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TRADE UNION INFLATION EXPECTATIONS AND THE SECOND-ROUND EFFECT IN SOUTH AFRICA: TODA-YAMAMOTO CAUSALITY APPROACH.

Temitope L.A. Leshoro

University of South Africa (Unisa)
Department of Economics,
P.O. Box 392
Pretoria 0003
South Africa.
Tel: (+27) 12 433 4625
Email: lesholat@unisa.ac.za

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Abstract

Inflation expectation is believed to be critical in the formation of prices and wages; hence the South African Reserve Bank (SARB) reacts to any first-round effect of inflation by tightening the monetary policy in order to avoid the second-round effect. But how important are the inflation expectations of the trade unions in leading the inflation rate? Using quarterly data and Toda-Yamamoto causality technique, this study investigates whether inflation rate is led by inflation expectations and/or vice versa, using three different measures of inflation expectations of trade union representatives. The study also investigates the importance of the exchange rate in leading or lagging inflation rate. The inflation expectations of trade union representatives were chosen because of the way in which this sector, through the trade union federation COSATU (Congress of South African Trade Unions), has antagonised the inflation-targeting framework adopted by SARB. The results obtained showed that inflation and the exchange rate have bi-directional causality, while uni-directional causality exists from inflation rate to inflation expectations. The study therefore concluded that a possible second-round effect of inflation cannot be experienced from the changes in inflation expectations of the trade unions, while providing possible policy recommendations. While many studies have observed inflation expectations in different ways, to our knowledge, no study has been conducted with regard to the cause and effect of inflation expectations of trade unions, in particular, on inflation rate using Toda-Yamamoto causality technique for South Africa.

Keywords: Exchange rate, Inflation, Inflation expectations, Toda-Yamamoto causality, Trade union.
JEL Classification Code: C12, E31, J51

1. INTRODUCTION

The ongoing argument about the determinants of inflation in many emerging economies, including South Africa, and the power of the trade unions in influencing the inflation rate focuses our attention on the possible importance of the second-round effect in South Africa, as alluded to by Kantor and Kavli (2011). Given the believe that the first-round increase in inflation will lead to a second-round effect, the South African Reserve Bank (SARB) endeavours to avoid the second-round effects of inflation by increasing the repo rate, irrespective of what causes the initial increase in inflation. The second-round effect occurs when, in the event of higher prices, businesses and trade unions expect inflation to increase further; both prices and wages therefore rise because businesses are able to set higher prices while trade unions have the bargaining power to negotiate wage increases. This will eventually cause an increase in the inflation rate – this is the second-round effect, which occurs when higher inflation expectations are self-fulfilling.

The implication, therefore, is that inflation expectation leads to inflation and if it is not controlled, it will be detrimental to the economy. According to Mboweni (2005), inflation expectations are critical in the formation of price and wage processes. Are all inflation expectations self-fulfilling? Do all first-round effects lead to second-round effects? This study thus investigates whether the inflation expectations of the trade unions leads or lags inflation rate in South Africa, such that given a higher inflation expectations of the trade unions, higher inflation will ensue or vice versa.

Furthermore, many countries have adopted the inflation-targeting framework, in order to achieve price stability along with sustained economic growth. New Zealand was the first country to introduce and adopt this framework in 1990. South Africa is the first African country to have formally adopted the inflation-targeting (IT) framework, which it did in February 2000, to be achieved in 2002, followed by Ghana in 2007 (Heintz and Ndikumana, 2010). However, trade union federation the Congress of South African Trade Unions (COSATU) has greatly antagonised this framework. SARB, being aware of the importance of price expectations of the trade union, business and financial sectors in influencing the inflation rate, commissioned the Bureau of Economic Research (BER) to conduct inflation expectation surveys. This is because while inflation expectations management is a form of

policy measure in achieving price stability, it is also important in monitoring how monetary policy effectively keeps prices stable within an economy (Kamada et al. 2015).

There are, however, different measures of inflation. While headline inflation considers the prices of all goods and services, core inflation excludes commodity prices and oil prices. Although commodity and oil prices fluctuate, which makes some economists prefer core inflation, headline inflation is more inclusive, as it incorporates the prices of all goods and services within the basket. The Monetary Policy Committee (MPC) of SARB, along with the Minister of Finance, conducts the monetary policy and thus targets the headline inflation within the flexible inflation-targeting framework of 3 to 6%.

SARB initially targeted the consumer price index for metropolitan and other urban areas, which excludes mortgage bond interest (CPIX), but later changed to target the headline CPI (Hammond, 2012). A target range allows the inflation rate to move both within and outside the target as a result of the effects of supply shock; this is the first-round effect. The target also allows SARB to determine how long to wait before bringing inflation back within the inflation target range (SARB, 2016). However, the reaction of SARB to the first-round effect is to avoid the second-round effect by tightening the monetary policy (Kantor and Kavli, 2011). As a result of the fluctuations in the commodity prices and the global financial crisis inflation expectations worsened, resulting in cynicism with regard to inflation-targeting worldwide (Frankel, 2012).

Therefore, while observing whether the inflation expectations of the trade unions lead current inflation rate in South Africa, or vice versa, the purpose of this study is to examine whether higher inflation expectations are indeed self-fulfilling, using Toda-Yamamoto causality technique for South Africa. According to our knowledge, there has been no study conducted with regard to the cause and effect of inflation expectations of trade unions in particular on South African inflation rate using Toda-Yamamoto causality technique for South Africa (Rossouw et al., 2011; Kantor and Kavli, 2011; Kabundi et al, 2014).

2. LITERATURE REVIEW

Roussouw et al. (2011) investigated inflation expectations and inflation credibility in South Africa, using survey data. They described inflation credibility as the views on past movements of inflation. The study adopted a logistic regression model and multinomial logit model, which is an extension of the binary choice model, for inflation expectations and inflation credibility. Using a set of demographic characteristics as explanatory variables, the study found that different income groups have different inflation expectations and past inflation (inflation credibility) differs between gender and it does not lead to higher inflation expectations.

Kantor and Kavli (2011) carried out a bivariate model using the simple Granger causality test to examine the direction of causality, as well as cross correlation method. Their study observed the causality between CPIX inflation as well as CPI inflation rates, and the inflation expectations of three groups of participants, namely, financial sector, business sector and trade unions. The conventional Granger causality test used is subject to changes in the lag length, whereby different directions of causality are obtained when the lag length is changed. Another limitation of the conventional Granger causality test is that it is affected by the stationarity of the variable, as further explained below. Kantor and Kavli's study estimated the model with all the variables in differenced form, since they were all integrated of order one, I(1). The study found that inflation expectations did not lead inflation rate for all the groups of participants, but that inflation rate led the inflation expectations of all participants except the business representatives, whose inflation expectations were not influenced by the current inflation rate. However, the study excluded the possible effect of real exchange rate, which is an important determinant of inflation rate.

In a later study Kabundi and Schaling (2013) examined the relationship between lag inflation and inflation expectations in South Africa in order to observe whether SARB has successfully anchored expectations of the private sector as well as the credibility of the inflation target since the adoption of the target. First, the study found economic agents to be backward-looking rather than forward-looking, which is contrary to the inflation-targeting (IT) framework. Second, the study used the simple Granger causality test, which is prone to lag length distortions, and found there to be bi-directional causality between lagged inflation and inflation expectations. However, contrary to Kabundi and Schaling's study, the study conducted by Leshoro and Kollamparambil (2016) found economic agents to be forward-looking, as one would expect in an IT regime. The reason for the

contradictory results could be due to the different econometric techniques and measures of inflation expectations used. The study by Leshoro and Kollamparambil (2016) estimated the hybrid new Keynesian Phillips curve (HNKPC) using different measures of inflation expectations, demand side variables, data frequencies and different econometric techniques of ordinary least squares (OLS) and generalised method of moments (GMM).

The result obtained by Leshoro and Kollamparambil (2016) is in line with the requirement of the monetary policy for a forward-looking phenomenon. Economic policies in general and monetary policies in particular require economic agents to be forward-looking because changes in prices should not occur before remedial measures are applied (Keynes, 1923). However, their study did not consider whether inflation expectation leads or lags inflation; rather, it observed if expected inflation drives inflation rate in order to determine whether economic agents are backward- or forward-looking.

In a panel study by Kabundi et al (2014), aggregate inflation expectations and expectations of three agents, namely, business, trade union and analysts, were used. They used only the two-year ahead inflation expectations measure for the three groups. Using the simple granger causality test and fixed-effects panel-data regression, the study found that the inflation expectations of different agents are heterogenous. However, changes in inflation cause a change in the inflation expectations of business and trade unions. Thus, given that inflation granger causes inflation expectations, the result indicates that the inflation expectations of business and trade unions are not well-anchored.

Dadam and Viegi (2015) analysed the effect of the labour market on the conduct of monetary policy in South Africa. The study used different econometric techniques such as ordinary least squares (OLS), the dynamic stochastic general equilibrium model and line graphs, within the specifications of the new Keynesian wage Phillips curve and the reduced form traditional Phillips curve. The results indicated a strong correlation between wage inflation and the inflation expectations of the trade unions. The study therefore showed that changes in wages could be controlled by regulating inflation expectations. This is because inflation expectations are extremely important in determining wage inflation, especially under the inflation-targeting regime, as mentioned earlier, alluded to by Mboweni (2005).

On the other hand, Sibanda et al (2015) assessed the impact of oil price and exchange rate on inflation expectations, using monthly time-series from July 2002 to March 2013. Their study found that both oil prices and exchange rates have strong and significant positive impacts on inflation rate. Sibanda et al (2015) also found that inflation expectations have a significant effect on inflation rates and that low and stable inflation with well-anchored inflation expectations will assist monetary authorities to achieve their monetary policy objectives.

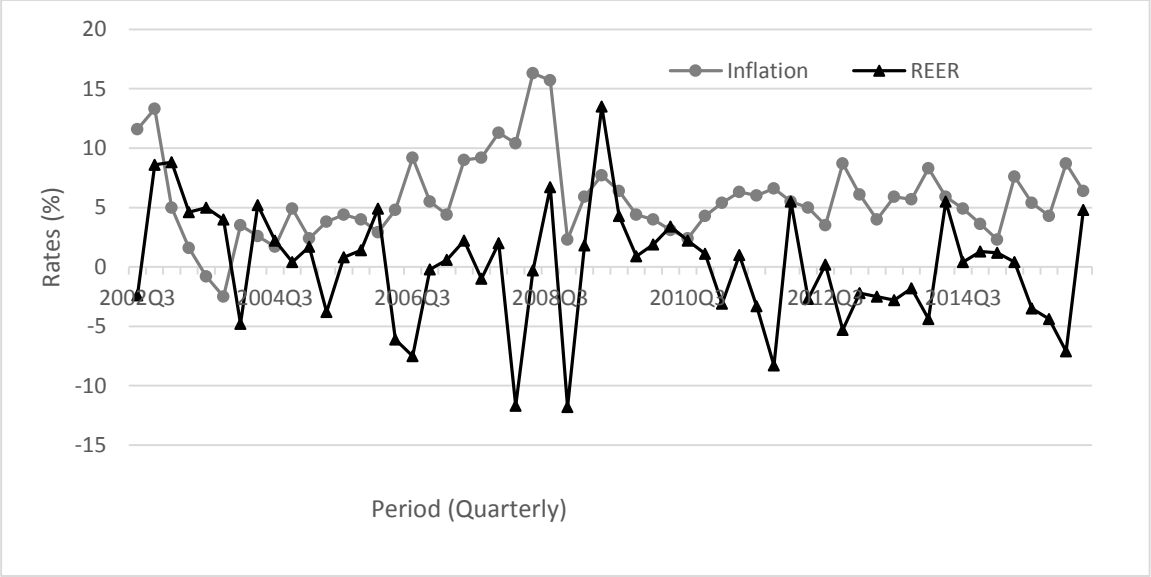
3. DATA AND METHODOLOGY

3.1 Data Sources

The variablesused are inflation rate, the three measures of inflation expectations, namely trade union inflation expectations in the current year, one year ahead and two years ahead; and real effective exchange rates. These were obtained from the South African Reserve Bank (SARB) database. The inflation rate is the total consumer prices for all the urban areas, seasonally adjusted at annual rate (this is the headline inflation that SARB targets). Trade union inflation expectations were obtained from the quarterly survey conducted by the BER on behalf of and published by SARB. The sample size used in this study is from the third quarter of 2002 to the second quarter of 2016. This is the period of the adoption of inflation target framework.

As shown in Figure 1, inflation and exchange rates display co-movement, showing positive movements in the early 2000s, and later moving in opposite directions. This reveals that there is a relationship between the two variables.

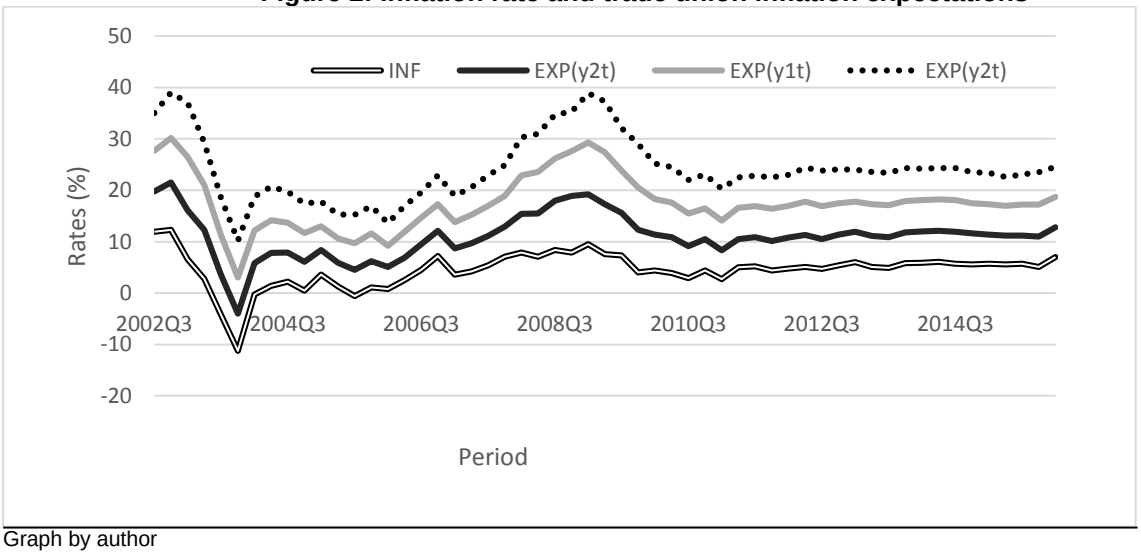
Figure 1: Inflation Rate and Exchange Rate (2002Q3 to 2016Q2)



Graph by Author

Figure 2 shows the plot of inflation rate and the three different measures of inflation expectations of the trade union representatives. All these variables tend to move closely together, with the same peaks and troughs. This does not imply causation or effect, hence we cannot deduce from the graph whether economic agents are forward-looking or backward-looking. Besides, forward- or backward-looking inflation expectations are beyond the scope of this current study.

Figure 2: Inflation rate and trade union inflation expectations



Graph by author

3.2 Methodology

In this study the Toda-Yamamoto approach to causality technique was adopted in order to estimate the direction of causality between current inflation rate and the three different inflation expectations of the trade unions, namely, trade union inflation expectations in the current year, one year ahead and two years ahead. The Toda-Yamamoto causality technique is more advanced than the conventional Granger causality test (Granger, 1969). This causality technique is unique because it makes use of vector autoregression (VAR) rather than the conventional Granger causality test; the variables do not necessarily have to be stationary, the order of integration of each variable does not have to be the same, and the variables do not have to be cointegrated (Toda & Yamamoto, 1995). The series can be integrated of any order, for example I(0), I(1) or I(2). However, the maximum order of integration should be lower than or equal to the maximum lag length. This technique makes use of the MWald statistic rather than the F-statistics used in the conventional Granger causality technique. In order for the simple Granger causality technique to be used, all the variables have to be stationary at level, otherwise the F-statistics will give a spurious result. However, in the case of MWald statistic of the Toda-Yamamoto technique, even if the variables are integrated of different orders, this does not provide spurious results.

An advantage of the Toda-Yamamoto causality technique over the conventional Granger causality technique is that since the maximum lag length is determined in the VAR, it does not change, and hence the result is reliable. In terms of the conventional Granger causality technique the lag length can be changed, which means that the technique suffers from the effects of the lags (AKÇAY, 2011). Caporale et al (2002) stated that if an important variable is omitted within a model, this adversely affects the validity of the inference in the case of a bivariate VAR, which thus results in invalid results and conclusions. However, this study adopts a multivariate VAR model, while also including the real exchange rate that was omitted in the earlier study by Kantor and Kavli (2011). It is essential to note that causality simply means that one variable leads or lags the other, and not that one variable determines the other.

The model to be estimated is shown as follows:

$$INF_t = \lambda_0 + \lambda_1 EXP_{yt} + \lambda_2 EXP_{y1t} + \lambda_3 EXP_{y2t} + \lambda_4 REER_t + \varepsilon_t \qquad \{1\}$$

The multivariate Toda-Yamamoto VAR causality system of inflation rate is:

$$INF_t = \alpha_0 + \sum_{m=1}^{k+d} \alpha_{1m} INF_{t-m} + \sum_{n=1}^{k+d} \alpha_{2n} EXP_{yt-n} + \sum_{p=1}^{k+d} \alpha_{3p} EXP_{y1t-p} + \sum_{q=1}^{k+d} \alpha_{4q} EXP_{y2t-q} + \sum_{r=1}^{k+d} \alpha_{5r} REER_{t-r} + \varepsilon_t \quad \{2\}$$

$$EXP_{yt} = \beta_0 + \sum_{m=1}^{k+d} \beta_{1m} INF_{t-m} + \sum_{n=1}^{k+d} \beta_{2n} EXP_{yt-n} + \sum_{p=1}^{k+d} \beta_{3p} EXP_{y1t-p} + \sum_{q=1}^{k+d} \beta_{4q} EXP_{y2t-q} + \sum_{r=1}^{k+d} \beta_{5r} REER_{t-r} + \eta_t \quad \{3\}$$

$$EXP_{y1t} = \varphi_0 + \sum_{m=1}^{k+d} \varphi_{1m} INF_{t-m} + \sum_{n=1}^{k+d} \varphi_{2n} EXP_{yt-n} + \sum_{p=1}^{k+d} \varphi_{3p} EXP_{y1t-p} + \sum_{q=1}^{k+d} \varphi_{4q} EXP_{y2t-q} + \sum_{r=1}^{k+d} \varphi_{5r} REER_{t-r} + \nu_t \quad \{4\}$$

$$EXP_{y2t} = \delta_0 + \sum_{m=1}^{k+d} \delta_{1m} INF_{t-m} + \sum_{n=1}^{k+d} \delta_{2n} EXP_{yt-n} + \sum_{p=1}^{k+d} \delta_{3p} EXP_{y1t-p} + \sum_{q=1}^{k+d} \delta_{4q} EXP_{y2t-q} + \sum_{r=1}^{k+d} \delta_{5r} REER_{t-r} + \mu_t \quad \{5\}$$

$$REER_t = \gamma_0 + \sum_{m=1}^{k+d} \gamma_{1m} INF_{t-m} + \sum_{n=1}^{k+d} \gamma_{2n} EXP_{yt-n} + \sum_{p=1}^{k+d} \gamma_{3p} EXP_{y1t-p} + \sum_{q=1}^{k+d} \gamma_{4q} EXP_{y2t-q} + \sum_{r=1}^{k+d} \gamma_{5r} REER_{t-r} + \upsilon_t \quad \{6\}$$

Where INF is inflation rate obtained from the consumer price index; EXP_{yt} is the inflation expectation of trade union representatives in the current year; EXP_{y1t} is the inflation expectation of trade union representatives one year ahead; EXP_{y2t} is the inflation expectation of trade union representatives two years ahead and $REER_t$ is the real effective exchange rate.

The Toda-Yamamoto causality technique estimates an augmented VAR $(k+d_{max})$ model using the asymptotic chi-squared distribution with k degrees of freedom, where k is the maximum lag length and d_{max} is the maximum order of integration. The maximum lag length, k, is obtained using the Akaike information criterion (AIC), which is then augmented by the maximum order of integration, d_{max}. The seemingly unrelated regression (SUR) method is used, in terms of which each of the variables in turn is regressed on the others from (1) to $(k+d_{max})$. The hypothesis to be tested for each model is that "each explanatory variable does not Granger cause the dependent variable" against the alternative hypothesis that it does. However, in this case, the causality of all the explanatory variables in equation 2, except INF, will be tested, while in equations 3 to 6, only the causality of INF against each dependent variable will be tested. These are the variables that show whether inflation expectation and exchange rate lead inflation and/or vice versa.

The result will be confirmed as a uni-directional causality if the coefficient of an explanatory variable in one model is statistically significantly different from zero and not the other way round in another

model, for instance, if the coefficient of REER, α_{5r}, in model 2 is statistically significantly different from zero, but the coefficient of INF, γ_{1m} , in model 6 is not statistically significantly different from zero. Thus, the study will conclude that REER Granger causes inflation, but that inflation does not lead REER.

4. DISCUSSION OF RESULTS

The results of DF-GLS, Phillips Perron (PP) and Zivot-Andrews tests for stationarity show that inflation rate and exchange rate were stationary at 5% and 1% levels of significance respectively, while all three measures of inflation expectations of the trade union representatives became stationary after the first difference, all at 1% significance level. The maximum order of integration is therefore one, I(1).

Table 1: Stationarity test result

Variables	**Levels**			**First difference**		**Conclusion**
	DF-GLS	Phillips Perron	Zivot-Andrews	DF-GLS	Phillips Perron	
INFL	-3.525**	-4.090**	-4.685**	-	-	I(0)
EXP_{yt}	-3.415**	-2.070	-4.258	-	-6.330***	I(1)
EXP_{y1t}	-1.866	-2.127	-3.761	-6.025***	-6.537***	I(1)
EXP_{y2t}	-2.269	-2.267	-3.527	-6.347***	-8.192***	I(1)
$REER_t$	-6.584***	-6.783***	-8.162***	-	-	I(0)

*** 1%, ** 5%. Eviews 9 was used for all computations.
Analysis: By author

The maximum lag length was obtained from the VAR model; this is the first step of the Toda-Yamamoto causality technique with which the maximum order of integration obtained above will be augmented. The chosen lag length using Akaike information criteria (AIC) is 2. The causality test was therefore carried out using the SUR method, where each variable was regressed on the others with a VAR of lag (1) to (3). The causality test results obtained are shown in table 2 below.

Table 2: Result of the multivariate inflation expectations model

Null hypothesis	**k**	**$k+d_{max}$**	**Chi-square stats**	**p-value**	**Decision**	**Direction of causality**
EXP_{yt} does not Granger cause INF	2	2+1 = 3	5.200	0.158	Not rejected	No causality
EXP_{y1t} does not Granger cause INF	2	2+1 = 3	0.580	0.901	Not rejected	No causality

EXP_{y2t} does not Granger cause INF	2	2+1 = 3	2.961	0.398	Not rejected	No causality
REER does not Granger cause INF	2	2+1 = 3	6.412	0.093*	Rejected at 10%	Causality REER → INF
INF does not Granger cause EXP_{yt}	2	2+1 = 3	48.270	0.000***	Rejected at 1%	Causality INF → EXP_{yt}
INF does not Granger cause EXP_{y1t}	2	2+1 = 3	20.125	0.000***	Rejected at 1%	Causality INF → EXP_{y1t}
INF does not Granger cause EXP_{y2t}	2	2+1 = 3	9.633	0.022**	Rejected at 5%	Causality INF → EXP_{y2t}
INF does not Granger cause REER	2	2+1 = 3	10.699	0.014**	Rejected at 5%	Causality INF → REER

*10%; **5%; ***1%. Eviews 9 was used for all computations.
Analysis: By author

The results clearly show that there is uni-directional causality from inflation rate to inflation expectations of the trade union representatives from the current period to two years ahead. This means that while inflation rate leads inflation expectations of trade union representatives in South Africa, it is not led by their inflation expectations. The result therefore supports the findings of Kantor and Kavli (2011). Inflation expectations of trade union representatives do not have any effect on inflation rate; however, the level of inflation rate leads trade union representatives' inflation expectations. Since inflation does not follow any measure of inflationary expectations, based on the level of inflation rate, trade unions may expect the inflation rate to increase further and therefore demand higher wages. Thus, according to the result obtained, the realised increase in wages based on their inflation expectations cannot cause inflation to increase. Hence South Africa does not suffer from the second-round effect of inflation caused by the trade unions.

On the other hand, there is a bi-directional causality between inflation rate and REER, which is an important variable that Kantor and Kavli's study omitted. The null hypotheses that INF does not Granger cause REER and that REER does not Granger cause INF were rejected at 5% and 10% levels of significance respectively. Due to the bi-directional relationship between inflation and exchange rates, whereby inflation leads exchange rate and it is also led by exchange rate, these two variables are thus important in each model. This further confirms the conclusion reached by Kantor and Kavli

(2011) that the strength in the exchange rate probably drives the inflation rate in both directions, and is not necessarily driven by inflationary expectations.

5. CONCLUSION

This study investigated the causality between inflation rate and different measures of inflation expectations of the trade union representatives as well as between inflation rate and exchange rate. The importance of exchange rate in inflation dynamics cannot be overlooked, hence its inclusion in the inflation rate model. The result thus showed that while inflation rate and exchange rate have bi-directional causality, inflation rate does not follow any of the measures of inflation expectations of the trade unions. There is uni-directional causality from inflation rate to the expected inflation. Therefore, trade union inflation expectations do not lead to the second-round effect of inflation rate. This means that if trade unions expect inflation to increase further, following an initial increase in inflation rate, and thereby demanding higher wages, this action will not result in higher inflation rate. This study shows that given an initial increase in inflation rate due to the supply shocks, the actions of the trade union representatives, by demanding higher wages, will not cause inflation to increase further.

Thus, the fact that SARB bases its monetary policy on the potential effect of inflation expectations on inflation rate is a cause for significant concern. This is because, according to SARB policy, the particular participant's inflation expectations need to be taken into account in order to observe possible changes in inflation. Meanwhile, based on the findings of this study, changes in inflation rate do not follow changes in inflation expectations of the trade union representatives. However, changes in inflation rate follow changes in exchange rate, while changes in exchange rate are also caused by changes in inflation rate.

It is, therefore, advisable that monetary authorities review their stance and change their focus on the economic variables that lead the inflation rate in South Africa rather than "using a blanket approach" that inflation expectations automatically lead inflation rate. Given the bi-directional causality between inflation and exchange rates, it is important for monetary authorities, in battling inflation, to redirect their attention to regulating the exchange rate. By continuously curbing inflation, not as a

result of the inflation expectations of the trade unions, monetary authorities will indirectly be able to regulate the exchange rate.

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