Analysis of the Effect of Consumer Price Fluctuations on Inflation in the City of Medan

Fitrawaty[1], Ainul Mardiyah[1], Haikal Rahman[2] and Mohammad Joharis[3]
[1]*Department of Economics, Universitas Negeri Medan, Medan –Indonesia*
[2]*Department of Civil Engineering, Universitas Negeri Medan, Medan –Indonesia*
[3]*Department of Indonesian Language Education, Universitas Negeri Medan, Medan –Indonesia*

Keywords: Consumer Price Index, Inflation, Expenditure Groups

Abstract: Inflation as measured by the Consumer Price Index (CPI) in Indonesia is grouped into seven expenditure groups consisting of: food products; processed food, beverages, cigarettes and tobacco; housing groups for water, electricity and fuel; clothing groups; health groups; education, recreation and sports groups; transportation, communication and financial services. Inflation that occurs can come from all expenditure groups. This research becomes important, so that the policy determination bias relates the prices of all expenditure groups. This study aims to identify; problems and causes, and the City of Medan inflation model. The method used is the VECM method, which utilized the assumptions test, such as stationary test, lag length test, stability test and cointegration test. The results of the study show that in the short term several variables do not significantly influence the current inflation rate. The causes of inflation are education, recreation and sports expenditure groups, whereas in the long term inflation contributors in the City of Medan are expenditure groups in the health sector.

1 INTRODUCTION

The indicator that is often used to measure the inflation rate is the Consumer Price Index (CPI). Alterations in CPI from time to time indicate the price movement of the package of goods and services consumed by the community. Since July 2008, the package of goods and services in the CPI hoop has been carried out on the basis of the 2007 Cost of Living Survey conducted by the Central Statistics Agency (BPS). Furthermore, BPS will monitor the development of prices of these goods and services on a monthly basis in several cities, in traditional and modern markets on several types of goods / services in each city. (BPS, 2018)

Inflation as measured by CPI in Indonesia is grouped into 7 expenditure groups (based on the Classification of Individual Consumption by Purpose - COICOP), comprising the Foodstuff Group; Processed Food, Beverages and Tobacco Group; Housing Group; Clothing Group; Health Group; Education and Sports Group; and Transportation and Communication Groups. (BI, 2018).

Inflation can be influenced by factors that come from the supply side (such as the occurrence of many requests but the offer of goods and services still low/ rare), or shocks (such as increases world oil prices and crop or flood disturbances). Of the weights in the CPI hoop, inflation weighted by surprise factors is represented by a volatile food group. administered prices (hence commodity prices are determined by the government) which cover approximately 40% of the CPI weight. Furlog in Astari (2015) states that price fluctuations in food commodities can be used as indicators of inflation because they have the ability to respond quickly to various economic shocks that occur, such as increased supply and demand blow. In Ikhsan 2010, if it were viewed based on aggregation, inflation rates for volatile food are always above core inflation and general inflation and move with high volatility.

Several results of Bank Indonesia's studies stated that the contribution of volatile foods to inflation in Indonesia was significant and ranked second after core inflation. Therefore, it can be said that the high level of food inflation is a factor driving the high level of general inflation. In addition, persistent food

Fitrawaty, ., Mardiyah, A., Rahman, H. and Joharis, M.
Analysis of the Effect of Consumer Price Fluctuations on Inflation in the City of Medan.
DOI: 10.5220/0009492900650070
In *Proceedings of the 1st Unimed International Conference on Economics Education and Social Science (UNICEES 2018)*, pages 65-70
ISBN: 978-989-758-432-9

inflation has an impact on relatively high inflation in Indonesia (Ikhsan, 2010). Thus, the ability of Bank Indonesia to control inflation is very limited if there were very strong shocks as when there was an increase in fuel prices which caused a surge in inflation.(BI, 2018). Inflation in North Sumatra Province has a relatively low level of persistence. Low inflation persistence indicates that inflation requires a relatively fast time to return to its natural value after a shock. The inflation persistence of North Sumatra Province is affected by the shock that occurs in the components of administered prices and volatile foods. Commodity groups that contribute greatly to inflation persistence are health groups and food groups (Surya, 2013).

Based on data from the 2012 survey Cost of Living (CLS) conducted by the Central Bureau of Statistics, Indonesia's population expenditure on food consumption reached 31 percent in 2014. With the number of poor people in Indonesia reaching 27.7 million (10.96 percent) in 2014, hence the increase in prices on food commodities affects the welfare of all Indonesian population in general and the poor in particular. Empirical studies show that the poor at the national and regional levels are very sensitive and vulnerable to the increase in food inflation that has occurred in recent years (Pratikto & Ikhsan, 2015).

Food inflation may come from the demand side if there is an increase in household income that affects demand so that it can push up food prices. Since the price of food is relatively flexible, the increased movement of the price of food can be an indicator of increasing demand in general. If this is the problem, then the increase in food prices should be an early signal for the central bank to tighten monetary policy (Soskic, 2015).

This classification of expenses based on COICOP can be used as an illustration of how the cost of living in the city of Medan. As one of the big cities in Indonesia, of course, it needs relatively more expensive costs than if you lived in the district. Medan as the provincial capital is the center of education, tourist destinations, trade, and the center of government so it is only natural that many people want to live in Medan. This condition induces an increase in the cost of living will be higher. Which expenditure groups from the seven groups that will give the largest contribution to inflation in the city of Medan? This discussion is important because it can serve as the basis of policy making in order of priority.

2 LITERATURE REVIEW

Generically, the theory of inflation can be categorized into three theory; the Quantity (Irving Fisher Theory), Keynes's Theory, and Structuralist Theory. Each highlights certain aspects of the inflation process and each is not a complete inflation theory that covers all the important aspects of this price increase process. There is no theory that really suits the condition of a country, so that policy making cannot only refer to one theory, but a mixture of several theories.

Quantity Theory (Irving Fisher's Theory), This theory is a theory that is still very useful for analyzing the causes of the emergence of inflation in this modern era, especially in developing countries. This theory highlights the role in the process of inflation which is caused by two factors: the money supply and expectations.

Keynesian theory, according to this theory, inflation occurs because people want to live beyond the limits of their economic capacity. Thus the public demand for goods exceeds the amount available. This happens because people know their desires and make those desires in the form of effective requests for goods. In other words, the community succeeded in obtaining additional funds beyond the limits of their economic capacity so that these groups of people could obtain goods that were larger than they should.

The Structuralist Theory believes that inflation occurs due to an imbalance in the economy. According to Boediono (1998), this theory can be called the theory of long-term inflation, because inflation is associated with structural factors of the economy that can only change gradually and in the long run. Most structuralist theory analyzes reflect cases of inflation in developing countries. There are economic shocks originating from within the country, for example crop failure (due to external factors that are too fast for seasonal changes, natural disasters, etc.); or matters that are related to foreign relations, for example deteriorating terms of trade, production rigidity, foreign debt, and foreign exchange rates, can cause price fluctuations in the domestic market. (Utari, et al, 2015).

3 RESEARCH METHOD

This study aims to determine interactional and dynamic responses between variables, so that the analytical method which is suitable to resolve the conducted research by using the Vector Autoregression (VAR) approach. VAR was first proposed by Christopher Sims (1980).

The stages of analysis to conduct analysis using VAR can be elaborated as follows. After carrying out all assumptions; such as stationary test, lag length test, data stability test, cointegration test, the next step is estimating the VAR Model. Vector Autoregression (VAR) is a method that treats all variables symmetrically without questioning the dependent and independent variables (Sims in Gujarati 2003: 848). Analysis of Vector Autoregression (VAR) in this study was used to analyze the impact of fluctuations in the consumer price index (CPI), which consists of several groups of expenditure, namely, food product; processed food, beverages, cigarettes and tobacco; housing, water, electricity, gas and fuel; clothing; health; education, recreation and sports; transportation, communication and financial services. From the variables used, the research model can be formed as follows:

$$LnY_t = A + \beta_1 LnX1_{t-1} + \beta_2 LnX1_t + \beta_3 LnX2_{t-1} + \beta_4 LnX2_t + \beta_5 LnX3_{t-1} + \beta_6 LnX3_t + \beta_7 LnX4_{t-1}\ \beta_8 LnX4_t + \beta_9 LnX5_{t-1} + \beta_{10} LnX5_t + \beta_{11} Lnx6_{t-1} + \beta_{12} Lnx6_t + \beta_{13} LnX7_{t-1} + \beta_{14} LnX7_t + e_{1t} \ldots\ldots\ldots\ldots 1$$

Where

Ln Y = Inflation at year t

$LnX1_t$ = CPI of Foodstuff Group at year t

$LnX2_t$ = CPI of Compehensive Food, Beverages, Cigarettes and Tobaco year t

$LnX3_t$ = CPI of Housing, Water, Elestricity, Gas and BBM Group at year t

$LnX4_t$ = CPI of Clothing Group at year tt

$LnX5_t$ = CPI of Health Group at year t

$LnX6_t$ = CPI of Education, recreation, Sport Group at year t

$LnX7_t$ = CPI of Transportation, Communication, and Financial Services at year t

This Impulse response is one of the important analyses in the VAR model. Impulse response analysis is used to determine the response of endogenous variables in the VAR system to shock certain variables. The resulting response can be positive, negative and not responding. Positive response due to its position above the horizon line and in the same direction, negative response due to its position below the horizon line and opposite direction, while not responding is indicated by a graph where the response tends to be horizontal near the horizon line (Widarjono, 2007). Impulse response analysis is also used to analyze short, medium and long term to see the shock of one other variable and how long the influence occurs. Based on the research observation period for the short term, which is a period of one year (Q1 / 2005 to Q4 / 2005); medium term is a five-year period (Q1 / 2006 to Q4 / 2009); and the long term is a period of more than five years (Q1 / 2010 to Q4 / 2017).

Test Variance Decomposition (VD), Analysis of Variance Decomposition (VD) illustrates the relative importance of each variable in the VAR system for their shock. Variance decomposition in VAR aims to analyze how much the contribution of a variable to another variable. The VD equation can be derived with the following illustration:

$$E_t X_{t+1} = A_0 + A_1 X_1 \ldots\ldots\ldots\ldots 2$$

The values A_0 and A_1 are used to estimate the future value of X_ (t + 1)

$$E_t X_{t+1} = E_{1+n} + A_1^2 e_{t+n-2} + \ldots\ldots\ldots\ldots + A_1^{n-1} e_{t+1} \ldots\ldots\ldots\ldots 3$$

This means that the value of VD is always 100 percent, the value of VD is higher explaining the contribution of variants of one variable transmit to other transmit variables higher.

4 RESULTS AND DISCUSSIONS

From the results of stationary data testing for all variables studied, it can be seen that LnX2 and LNY data are stationary at level 1 (level), while other data are stationary at the level of first different, namely; LnX2, LnX3, LnX4, LnX5, LnX6, where the ADF-test value is greater than the critical level of confidence (1%, 5%, 10%).

This optimal lag length test is very useful to eliminate autocorrelation problems (correlation between period t interrupts with t-1 errors sorted by time) in the VAR system. Based on the provisions, the use of optimal lag is three.

Before entering the further analysis stage, the estimation equation VAR system which has been formed to be tested is stability.Based on the stability test results (the VAR model) shows that the modulus of the entire root unit <1 and is based on image inverse characteristic roots of AR polynomial it can be seen that all the root (illustrated by a dot) is in a circle so it can be concluded that the model specifications are stable. It can be concluded that the estimated VAR that will be used for IRF and VD analysis is stable and valid.

Furthermore, the cointegration test will be carried out using the Johansen method According to the table Johansen cointegration test method is known that there are four cointegrated equations because it has trace values which are statistically greater than the critical Johansen value 5%. It can be concluded that the data is cointegrated or that there is a long-term relationship between research variables. The cointegration test results indicate that between LnY, LnX1, LnX2, LnX3, LnX4, LnX5, LnX6, LnX7

movements have long-term stability and balance and similar movements. In other words, in each short-term period, all variables tend to adjust to each other, to achieve long-term equilibrium. Because cointegration occurs, the VAR in difference estimation cannot be done, otherwise this research will use VECM estimation.

Vector Error Correction Model (VECM)

After doing several previous tests, it was found that the data was stationary at the 1st level difference and cointegration occurred, then the next step was to form a VECM model. VECM shows short-term and long-term relationships. In the short term, the variables in the study will tend to adapt to other variables to form long-term equilibrium. The following are the results of estimation of VECM lag 2 based on the LR, FPE, AIC and HQ criteria in determining the optimal lag:

Table 1: VECM Estimation of Short-Term and Long-Term INF

Variables	Coefficient	T-statistics	Interpretation
Short-Term			
CointEq1	0.065036	0.92019	Not significant
D (LNY (-1))	-0.695871	[-3.33728]	Significant
D (LNY (-2))	-0.115520	[-0.61047]	Not Significant
D (LNX1 (-1))	-5,927109	[-2.51472]	Significant
D (LNX1 (-2))	-1.444943	[-0.55241]	Not Significant
D (LNX2 (-1))	-0.556895	[-1.19222]	Not Significant
D (LNX2 (-2))	-0.501613	[-1.39144]	Not Significant
D (LNX3 (-1))	-6,868431	[-1.36004]	Not Significant
(LNX3 (-2))	2,695250	[0.52197]	Not Significant
D (LNX4 (-1))	2,024738	[0.52309]	Not Significant
D (LNX4 (-2))	0.299194	[0.08183]	Not Significant
D (LNX5 (-1))	2,759121	[0.33112]	Not SignificaNt
D (LNX5 (-2))	3.730908	[0.45806]	Not Significant
D (LNX6 (-1))	10.93786	[2.76147]	Significant
D (LNX6 (-2))	-0.820468	[-0.16197]	Not significant
D (LNX7 (-1))	2,716297	[0.85302]	Not Significant
D (LNX7 (-2))	-1.738036	[-0.55171]	Not Significant
C	9.63E-05	[0.00110]	Insignificant
Long Term			
LNY (-1)	1.000000	-	-
LNX1 (-1)	-22.46052	[-2,56417]	Significant
LNX2 (-1)	8,277,676	[9,35927]	Significant
LNX3 (-1)	14.69413	[2.12618]	Significant
LNX4 (-1)	33.51176	[5.82098]	Significant
LNX5 (-1)	-79.37459	[-5.89124]	Significant
LNX6 (-1)	1,382401	[0.16048]	Not Significant
LNX7 (-1)	4,824958	[1,46760]	Not Significant
C	182,8673	-	-

Source: EViews 10 (Processed)

Results of VECM estimation with Lag-2 Tabel 1.1 for observation periods 2001: 1-2016: 4 , the VECM model for food, beverages, cigarettes and tobacco; housing, water, electricity, gas and fuel; clothing, health, education, recreation and sports and transportation, communication and financial services groups.

Short-term inflation model for The City of Medan

D (LNY) = 9.63E-05 - 0.695871 D (LNY (-1)) - 0.115520 D (LNY (-2)) - 5.927109D (LNX1 (-1)) - 1.444943 D (LNX1 (-2)) - 0.556895 D (LNX2 (-1)) - 0.501613 D (LNX2 (-2)) - 6,868431 D (LNX3 (-1)) + 2,695250 D (LNX3 (-2)) + 2,024738 D (LNX4 (-1)) + 0.299194 D (LNX4 (-2)) +2.759121 D (LN5 (-1)) + 3.730908 D (LNX5 (-2)) + 10.93786 D (LNX6 (-1)) - 0.820468 D (LNX6 (-2)) + 2.716297 D (LNX7 (-1)) - 1.738036 D (LNX7 (-2)) + 0.065036 ECT.

While the long-term model for The City of Medan Inflation Model, can be describes as follows:

LNINF = 182.8673 + 1.000000 LNY (-1) - 22.46052 LNX1 (-1) + 8.277676 LNX2 (-1) + 14.69413 LNX3 (-1) + 33.51176 LNX4 (-1) -79.37459 LNX5 (-1) + 1.382401 LNX6 (-1) + 4.824958 LNX7 (-1)

The Largest Causes and Contributors of Inflation in the short term in The City of Medan

Based on the results presented in Table 1.1 it is known that in the short term (in 2001: 1 - 2001: 4) most expenditure groups did not have a significant effect on the inflation rate at the 5% level, meanwhile, in the long term (most expenditure groups had a significant effect on the inflation rate in the field cities such as processed food, beverages, cigarettes and tobacco; housing, water, electricity, gas and fuel oil; clothing, and health, while the education, recreation and sports and transportation, communication and financial services has no significant effect on inflation in the city of Medan.

In the short term (period of one year) is a very reasonable matter: the increase or decrease in prices of the expenditure group does not have a significant effect on the inflation rate in the city of Medan. This condition occurs because every process in the economy requires time (time lag) to show its influence on economic conditions.

In the short term, each expenditure group has a different influence on inflation, either from the direction of influence or from the magnitude of its influence. From the results of the Vector Error Correction Model (VECM) estimation, it was found that the biggest contributors to inflation were Ln X6 expenditure groups, notably education, recreation and sports expenditure groups. Changes in the lifestyle of the people become more hedonistic (luxurious style), meaning that people see education not just learning subjects, but extracurricular school facilities and activities are also a consideration when parents want to choose school. The growing number of schools with various extracurricular activities and facilities, as evidence of the increasing number of community requests for schools. Informal activities as a support for the learning process at school are also growing, and are in great demand by the community, such as courses such as tutoring, developing sports courses,

art courses and developing children's talents and personalities. This is a household expenditure post which also costs quite tremendous. Interest and change in people's tastes, resulting in large expenditure items.

Likewise, with recreation that has become a necessity amid increasingly busy community activities, from the cheapest suburban recreation to the city center at an expensive cost, all become the target of the community, especially on weekends and holidays. Recreation are not just for the upper middle class, but also for the lower class, which has followed the lifestyle of the city.

Increasing public awareness of healthy living, resulting in sports activities, is also increasingly in demand. Throughout the age of children, adolescents and parents, consider exercise absolutely essential. This condition has caused businesses in the field of sports to also develop. Community interest in sports, resulting in people not reluctant to spend a certain amount of money to be able to follow it.

The Largest Causes and Contributors of Inflation in the Long-term in The City of Medan

From the estimation results of VECM, in the long-term expenditure group which is a contributor to inflation in the city of Medan is an expenditure group in the health sector. The more advanced a region, the level of health awareness is increasing.

The large number of subsidies provided by the government, such as BPJS which provide cheap services to all levels of society, has resulted in an increase in public health. Generic drug services also help alleviate public health expenditures. Government hospital services like Adam Malik and Pringadi Hospital are getting better, with more complete facilities that can meet the needs of the community so that the level of health is likewise increasing.

5 CONCLUSIONS

1. The problem of inflation in Medan City is caused by several expenditure groups. The food expenditure group turned out to be not the biggest contributor to inflation in Medan City. Scarcity of goods and weather factors are still a major problem for retail traders so that the buying price of traders becomes expensive.
2. The main causes of inflation in the short term are education expenditure groups, because those that include education costs are not only school tuition fees, but supporting facilities, increasingly extracurricular activities, and are quite expensive.
3. The main causes of inflation in the long term are in the fields of health, recreation and sports. The shift in people's tastes, a hedonic lifestyle and luxury, make recreation a necessity. The level of awareness of healthy lifestyles is also increasing, so that sports facilities, public open parks, sports facilities are growing.
4. Some expenditure group variables have no significant effect on the occurrence of inflation in the short term. This happens naturally, because economic symptoms including price increases require time to show their influence. Conversely, the seven expenditure groups have a significant effect on the long term.

REFERENCES

Bernanke, B.S., & Mihov, I. (1998). Measuring Monetary Policy. The Quarterly Journal of Economics, 113 (3), 869–902. DOI: https://doi.org/10.1162/003355398555775

Boediono. (1998). Monetary Economics. Yogyakarta: BPFE.

Dharma S. (2014). Analysis of the role of the regional inflation monitoring and control team (TPID) on inflation control in the province of North Sumatra, Journal of Economics and Finance Vol.

Fitrawaty, (2016). Analysis of Instrument Interdepency of Monetary Policy through Indonesia's Indonesia's Economic Growth, Proceedings of AISTEEL, The First Annual International Seminar, on Transformative Education and Educational Leadership, State University of Medan, Indonesia.

Fitrawaty, (2017). Analysis of Shock Inflation through Indonesia's Economic Growth, Proceedings, International Conference on Global Education V, Ekasakti University, Padang - Indonesia, Universiti Kebangsaan Malaysia, Bangi-Malaysia.

Fitrawaty, 2017, The Analysis of Instrument Interdependency of Monetary Policy through the Indonesian of Unemployment, Proceeding UNICEB, Unimed International Conference on Economics of Business 2017, State University of Medan, Indonesia.

Furlong, F, & Ingenito, R. (1996). Commodity Prices and Inflation. Federal Reserve Bank of San Francisco (FRBSF) Economic Review, 2, 27-4

Ikhsan, M. (2010). Macro Economic Policy Specifically in Price Stabilization and Poverty Reduction. Speech inauguration of Professor of Economics, Faculty of Economics, University of Indonesia.

Lee, H., & Park, C. (2013). Asian Development Bank Economics Working Paper Series No.363.

Pratikto, R. & Ikhsan, M. (2015). Inflation and Poverty: Implications for Monetary Policy. Presented at the Indonesian Economic Development Academic Seminar (SAPEI) 2015.

Soskic, d., (2015). Impact of Food Prices Inflation: Case of Serbia., Economics of Agriculture., UDC: 338,516.49: 336.748.12: 338.439.4 (497.11) 1/2015.

Utari.gad, Cristina.rs, Pambudi. S, (2015), Inflation in Indonesia: Its Characteristics and Control, Nationality Series No. 23.