ISSN: 2755-0214

Journal of Economics & Management Research

SCIENTIFIC Research and Community

Review Article

Open Access

The Correlation between Exchange Rates and Selected Types of Building Materials Prices in Namibia, 2016-2021

Milner Siboleka

Assistant Portfolio Manager & Economist at First Capital Namibia

ABSTRACT

Namibia is faced with low access levels to housing, a situation partly ascribed to costly building materials. As an open small economy which imports a significant share of its building materials requirements, the exchange rate remains key factor on the trend of end user prices. This paper analyzed bivariate relationships between the exchange rate and building material prices disaggregated in six categories of building materials namely: Brickwork materials; Roofing, doors & window materials; Plumbing materials; Electrical materials; Tilling & painting materials; and Total materials. The correlation coefficient results ranged from 0.4751 to 0.8990 with Tilling & Painting and brickwork materials having the lowest of all albeit generally still high correlation coefficient of 0.5 while Electrical and Plumbing materials have the highest correlation coefficients of 0.8990 and 0.7819 respectively. This paper interprets these results in line with composition of imports among these categories. Brickwork materials that have the lowest correlation coefficient alongside tilling and painting materials are predominantly produced locally while Electrical and plumbing materials with the highest correlation coefficients are predominantly imported.

***Corresponding author**

Milner Siboleka, Assistant Portfolio Manager & Economist at First Capital Namibia. E-mail: msiboleka8@gmail.com

Received: May 23, 2022; **Accepted:** May 30, 2022; **Published:** July 29, 2022

Keywords: Correlation Coefficient, Building Materials, Exchange rate

Introduction

Housing access and affordability had been at the center of policy making in Namibia given the low access levels largely explained by generally elevated prices of residential houses and by extension the cost to set up a dwelling structure. Affordability had always been a subject topic in debates of solving the Namibian housing challenges. In addition to other fundamental factors of house prices or building cost, the price of building materials which are inputs in the construction of a house are key considerable factors for house prices. In Namibia, the policy convergence to address the housing situation through accelerated land delivery has seen the mobilization of resources for land servicing and geographic area expansion of a number of local authorities in an effort to make more land available for housing development. Consequent to more land made available for housing, housing construction projects also scaled up. Most notably this contributed to the growth of the construction sector in addition to commercial and public sector constructions over the past years which was one of the key drivers of economic growth in the country over an extended period. The demand created by this cycle of increased housing delivery had an impact on the development of economic activities in cement production, sand mining and their entire value chain system of the construction industry. A significant shift was observed on import substitution of most building materials used in the housing construction value chain. Government policies were also supportive to this trend hence import restriction policies were enacted to promote local industries and financing was further channeled to these industries. In some areas local supply capacity was increased to respond to local demand most notably the cement supply which is estimated at 2.2 million tones relative to the local demand of 650 000 tons per annum [1].

Despite the increased supply of building materials from both local sources and stable international supply chains, a number of factors are essential when explaining domestic prices of building materials, among them the exchange rates which by extension affects the price of imports. Like many small open economies, Namibia imports a significant share of different goods for which a sizable share are inputs or intermediary goods used in the production of certain final products. Other than sand and largely cement requirements, a significant share of building materials are imported most notably plumbing, electrical, roofing and other related materials. Local industries of distribution warehouses or stores have been established in the country to manage the supply of materials for construction activities. A significant share of these building materials is imported. Even with materials that are locally produced like cement, other inputs used in the production value chain are imported notably the packaging supplies or plastics and other inputs used in the production process. Given the high share of domestic import on building materials, the exchange rates which ultimately affects the price at which these materials are imported remains a key function to explain the prevailing domestic building material prices. It is expected that the prevailing end user prices of building materials in the country have some sought of relationship with the exchange rate, given the high import bill of these materials. It is against this background that this paper was motivated to explore the statistical relationship between the exchange rate and the cost of building materials.

To estimate the statistical relationship between variables of interest, the paper uses the correlation coefficient approach by estimating the statistical linear relationship between variables using the Pearson's coefficients generally known as correlation coefficients. Using the correlation analysis, this paper seeks to

estimate the responsiveness of domestic retail prices of building materials to exchange rate movements. The paper used monthly time series data on domestic building materials prices from the First Capital Namibia's Building Cost Index publication of which the researcher is the lead author and the import prices from the Bank of Namibia. The import prices variable used is the nominal effective exchange rate indices that were retrieved from the central bank (Bank of Namibia) website. Time series data of the variables under study were imported in SPSS which was used to produce the graphical (scatter plots) and point estimate (coefficients) results.

Literature Review

No literature is traded on the subject matter relating to the relationship or responsiveness of domestic building materials to exchange rate movement in Namibia. Moreover, no literature was found in any topic that relates to explain the prices of local building materials or some modeling or estimation analysis of building materials prices. However, little literature is traded on the subject matter done on other countries, while an extensive international literature exist on the general exchange rate pass through to domestic prices. One of such literature on exchange rate pass through was done on Namibia by central bankers which this paper will also cover.

Exchange Rate Policy

To appreciate the findings in this research, it is vital to review the exchange rate policy of Namibia. Since 1993 (three years post-independence), when the local bank notes, Namibian dollar, were first issued, Namibia adopted a fixed exchange rate regime in which the country's currency, the Namibian dollar is pegged to the South African Rand (the anchor currency). This regime is managed under the Common Monetary Union in which Eswatini and Lesotho are equally members alongside Namibia and South Africa. Through this arrangement Namibia's domestic currency (Namibian Dollar) is linked to the ratio of one to one with the South African Rand [2]. This arrangement further provides for the South African rand to be a legal tender in Namibia.

Related Literature

In a series of literature reviewed, a paper published on the topic of estimating the correlation between building materials and the exchange rate in Nigeria covering a period from 2010 to 2020 was considered. In this paper aimed at establishing a statistical relationship between the exchange rate and building prices using correlation analysis in Nigeria, Ugochukwu et.el found strong positive correlation between the Naira exchange rate with the prices of selected building materials namely: cement (r =0.83), tiles(r =0.83) and reinforcement bars (r =0.99) [3]. These results shows that there a positive correlation trend between exchange rate and price of building materials in Nigeria. This trend is interpreted that domestic prices on building materials move in similar direction with that of the exchange rate. Worth noting of these findings is that the price of cement which is predominantly locally produced in this country has the least albert generally higher positive relationship with the exchange rate. Using the case of Nigeria, conclusion can be drawn from this paper that the Naira exchange rate is a key variable to consider when trying to understand the prevailing price movements or inflation of local building materials.

Other literatures included cover a broad relationship of exchange rate and headline inflation. One of such is specifically on Namibia. According to Mushendami & Namakalu, in their paper on the exchange rate path-through to inflation in Namibia, they found that there is a one-way directional relationship where domestic inflation as a dependent variable which is explained by the exchange rate, global oil prices and imported prices [4]. This means a causal relationship was confirmed in the results whereby the exchange rate among other control variables used have a causal effect on the prevailing domestic inflation in Namibia. Furthermore, the paper found that the elasticities of the pass-through effect of these variables on local prices were low. These results suggests that despite that there is statistical evidence of causation of the variables on local prices, the responsive elasticities are low a result explained by the strategy of pricing retail goods on the shelves. From this paper conclusion is drawn that the sensitivity or responsiveness of local inflation to exchange rate movements does exist albeit low meaning that retail shops look beyond what it costs them to import goods when setting up retail prices.

On the other hand, Jongrim H et el [5]. In the paper published through the World Bank on inflation and exchange rate path-through where a sample of 47 countries across various continents with varying income levels were considered in the study, they found that there is generally a relationship between exchange rate and domestic inflation levels. Generally, there is evidence of exchange rate pass-through to domestic inflation in these countries. However, the degree of the pass-through responsiveness is dependent on a number of factors namely: monetary policy framework, the nature of exchange rate shocks and trade policies among other factors. This paper re-affirms the broad-based evidence of a statistical relationship between domestic inflation and exchange rates. Furthermore, the paper finds that the institutional capacity of monetary policy management in the country and by extension monetary policy independence is a key factor to manage domestic underlying inflation in addition to external and domestic economic fundamentals.

Another literature is that of Aisen et el published through the International Monetary Fund (IMF) on the assessment of the exchange rate path-through in Mozambique [6]. The paper found the evidence of the exchange rate path-through to domestic inflation. On both their main bilateral exchange rates: the local currency (mazambiquean cetric) with the USD and the South African Rand (ZAR), the paper found evidence of path-through to local prices. This was similar with the Nominal Effective Exchange rate. The paper estimated that against the Mozambiquin cetric, a long run relationship exist and path-through elasticities are as follows: for every 10 percent increase in of the mozambiquen dedic against the USD, ZAR and NEER domestic prices will rise up by 5.3 percent, 2.96 percent and 4.2 percent respectively. These results re-emphasize the importance of exchange rate to inflation in Mozambique given its openness and size of the economy relative to the global economy.

Methodology

The variables used in this paper are as follows: For the exchange rates, the Nominal Effective Exchange rate (NEER) data from the central bank (Bank of Namibia) was used while for the variable of building prices the paper used the data from Fist Capital Building Materials Price Indices of which the author of this research is the lead researcher. The building materials prices used shows the end user prices or consumer prices at retail building materials shops covered from geographic representative sample of towns in the country. Monthly data was used covering the period from 2016 to 2021.

For completeness on building materials prices, purpose-specific categories of building materials were utilized as variables for which price indices on such categories were used in this study.

As such the following variables were used to represent building materials prices:
X1= Brickwork materials
X2 =Roofing, doors & window materials
X3=Plumbing materials
X4= Electrical materials
X5=Tilling & painting materials
X6=Total materials

To estimate the correlation coefficients, time series monthly data were analyzed using EViews following the following computational formular:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

such that r takes values between –1 and +1 *only* or $-1 \leq r \geq +1$.

The following framework of interpreting correlation coefficient results was applied to this paper:

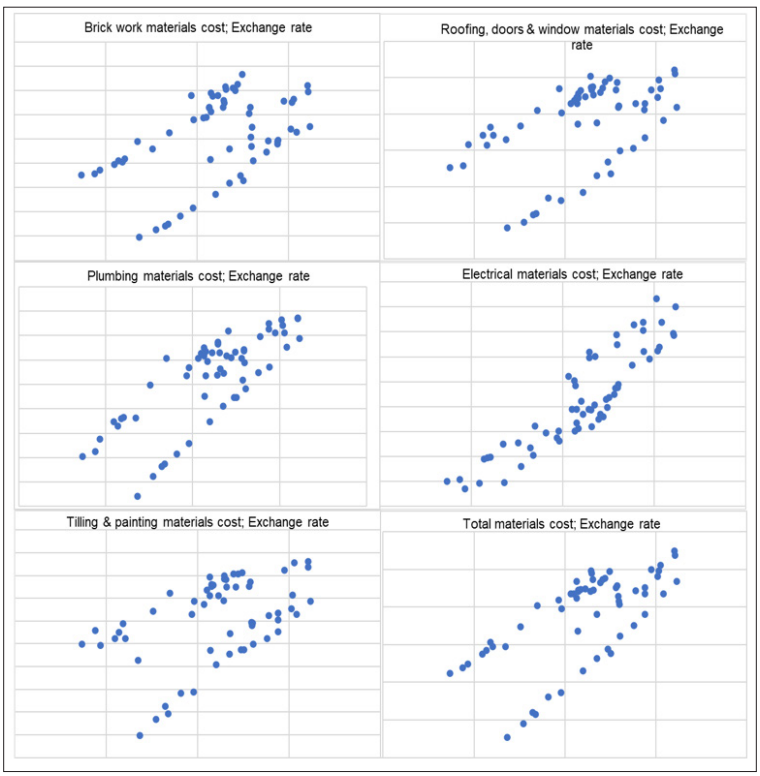
- -1 = Perfect negative correlation/Strong negative
- -0.1 to -0.4 = Weak negative correlation
- -0.5 to -0.79 = Strong negative correlation
- -0.80 to -0.99 = Very Strong Negative correlation
- 0= No correlation
- 0 to 0.4 = Weak positive correlation.
- 0.5 to 0.79 = Strong positive correlation
- 0.80 to 0.99 = Very Strong positive correlation
- 1 = Perfect positive correlation/Strong positive

Computation of the Pearson Correlation Coefficient

r = the sample Pearson's correlation coefficient
x = the values of the independent variable
y = the values of the dependent variable
n = the number of paired data points in the sample

Findings

The table below shows results of the correlation scatters plots of the variables. The scatter plots which show bivariate correlations use the exchange rate as one variable against the prices building materials categories. From these scatter plots it's evident that there are some thought of statistical relationship between various building materials categories with the exchange rate. These scatter diagrams are the basis for estimating the correlation coefficients that narrows this correlation to a statistic.



The following section presents the results of the correlation coefficients following the methodological model outlined in the methodology chapter earlier.

Corelation variables (X,Y)	Corelation coefficient, r
X Variable(Exchange rate) against Y Variables as follows:	
Brick work materials	0.4875
Roofing, doors & window materials	0.5097
Plumbing materials	0.7819
Electrical materials	0.8990
Tilling & Painting materials	0.4751
Total materials	0.6699

These results shows that exchange rate corelates highest with Electrical material prices (r= 0.8990) and Plumbing materials (r= 0.7819) while the lowest correlation among these materials categories is with Tilling and Painting material prices(r=0.4751) and Brickwork materials (r=0.4875). For all materials categories, there is a positive relationship with correlation coefficients ranging from 0.4751 to 0.8990 [7-13].

Conclusion and Policy Implications

The correlation results shows that all the building material categories prices are corelated to the exchange rate hence the correlation coefficients ranging from 0.4751 to 0.8990. The highest correlation coefficient is with Electrical material prices (r= 0.8990) and Plumbing materials (r=0.7819) while the lowest correlation among these building material categories is with Tilling and Painting material prices(r=0.4751) and Brickwork materials (r=0.4875). This paper interprets these results in line with composition of imports among these categories. Brickwork materials that have the lowest correlation coefficient alongside tilling and painting materials are predominantly produced locally while Electrical and plumbing materials with the highest correlation coefficients are predominantly imported. This could be a good explanation for these results as a trend is observed.

References

1. Siboleka M, Kavezuva C (2021) House Building Cost Index. First Capital 3:2021.
2. Bank of Namibia (2020) Namibia's Monetary Policy Framework. Windhoek.
3. Ugochukwu SC (2016) The correlation between foreign exchange rates and prices of building materials in Nigeria, 2011-2017. International Journal of Business & Management 5: 94-100.
4. Mushendami PL, Namakalu H (2016) Exchange rate path-through to inflation in Namibia. British Journal of Emerging issues in Economics, Finance & Banking 5: 1860-1873.
5. Jongrim H, Stocker MM, Yilmazkuday H (2019) Inflation and exchange rate pass-through. Policy Research Working Paper WPS 8780.
6. Aisen A, Manguinhane E, Simione FF (2021) An Imprirical Assessment of exchange rate pass-through in Mozambique. IMF Working Paper WP/20/132 2021: 34.
7. Dornbusch R (1987) Exchange Rates and Prices. American Economic Review 77: 93-106.
8. Gaomab II M (1998) Modelling Inflation in Namibia. Bank of Namibia. Windhoek.
9. Government of the Republic of Namibia (2012) Namibia's Fourth National Development Plan: 2012/13 to 2016/17. Windhoek: National Planning Commission.
10. Government Republic of Namibia (2009) Namibia National Housing Policy. Windhoek.
11. Government Republic of Namibia (2021) Second Harambee Prosperity Plan: 2012/13 to 2016/17. Windhoek: National Planning Commission.
12. Likukela M (2007) An econometrics analysis of the determinants of inflation in Namibia. University of Namibia.
13. Wegner T (1993) Applied Business Statistics: Methods and Applications. The Rustica Press.