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THE IMPACT OF IMPORT ON INFLATION IN NAMIBIA

Mika Munepapa
Namibia University of Science and Technology
NAMIBIA
mmunepapa@gmail.com

Johannes P S Sheefeni[1]
University of Namibia
NAMIBIA
peyavali@gmail.com

ABSTRACT

This study examined the impact of imports on inflation in Namibia using quarterly data from the period 1991Q1 to 2013Q4. The model estimated used imports as a dependent variable, while gross domestic product, money supply (M2), lending rate, and exchange rate as the explanatory variables. An error correction modelling approach was applied on the double log functional form in order to investigate the significance and effect of explanatory variables to inflation in Namibia. The results for the unit root test showed that all the variables were stationary in first difference. The residual based test to cointegration revealed that there is cointegration among the variables. The error correction model showed that imports have a positive effect on inflation in the long run while in the short run the effect is insignificant.

Keywords: Error correction model, import, inflation, Namibia.

INTRODUCTION

Inflation is one of the major macroeconomic variables and it is defined inflation as a persistent increase in general price level of consumers in a country (Barro, 2008). Furthermore, Barro stated that inflation can also be explained by the purchasing power of the country. That is a continuation drop in the purchasing power.

Economic theory states that inflation and import have positive relationship. For example, an increase in aggregate spending exceeds the local demand that leads to the need for import to meet the local demand. As import quantity's demanded increase, the price of imported goods and services rise, causing the inflationary pressure to the economy. The lack of sufficient resources for production in many developing African countries has led to a dependency on import for consumption (Ogbokor & Sunde 2011; Islam, 2013).

According to Ogbokor and Sunde (2011), Namibia heavily depends on South Africa for imports. About 80% of Namibia's import is from South Africa, with a huge percentage of this being food for consumption. This is because of the capability of South Africa to produce more than many other African countries. The huge dependency of Namibia to South Africa for import also imply that the general increase in price levels in South Africa will also be passed on, resulting in inflationary pressure to Namibia. For example, the current drought situation South Africa is experiencing signal an anticipation of increase in prices. This price will be reflected and felt in Namibia too via the Namibian dollar which is linked on par with the South Africa Rand. Therefore, this suggests that Namibia always suffers as a result of inflation or changes in prices in South Africa. This is so, since Namibia is not capable of producing enough for the local market demand, thus import increases every time.

[1] Corresponding author

According to the Namibian Statistics Agency (NSA) inflation is averaged 9.70 percent from December 1973 to January 2016, with the highest recorded in June 1993 at 20.54% and lowest of 0.88% recorded in May 2005 (Bank of Namibia & NSA, 2016). A country needs favorable rate of inflation to keep the performance of the economy at a satisfactory level. However, according to NSA the inflation was recorded 5.30% in January 2016 compared to the average of 4.87% in 2015 (NSA, 2016). If this continues, it is expected that prices of goods (especially food) and services will rise resulting in lower economic growth. This will require the central bank, Bank of Namibia to intervene in order to stabilise the inflation by increasing the interest rate, particularly repo rate. However, the rise in interest rate will hurt Namibians who still have debts to settle as the costs are likely to go up. In the end, the economic and financial problems in the country will upswing. Hence, the need to study the impact of import on inflation in Namibia is very crucial.

The paper is organized as follows: the next section presents a literature review. Section 3 discusses the methodology. The empirical analysis and results are presented in section 4. Section 5 concludes the study.

LITERATURE REVIEW

There are three major theories that explained the cause of inflation namely, the Monetarist model, Keynesian view and Structuralist model. In addition, the paper also attempted to explain the demand-pull and cost-push inflation.

The monetarist argues that domestic inflation is caused by the excess supply of money within the economy as stated by Friedman in 1969. Monetarists do not believe that domestic inflation can be caused by changes in demand for money, and cost of production of goods and services in the country. Rather, it is money supply that boosts transactions mechanisms, which eventually causes the demand to exceed the money supply (Likukela, 2007). Furthermore, monetarists highlighted that government budget deficit is an important factor that contributes to inflation. This is because in the presence of budget deficit, government finds it necessary to borrow or print more money for expenditure. This subsequently, leads to more money in circulation resulting in inflation (Ogbokor and Sunde, 2011).

Keynesians argue that controlling money supply with fixed monetary policy will not guarantee a controlled spending within the economy. Spending does not only depend on money that is circulating in the economy but also on how rapid, money is used in the economy (Ogbokor and Sunde, 2011). On the contrary, monetarists conclude that inflation is caused by interest rate movement but not the money supply in the economy. This means that when interest rate is low, demand for money will increase, which will dispose individuals to have a lot of money or more money circulating in the economy resulting in increase in price.

Structuralists argue that inflation is caused by demand pressure structural factors and cost pressure. This can lead to changes in prices in real world of money prices such as wages. Wages tend to be inflexible downward; this could lead to inflation (Ogbokor and Sunde, 2011; Likukela, 2007). The structuralists further state that changes in the economics structure causes relative prices to rise. This leads to influence in money prices, in other words leads to growth in money supply.

The cost-push inflation is when there is a shift in the supply curve such that any level of output will require a higher price level than before a shift (Hiller, 1997). It is believed that a

shift in aggregate supply can be caused by factors, such as push for high money wages, increase in the price mark-up over cost of employers. Generally, the cost of raw materials and increase in wages are more likely to push the prices up.

Demand-pull inflation is said to occur as a result of an increase in real aggregate demand at any price level (Hiller, 1997). Inflation results as aggregate demand exceeds aggregate supply in the economy. According to Hiller (1997) when GDP increases, that is an increase in the national economy, unemployment is likely to go down and households are more likely to increase their consumption. The economy will have more money and few goods and services causing prices to increase. The prices, however, are not expected to continue increasing as supply will also increase in the long run due to demand.

Numerous studies previously looked at the relationship between inflation and imports.
Cole (1986) examined the relationship between the imports and domestic inflation in Latin America. The study employed the Ordinary Least Square (OLS) method of Double-log model to estimate the relationship and effectiveness between the dependent variable and independent variables. The results confirmed that import or import prices had no statistical significance with the domestic inflation.

Gaomab II (1998) modelled inflation in Namibia for the period 1973 to 1996. The study employed the method of cointegration, error correction model and structural stability for testing time series and forecasting. The results obtained revealed that there was dominance of foreign prices and imported inflation from South Africa on Namibian prices and inflation. Furthermore, the results showed a little impact from the rest of the world, especially the United States, although it was indicated that the effect was indirect through South Africa.

Cheng and Tan (2002) determined the factors that caused inflation in Malaysia using quarterly data from the year 1973 to 1997. The study used the time series approach namely, multivariate cointegration, vector-error correction modeling, impulse response functions and decompositions, to run ant tests for regressions. The outcome showed that inflation from other Asian countries had a big impact on Malaysia inflation.

Ogbokor (2004) analysed the impact of inflation on Namibian economic growth using data for the period 1991 to 2001. The study employed the double-log transformation models that helped to interpret the results in elasticity form (percentage form). The results showed that imported inflation was one of the problems that were experienced as it decelerated the economic growth.

Corrigan (2005) analysed the relationship between import prices and inflation in the United States, using quarterly data for the period 1986 to 2004. The study adopted a triangle model to measure the relationship between economic-wide inflation to import prices, a measure in demand excesses in the economy and inertia variable. The results indicated that import prices have played a significant role in explaining inflation patterns.

Narayan and Narayan (2005) empirically assessed Fiji's import demand function using the data for the period 1970 to 2000. The cointegration method was used to test for the long-run relationship between import and independent variables which included relative prices. The result revealed that there was a long run relationship between import and independent variables, and all variables were significant to the model. The study implied that inflation had an influence on import prices.

Likukela (2007) analysed the determinants of inflation in Namibia during the period 1993-2003. The study employed the cointegration test and the error correction model to test for the correlation of inflation and independent variables. The results of South African's price index and the United States' price index were all significant in determining inflation in Namibia. Similalry, Ogbokor and Sunde (2011) examined whether inflation in Namibia is import driven. The study used the OLS (Ordinary Least Square) method to estimate the relationship between import and inflation on the data for the period 1990 to 2007. The results showed that inflation in Namibia heavily depends on import.

Islam (2013) carried out an empirical study on the impact of inflation on import. The study used the trend of inflation using the number letter of credit and value of letter of credit opened in Prime Bank Limited, Khulna Branch, as well as from publications and office files from 2008 to 2012. The study also used trends of variables through comparison. After close examination of the trends, it was revealed that there was a very small significant or very insignificant correlation between inflation and import trade.

Based on the empirical studies, it is good enough to conclude that import prices and inflation have a relationship. However, most of the studies summarised focused more on other countries, and only few are Namibian based. The latest study that investigated the relationship between import and inflation in Namibia was the study done by Ogbokor and Sunde (2011) based on the period 1990 to 2007. This is to say, there was no further study post 2007 to date. Therefore, this study intended to fill the gap and add to empirical literature of Namibia.

METHODOLOGY

In order to establish the relationship between import and inflation in Namibia, the study follows an error correction modelling approach as used by Likukela (2007). The general function of inflation is expressed below:

$$\pi = f(M2, GDP, Lr, Ex, IPI) \quad \ldots 1$$

The regression equation is denoted as follows:

$$\pi = \theta_0 + \theta_1 M2 + \theta_2 GDP + \theta_3 Lr + \theta_4 Ex + \theta_5 IPI + U_t \quad \ldots 2$$

The double log-linear model of equation (2) is as follows:

$$ln\pi = \theta_0 + \theta_1 lnM2 + \theta_2 lnGDP + \theta_3 lnLr + \theta_4 lnEx + \theta_5 lnIPI + U_t \quad \ldots 3$$

$$Where\ U_t - N(\pi; \sigma^2)$$

In the above equations, Π represent Inflation rate in Namibia; M2 represent Broad money supply; GDP denote the Gross Domestic Product; Lr represent the lending rate; Ex represent the price index of Namibian dollar per United State Dollar; while IPI represent the import price index or imports. All coefficients (θs) were expected to have a positive sign, expect for gross domestic product and lending rate. The following steps were followed:

Unit root test

The first step prior to estimating the regression model is to test the variables for the unit root in order to determine the order of integration which either be zero I(0), one I(1) or higher order I(n). According to Gujarati (2004) the unit root test is a test ordered to test for trends in time series variables, that is, if the variables are stationary or non-stationary. Stationary mean a variable has a mean of zero and a constant variance over time, with the covariance that have an error term with the mean equal to zero. If a variable is non-stationary it has a unit root meaning there is a problem of spurious if the regression is to be estimated using the ordinary

least squares (OLS). Therefore, to correct for the unit root in variables, it must be differenced. The unit root test uses tests like Augmented Dicky-Fuller (ADF), Phillips Peron (PP) and many others. Equation three (3) above can be difference when:

$$\Delta ln\pi = \theta_0 + \theta_1 \Delta lnM2_t + \theta_2 \Delta lnGDP_t + \theta_3 \Delta lnLr_t + \theta_4 \Delta lnEx_t + \theta_5 \Delta lnIPI_t + U_t \quad \ldots 4$$

Where Δ denote difference, although a variable can be differenced once or more than once. A model specification for unit root test can also exclude both constant and trend or include constant without trend or include both constant and trend:

$\Delta y_t = \beta_2 y_{t-1} + U_t$ (No constant and no trend)
$\Delta y_t = \beta_0 + \beta_2 y_{t-1} + U_t$ (Constant)
$\Delta y_t = \beta_0 + \beta_1 t + \beta_2 y_{t-1} + U_t$ (Constant and trend)

Cointegration test

Cointegration mimics a long-run equilibrium among the variables. If Y_t and X_t are integrated by order one or two but their error term is integrated by order zero, Y_t and X_t are said to have a long-run relationship or equilibrium between them. If the U_t is I(0), the linear combination of the variables cancel out the stochastic trends in the two variables (Gujarati, 2004). There are numerous tests for cointegration but the Engle-Granger or residual based test to cointegration approach is appropriate for this modelling approach.

Error Correction Model

The presence of cointegration suggests a long-run relationship thus, the unit root test for U_t indicate that it is stationary without differencing. However, it is not indicated how the equilibrium is achieved, hence, there might be a disequilibrium in a short-term. Therefore, if variables have long-term equilibrium, the error U_t from equation four (4) was treated as an "equilibrium error" (Gujarati, 2004). Consequently, the error correction model (ECM) can be re-written from equation 4 as follows:

$$\Delta ln\pi_t = \theta_0 + \theta_1 \Delta lnM2_t + \theta_2 \Delta lnGDP_t + \theta_3 \Delta lnLr_t + \theta_4 \Delta lnEx_t + \theta_5 lnIPI_t + \theta_6 \Delta lnU_{t-1} + V_t \quad \ldots 5$$

Where U_{t-1} is the lagged value of the error from the long-run model and V_t is the white noise error (normally distributed with constant variance and zero mean) term at the ECM. In equation eight (5) $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5$ are short term coefficient, whereas θ_6 is a negative value and long run coefficient. It gives information about the speed at which a dependent variable adjusts towards its long run equilibrium level.

Data Sources

This study used quarterly data from period 1991Q1 to 2013Q4. The data was collected for the following variables: Inflation rate, Broad money supply, Lending rate, import price index, GDP and exchange rate Namibian dollar per United States dollar. Inflation rate, lending rate, GDP and exchange rate were collected from Bank of Namibia and money supply import price index was collected from World Bank. Details about methodology should be given in this section.

RESULTS
Unit root tests

The study applied the Augmented (ADF) and Phillips-Perron (PP) for unit roots tests. The ADF test was found to have the lower power and it tends to under-reject the null hypothesis

of unit roots (Lungu and Sheefeni, 2014). Therefore, the PP test is used as a confirmatory test.

Table 1: Unit root test for ADF and PP in Levels and First Difference

Variable	Model	Augmented Dickey Fuller Test (ADF)		Phillips Peron Test (PP)		Order of Integration
		Levels	First Difference	Levels	First Difference	
LNGDP	Intercept and Trend Intercept	-2.985 1.732	-4.394** -3.829**	-1.654 0.559	-5.413** -5.326**	1 1
LNIMPORTS	Intercept and Trend Intercept	-2.781 -0.174	-3.357** -3.327**	-2.307 0.101	-10.193** -10.198**	1 1
LNLR	Intercept and Trend Intercept	-3.340** -0.614	-3.130** -3.118**	-2.307 -0.616	-4.291** -4.307**	1 1
LNEX	Intercept and Trend Intercept	-2.373 -1.636	-3.023** -3.007**	-1.768 -1.360	-4.239** -4.238**	1 1
LNπ	Intercept and Trend Intercept	-3.660 -3.303	-4.127** -4.107**	-3.159 -2.349	-5.651** -5.727**	1 1
LNM2	Intercept and Trend Intercept	-2.275 -0.200	-2.654** -2.754**	-3.548 -2.030	-5.322** -5.375**	1 1

*Author's construct. Note: ** denotes the rejection of null hypothesis at 5 percent.*

Table 1 shows the result of the ADF and PP. The results reveal that all the variables were found to be integrated of order one. The results indicate that all six variables are non-stationary in levels and that the basic OLS cannot be directly applied.

Cointegration test

Upon finding out that the variables were integrated of order one I(1), the variables were further subjected to cointegration test. The residual was indeed found to be stationary in levels; hence, there is a presence of long-run relationship. This qualifies the use of an error correction modelling approach, in order to cater for the "disequilibrium error". .

Error correction model

The error correction model takes into account the two lags of each variable that include the independent variable. The lags are included to ensure the good performance of the model.

Table 2: The Error Correction Model

Variable	*Coefficient*	*t-Statistic*	*P-value*
C	*-0.0665*	*-2.1454*	*0.0354*
$\Delta ln\pi_{t-1}$	*0.4795*	*4.30761*	*0.0001*
$\Delta ln\pi_{t-2}$	*0.15936*	*1.38757*	*0.1697*

$\Delta lnGDP$	*7.01663*	*4.31454*	*0.0001*
$\Delta lnGDP_{t-1}$	*-3.9161*	*-1.9518*	*0.055*
$\Delta lnGDP_{t-2}$	*-1.3427*	*-0.766*	*0.4463*
$\Delta lnM2$	*1.67866*	*3.58008*	*0.0006*
$\Delta M2_{t-1}$	*-0.658*	*-1.1693*	*0.2463*
$\Delta lnM2_{t-2}$	*-0.122*	*-0.2578*	*0.7973*
$\Delta lnLr$	*1.87522*	*3.11689*	*0.0027*
$\Delta lnLr_{t-1}$	*-1.236*	*-1.6308*	*0.1074*
$\Delta lnLr_{t-2}$	*-0.2861*	*-0.4522*	*0.6526*
$\Delta lnEX$	*0.85738*	*2.12329*	*0.0373*
$\Delta lnEX_{t-1}$	*-0.4037*	*-0.8323*	*0.4081*
$\Delta lnlnEX_{t-2}$	*0.18061*	*0.42258*	*0.6739*
$\Delta lnIPI$	*-0.1554*	*-0.3074*	*0.7595*
$\Delta lnIPI_{t-1}$	*0.29314*	*0.50963*	*0.6119*
$\Delta lnIPI_{t-2}$	*0.00211*	*0.00429*	*0.9966*
ect_{t-1}	*-0.139*	*-3.1552*	*0.0024*

$R^2 = 0.651680$; $F - stats$ 7.275823 ;

The model clearly indicate that the gross domestic product have a big impact on inflation rate in Namibia than other chosen variable. The model shows that inflation increases by 0.47 percent for every one percent increase inflation in the previous quarter holding other factors constant. When gross domestic product rises by one percent inflation goes up by 7.01 percent holding other variable constant, while inflation rate will go up by 1.68 percent for every one percent increase in money supply ceteris paribus. Furthermore, inflation rate rises by 1.88 percent for every one percent decrease in lending rate, and for every one percent increase in exchange rate will rise the inflation by 0.86 percent, and a one percent increase in imports reduces inflation rate by 0.16 percent. The rate of is 13.9 percent that gives us the speed at which the error correction model correct for the dis-equilibrium in the model. This mean inflation rate adjust at the rate of 13.9 percent to reach its equilibrium and is attained every after a quarter.

In addition, the model above specifies that all variables are significant to the model of inflation rate expect the imports. The result shows that t statistics of variable import is less than the t critical values. Overall the model is significant since the f-value is greater than the critical value.

Furthermore, the model gives a negative relationship between imports and inflation rate in Namibia which oppose theory. However, the import lagged once indicates a positive relationship between inflation rate and imports but the effect is not significant. A positive value for imports lagged once demonstrates that the import of previous quarter explains the inflation rate for the current quarter which also goes with theory. All the other variables were found to be positive related to inflation rate. The result confirm the findings done by Likukela (2007) where a negative relationship was found between GDP and inflation, and Likukela's study also gave a positive relation between exchange rate and inflation. The study also match the result from Ogborkor and Sunde (2011) that found a positive relationship between inflation and a lagged value of inflation, a positive relationship between money supply and inflation, a positive relation imports and inflation, and a negative relationship between imports and inflation.

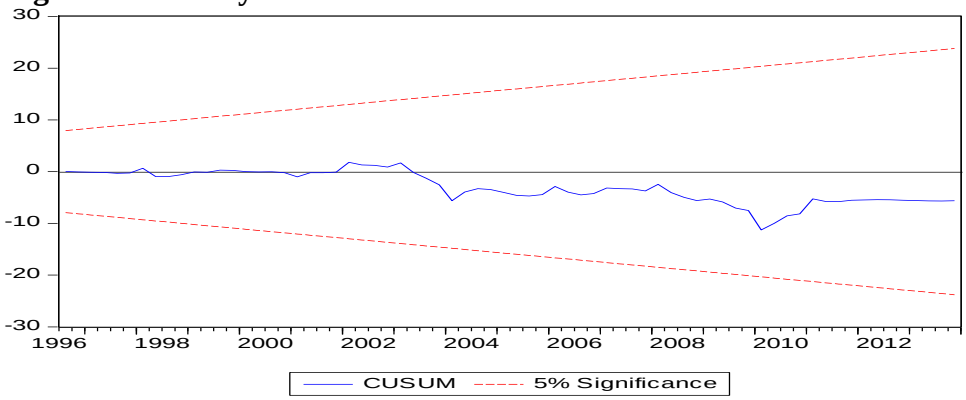
The diagnostics tests

Normality test: the null hypothesis of this test denotes that the model is normally distributed, while the alternative denotes that the model is not normally distributed. The result for the Jarque-Bera statistics is 47.64354 with the probability value of 0.000 and this leads us to reject the null hypothesis and conclude that the model is not normally distributed.

Serial Correlation LM test: the null hypothesis of this test denotes that the model does not suffer from autocorrelation, while the alternative denotes that the model suffers from autocorrelation. Using the Breusch-Godfrey Serial Correlation LM Test the result shows that the model does not suffer from autocorrelation sine the p-value of Obs*R-squared is 0.3180 which is more than five percent.

Heteroskedasticity test: the null hypothesis of this test denotes that the model is homoskedasticity, while the alternative denotes that the model is heteroskedasticity. Using the ARCH test the result shows that the model does suffer from heteroskedasticity because the p-value of Obs*R-squared is 0.7674 which is more than 5 percent.

Figure 1: Stability test



Source: Authors construct

Figure 1 shows that the model was also checked for model stability and using the CUSUM test the red line did not exceeds the best lines which indicate that the model is a good-fit.

CONCLUSIONS

The main purpose of this study was to determine whether imports have an impact on inflation in Namibia. The study employed the following econometrics techniques. The unit root test for testing the stationarity in variables, the cointegration test to test for the long run relationship between variables as well as the error correction model. These techniques were employed on quarterly data for the period 1991:Q1 to 2013:Q4. The findings are that imports in Namibia do not significantly affect the inflation in the short run. Furthermore, a positive relationship was found between inflation rate and the import lagged once that states inflation is positively affected by the imports of previous period, which is of previous quarter. But because of the insignificance of variable imports on inflation rate model, it can be concluded that the impact of imports in Namibia is not that important in explaining inflation in the short run but it is very important in the long run.

The less impact of imports on the model it is good enough to indicate that policy makers should focus more on other variable in short run but it is useful to consider imports effects on

inflation in the long run. However previous study done by Ogbokor and Sunde (2011) found a significant relationship in the short run. Namibia policy makers need to establish project development that will reduce the heavy dependence on imports to keep prices in Namibia stable. Some ways to do that is to encourage more investment into the economy in order to increase more production locally to reduce imports. The government can encourage more investment in small projects by increasing their investment through Small enterprise bank (SME bank).

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