem unit root or data stationer.

Causality Granger

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The core of this test can identify whether a variable has a two-way connection or only in one direction only. Because in this test the influence of the past on the present condition so that the data used is the time series data.

Table 2 : Result granger causality test

Pairwise Granger Causality Tests

Lags: 12

Null Hypothesis:	Obs	F-Statistic	Probability
SERIES02 does not Granger Cause SERIES01	32	14.2934	0.00087
SERIES01 does not Granger Cause SERIES02		0.71273	0.71092

Sources : Proceed by author

By using lag 12 visible results obtained with the level probabilistic significant variable Resid 02 (WPI) at variable Resid 1 (CPI), or in other words the value of alpha smaller than the level of probabilistic 5%, so that it can be concluded on the research data used to each other influence but only in one direction. So it can be concluded refused stating that the data is causality WPI and CPI, CPI morbidly However causality with WPI.

Cointegration Test

Phillips and Ouliaris (1990) presents a theoretical analysis of several tests based on residuals from cointegrating regression. Among the test considered is augmented Dickey Fuller tests, as recommended by Engle and Granger, and change the Dickey Fuller test was developed in the context of testing for unit roots by Phillips and Perron (called test 'Z'). teoritisβDari their results showed that the Z test based on the estimated regression Dickey Fuller (who here uses the residuals of the cointegrating regression) tend to have a higher power than the second test of

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based Z t statistic for the regression Fuller and augmented β Dickey Dickey Fuller test. In addition they developed two new tests that have similar electrical with Z test based on the β properties, either of these tests baru estimated be invariant to normalization imposed in cointegrating regression. Phillips and Ouliaris provide critical values for each statistical test, which allows up to five variables in the cointegration regression, and that allows for the inclusion of an intercept, and to both intercept and time trend, the cointegration regression. The following results display out put to test cointegration.

Table 3 : Result cointegration test

Dependent Variable: SERIES01

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SERIES02	-0.481555	0.148829	-3.235628	0.0024
C	237.9621	26.93669	8.834125	0.0000
R-squared	0.199532	Mean dependent var		154.6166
Adjusted R-squared	0.180473	S.D. dependent var		57.73067
S.E. of regression	52.26227	Akaike info criterion		10.79482
Sum squared resid	114716.5	Schwarz criterion		10.87591
Log likelihood	-235.4859	F-statistic		10.46929
Durbin-Watson stat	0.415112	Prob(F-statistic)		0.002369

Sources : Proceed by author

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From the output above we can ensure that the cointegration test, we can see the value durbin Watson. DW test value generated 0.415112, when compared with the value d table above shows that the value d count> d table, so it can be ascertained that the variable consumer price index and wholesale price index "cointegrated." So we can conclude that we accept the hypothesis that the data cointegrated.

Error Corection Model

If a variable time series, viewed in isolation, have a unit root then we need to take the first difference of the variables in order to obtain a stationary series. However, because of economic theory with regard to the relationship between variables, we might be more useful in the context differencing consider regression model. For example, let C be the consumption and income and consider me to be a model:

$$\Delta C_t = \beta \Delta I_t + u_t$$

Table 4 : Result ECM Test

Dependent Variable: D(SERIES01)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SERIES02)	0.065122	0.135007	0.482360	0.6321
C	-3.003248	4.399033	-0.682706	0.4986
R-squared	0.005643	Mean dependent var		-2.846047
Adjusted R-squared	-	S.D. dependent var		28.50313

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	0.018610		
S.E. of regression	28.76712	Akaike info criterion	9.601738
Sum squared resid	33929.44	Schwarz criterion	9.683655
	-		
Log likelihood	204.4374	F-statistic	0.232671
Durbin-Watson stat	2.104414	Prob(F-statistic)	0.632115

Sources : Proceed by author

In the above equation CPI change from one period to the next is explained by changes in the wholesale price index during the same time interval (thus extra from WPI a week will lead to an increase in CPI 0.065IHPB per week if β = 0.5) without reference to the equilibrium or relationship long-term between CPI and WPI that may exist (hence the decision to increase the wholesale price index amounted 0.065IHPB a week given additional CPI made without considering whether the current CPI is too high, or too low).

$$C_t = C_{t-1} = C_{t-2} = \ldots \quad \text{and} \quad I_t = I_{t-1} = I_{t-2} = \ldots$$

If we make the regression equation of the equation ecm above will be as follows:

Estimation Equation:

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Substituted Coefficients:

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D(SERIES01) = 0.06512204396*D(SERIES02) - 3.003248097

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V. CONCLUSION

The evidence presented here suggests that Engle and Granger (1987) and Johansen (1988) cointegration tests conventional gave mixed results. However, based on the analysis clearly shows that there is a long-term relationship between this index (cointegrated). Thus, it can be concluded that the two variables that we examine this cointegrated and have a relationship causal or granger cause one direction, and in a sense has a long-term relationship, it is in line with or parallel to the findings of Basu (1995), Clark (1999) and Kim (2004). Meanwhile, if we see there is also a short-term relationship between the two indices, the relationship is one-to-one.

There is a great debate about the price level targeting to inflation targeting. It is said that the policy of targeting the price level produces too much volatility in output and prices in the short term. The reason for this is that the price level targeting requires that prices will return to their previous level after each shock, but in the long term, prices are fully determined. Therefore, the price is very uncertain in the long term, so the trade-off between price levels can be affected by inflation targeting (in, Srour, 2001).

Having a long-term relationship between the price index means that the existence of price stability in the index will ensure price stability in the other indices. Therefore, committed to price level targeting may not bring the benefits of price targets for the whole of society, including businesses and consumers. However, the short-term relationships (WPI and CPI-based inflation move together) brings the benefits of inflation targeting in the long term future.

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