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Effects of Systmatic Risk Factors on Profitability of Cassava Farming in Zanzibar

[1]Zuhura Mohammed Aballah and [2]Ali Mohammed Ali
[1]*P.O. Box 1349, Mkunazini, Zanzibar, Tanzania*
[2]*Zanzibar University, P.O. Box 2440, Zanzibar, Tanzania*

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Corresponding Author:
Zuhura Mohammed Aballah
P.O. Box 1349, Mkunazini, Zanzibar, Tanzania

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Abstract: Backbone of Zanzibar economy is farming. Farming contributes much in the form of profitability generated that is influenced by systematic risk factors. This study aim is to find the effect of systematic risk factors on profitability of cassava farming in Zanzibar. The sales margin is used to measure the profitability of cassava farming in Zanzibar while real GDP, inflation rate, lending interest rate and broad money are used as systematic risk factors. By using annual time series data from 1985-2016, Ordinary Least Square (OLS) method is employed in running regression. The finding of the study shows a significant negative effect of inflation rate, broad money and lending interest rate. Therefore, the government should closely monitor and prudently manage the systematic risk factors. Moreover, cassava producers should be aware of the changes in systematic risk factors.

INTRODUCTION

Agriculture is an important aspect of the economy that provides the basic ingredients to mankind and raw materials for industrialization, hence, increase wealth, improve standard of life and alleviate poverty. Agriculture is primarily engaged in growing crops such as cassava, feeding, breeding, raising livestock, processing, marketing and distribution of crops and livestock products. Agricultural producers are motivated to farm cassava product when they raise profitability when necessary income cover their costs and are enough for equity holders and assets within the specified period of time. It is very important for producers to consistently evaluate the profitability of their business in order to help them judge the results of business strategies and activities in objective monetary terms. Profitability is analysed by sales margin. A profitability of a business can be impacted with systematic risk factors. These factors are beyond the control of the producers. Among systematic risk factors are interest rates, GDP, unemployment rate, inflation rate and exchange rates (Muchiri, 2012).

Economy of Tanzania relies extensively on agriculture. Agriculture is the second dominant sector to contribute to national economy, representing 25.88% of GDP after services sector which is 44.30% of GDP. Moreover, 30% of export earnings and employment of 75% of the labour force are attributed to agriculture (Chongela, 2015). Recently, however, agricultural activity in Tanzania has registered a decreasing growth rate. According to Baunsgaard *et al*. (2016), the share of agriculture in total output of Tanzania declined from 47% in 1995-23% in 2014 in favour of higher value-added manufacturing and services. In 2016, agricultural activity in Tanzania increased at a growth rate of 0.3% which is <5.1% observed in 2015 and crop production recorded a negative growth rate of 2.9% in 2016 compared to a growth of 8.1% in 2015 (Anonymous, 2017a-j). Thus, reduces sales margin of farmers.

Agriculture in Zanzibar is also one of sources of economic development, Foreign exchange earnings, national income, poverty alleviation, employment, investment and supply of food. From 2000-2007, agriculture contributed 25% to the total GDP and >70% Foreign exchange earnings and 70% of the population depends directly or indirectly in the agriculture sector for their livelihood (Anonymous, 2001, 2009). In 2012, agriculture, forestry and fishing in Zanzibar were estimated to have contributed 30.2% of GDP; crops (18.9%), livestock (3.8%) forestry and hunting (0.3%) and fishing (7.1%). As of 2014, agriculture contributed 27.9% of GDP (Anonymous, 2015). Agricultural activity in Zanzibar in particular also registered a decreasing growth rate. For instance, in 2014, agriculture registered-0.4% while other major sectors such as industry and service registered positive growth rate (Anonymous, 2015). The reason for the decrease could be many but one of them can be economic factors such as inflation rate that keeps fluctuating. For example, inflation rate for the year ended December, 2016 increased to 3.0% compared to 2.3% recorded in November, 2016 (Anonymous, 2016).

Several factors are undoubtedly the reasons for falling of the production of cassava in Zanzibar which also indicate the unsatisfactory profit. Moreover, although, cassava is a major enterprise for farmers in Zanzibar and yet its production is decreasing, no studies have been thoroughly conducted that addresses factors affecting the profitability of cassava farming in Zanzibar. This area has been ignored by many researchers. As such, this study intends to examine the effect of systematic risk factors (i.e., real GDP, inflation rate, lending interest rate and broad money) on profitability (i.e., sales margin) of cassava farming in Zanzibar.

Literature review: This part presents empirical literature of systematic risk factors on profitability. Observed that among the serious challenges that farmers face is the lack of access to finance. Farmers need loans to modernize agriculture and improve production. But banks in developing countries including Tanzania are not willing to lend to farmers. They consider agriculture as a high risk business to lend.

Olukunle (2016) conducted a research on socio economic determinants and profitability of cassava production in Nigeria. The study found three significant determinants of net profit land area planted to cassava, man-days of labour used and marketing cost incurred by the farmer. Oluwatoyese *et al*. (2016) conducted study on macroeconomic factors and agricultural sector in Nigeria. The study used time series between 1981 and 2013, the study observed a long run significant relationship between the agricultural output and commercial bank loan on agriculture, interest rate and food import valve whereas exchange rate, unemployment rate and inflation rate were found to be insignificant. Kadir and Tunggal (2015) did study on the impact of macroeconomic variables toward agricultural productivity in Malaysia. The study used annually data between 1980 and 2014. The study found the significant impact of exchange on agricultural productivity in the long run and a significant impact of net export, government expenditure and inflation rate agricultural productivity in the short run.

Adegbite and Azeez (2015) also conducted study on the long run effect of interest rate and money supply on petroleum profit tax in Nigeria. The study found a negative impact of money supply on petroleum profit tax in Nigeria in the long run. Enu and Attah-Obeng (2013) conducted a study on impact of macroeconomic factors on agricultural production in Ghana. The result of the study indicates an inverse relationship between GDP and agricultural production. Enu and Attah-Obeng (2013) conducted study on macro factors that influence agricultural production in Ghana. The study period was from 1980-2011. Apart from inflation, the study found that labour force, real exchange rate and real GDP per capita were all statistically significant.

Moreover, Illo (2012) undertook a research on the effect of macroeconomic factors on financial performance of commercial banks in Kenya. The period of the study was on quarterly basis between June, 2002 and 2012. The finding of the study was that ROA was found to be positively correlated with GDP growth rate, money supply (M_3), lending interest rate of individual commercial banks and inflation and negatively correlated with exchange rate. Kargbo (2007) conducted a research on the effects of macroeconomic factors on South African agriculture. The study used an annual data between 1957 and 2004. The study found that real exchange rates, interest rates, inflation and money supply have significant and persistent impacts on agricultural output. Imahe and Alabi (2005) conducted study on the determinants of agricultural productivity in Nigeria. The finding of the study showed significant relationship between agricultural productivity and that arable land, per capita, average rainfall, fertilizer distribution, value of food imports, agriculture capital expenditure and the loans by commercial banks to agricultural sector. According to Kapinga *et al*. (2005), the current cassava productivity is declining and the constraints are prevalence of devastating pests/diseases, shortage of planting material; drought, poor soil fertility use of varieties with low genetic potential and low adoption rates of research recommendations, the low level of utilization of cassava and poor post-harvest handling techniques of cassava at farm level. Other constraints of cassava productivity are poor transportation, inadequate credit facilities and inadequate presence of processing machines.

MATERIALS AND METHODS

This study is a quantitative based research and that employ regression. The researcher used time series data from 1985-2016 on the variables to examine the effect of systematic risk factors on sales margin of cassava farming in Zanzibar. This study carried out in Zanzibar in particular in Unguja island-North A, North B and central because is the areas where a large number of farmers grow cassava. The study used secondary data. Secondary data on selling price and cost of production (which includes cost of production includes cultivation, planting and harvest cost, fertilizer cost, transportation cost, labour cost, handling cost, empty bag cost and sisal rope cost). It is collected from Kizimbani Research Institute in Zanzibar. Secondary data on real GDP was obtained from Central Intelligence Agency World Fact Book's website while inflation rate, lending interest rate and broad money was obtained from International Monetary Fund's website.

Model presentation: Ordinary Least Square (OLS) technique is used to examine the effect of systematic risk factors on profitability (Sales margin) of cassava farming. The method of OLS is extensively used in regression analysis primarily because it is initiatively appealing and mathematically much simple (Gujarati, 2005).

In order to avoid unreliable regression estimate econometric tests were conducted: unit root test using Augmented Dickey-Fuller (to test stationary in time series). The null hypothesis is rejected if p-value is less than a significance level of 5%, otherwise it will not be rejected. Multicollinearity test (to test whether high correlation between predictor variables exist) and autocorrelation test using Durbin-Watson test (to test whether the error term in one time period is correlated with the error term in any other time period). The study is also conducted unit root test in order to check whether the data is stationary.

Model specification: The study employed a regression OLS Model which is formulated as follows:

$$Y_t = \beta_o + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \varepsilon_t$$

where, Y_t represents sales margin at time t. The sales margin is an important indicator of the success of the business as it reveals the amount of profit generated from the sale of a product or service. The higher the sales margin the more profit potential that the business generates.

X_{1t} represents real Gross Domestic Product (GDP). GDP is the sum of gross value added by all resident producers in the economy plus any produce taxes less any subsidies not included in the value of the products without deducting the depreciation of fictitious assets or depletion of natural resources (See world development indicators). GDP growth is measured as the annual percentage growth rate of GDP at market prices based on constant local currency (i.e., 2000 per US dollar). It is expected to have a negative positive effect on profitability (sales margin) (Amadeo, 2017). GDP growth is included in the model because the higher GDP growth normally increases the economic activities of the country which increases selling price and profit.

X_{2t} represents an inflation rate at time t. Inflation rate is the rate at which prices in the economy are increasing and it can cause an increase in business expenses such as rent, utilities and cost of materials used in production. When the costs of materials are raised, the entire economy is affected and it is likely that business people raise prices on their products and services to keep pace with inflation and maintain profits.

X_{3t} represents a lending interest rate at time t. Lending interest is the amount the borrower pays for the use of money borrowed from the lender or financial institution (Crowley, 2007). Some small businesses rely on loans from banks or other financial institutions as a source of financing. A rise or fall in interest rates affects the business activities as well as the buying habits of the consumers (Hamel, 2017). Higher interest rates result in higher total business expenses for enterprises with debt. High interest rates can also reduce consumer spending because high rates make it more expensive for consumers to take out loans to buy materials, hence, result to low sales growth rate and profitability of an enterprises.

X_{4t} represents broad money at time t. Broad money is the sum of currency outside banks demand deposits other than those of the central government the time, savings and Foreign currency deposits of resident sectors other than the central government; bank and traveller's checks and other securities such as certificates of deposit and commercial paper. Increase in money supply reduce the interest rate and put more money in the hands of consumers. This in turn leads to an increase in consumer spending. In contrast, a decrease in the money supply leads to a decrease in consumer spending. β_o represents intercept of the regression model. ε_t represents error of the regression model. t represents annual time period from 1985-2016.

RESULTS AND DISCUSSION

This part interprets and discusses results. Before main analysis the study tests for unit root and find correlation among independent variables.

Table 1: Unit root test

	Probability of trend			Probability of first difference		
Series	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None
GDP	0.1032	0.1034	0.4595	0.0000	0.0000	0.0000
Inflation	0.5297	0.5951	0.0793	0.0004	0.0019	0.0000
Interest	0.7660	0.0841	0.3226	0.0006	0.0052	0.0000
Money	0.0877	0.0474	0.2033	0.0000	0.0000	0.0000
Sales margin	0.3126	0.4180	0.9528	0.0009	0.0014	0.0003

Table 2: Correlation

Variables	GDP	Inflation	Interest	Money	Net
GDP	1.000000	0.165252	0.098540	0.059659	-0.251525
Inflation	0.165252	1.000000	0.267180	0.033185	-0.408704
Interest	0.098540	0.267180	1.000000	0.205990	-0.636928
Money	0.059659	0.033185	0.205990	1.000000	-0.409495
Sales margin	-0.251525	-0.408704	-0.636928	-0.409495	1.000000

Table 3: Regression analysis

Variables	Coefficient	SE	t-statistic	Prob.
C	0.005404	0.003122	1.730607	0.0964*
GDP	-0.178364	0.166931	-1.068489	0.2959
Inflation	-0.118199	0.068478	-1.726084	0.0972*
Interest	-0.312893	0.089062	-3.513192	0.0018***
Money supply	-0.071672	0.033766	-2.122600	0.0443**
R^2	0.571549			
Adjusted R^2	0.500140			
SE of regression	0.016305			
Sum squared resid	0.006380			
F-statistic	8.003919			
Prob (F-statistic)	0.000301***			
Durbin-Watson stat	1.747248			

*Means at 10%, **Means at 5% and ***Means at 1%

Unit root test: Since, this study is a time series based research, unit root test must be done in order to see whether the data is stationary or non-stationary before running regression. For unit root test, ADF test is carried out to test on the stationary of dependent and independent variables. The result in Table 1 indicates that the p-value for each series in at least one of the three models is greater than a significance level of 5%, meaning that we cannot reject the null hypothesis. Therefore, all series are not stationary and we cannot use them to run regression. Instead what we do is to apply the first difference technique and test again to see whether the series are still non stationary. In order to reject the null hypothesis, the p-value shown in intercept, intercept and trend and none for each series should be <5% level of significance.

As indicated in the Table 1, the p-values for each series after first difference with all methods are <5%. Therefore, we reject the null hypothesis and accept the alternative hypothesis which indicate stationary of the series. As such, the data of first difference will be used in running regression.

Correlation: Existence of multicollinearity can be detected from Table 2. Multicollinearity test is used to test whether perfect or exact relationship between the predictor variables exists. However, the result displayed in the table does not indicate the existence of multicollinearity between predictor variables because the maximum correlation value that exists between the predictor variables is 20% (and that was between money and interest). Otherwise all other relations are below 20%.

Table 2 indicates that sales margin had a negative correlation with all variables (i.e., -0.252 with real GDP, 0.409 with inflation, -0.637 with lending rate and -0.409 with broad money). This means when real GDP or inflation rate or interest rate or broad money increases the sales margin will decrease and vice versa.

Effect of systematic risk factors on profitability of cassava: The results presented in Table 3 shows effects of all systematic risk factors on sales margin. All systematic risk factors have significant negative impact on net sales margin except GDP. A one unit increase in inflation rate will lead to 0.123199 units decrease in net margin a one unit increase in lending interest rate will lead to 0.312893 units decrease in net margin and a one unit increase in broad money growth rate will lead to 0.071672 units decrease in net margin. From all the systematic risk factors, interest rate had a strong significant effect on sales margin. An increase in interest rate could be advantage for commercial banks, since, they are the lenders. But for borrowers, especially, those who own small businesses like farmers, the rise in interest rate can significantly affect their business. People who own small businesses do not have access to finance because lending institutions charge them high rate and the time given for repayment is very short. As such, small business owners rely on equity fund. Bawuah *et al*. (2014) on the effect of interest rate on small enterprises using primary data observed that small businesses are disproportionately affected during periods of rising interest rates. High interest rates increases the cost of borrowing increases an incentive to save rather than spend increases the value of currency and affect both consumers and firms. The higher the interest rate, the more people are unwilling to borrow money in order to finance their business and make large equipment purchases due to the high cost of borrowing. This can create a significant effect of decreased spending throughout the economy and a situation where output and

productivity decrease. An inverse relationship of interest rate and economic growth has been covered in several studied. For example, the study of Mutinda (2014) established a strong negative relationship between interest rate and economic growth.

Both inflation rate and money supplys as displayed has slight but statistically significant and negative effect on sales margin of cassava. Inflation is the rate at which prices in the economy are increasing and it can cause an increase in business expenses such as rent, utilities and cost of materials used in production. When the costs of materials are raised, the entire economy is affected and it is likely that business people raise prices on their products and services to keep pace with inflation and maintain profits. One of the reason inflation rate increases is because of the increase in money supply. Mbongo *et al*. (2014) studied the effects of money supply on inflation in Tanzania. This study complies with Adegbite and Azeez (2015) and Enu and Attah-Obeng (2013) who found a negative impact of money supply on petroleum profit tax in Nigeria in the long run. The negative impact of inflation rate, money supply (M3) and interest rate on agricultural output was also established in the study of Kargbo (2007).

The study findings presented indicates R^2 adjusted of 0.5. This shows overall model is good. The result indicates a Durbin Watson of 1.747 that meet requirement of rule of thumb. A rule of thumb shows that normal value should range of 1.5-2.5 (Field, 2009). Therefore, since, in our case the value of Durbin Watson is 1.747, serial correlation is not of our concern.

CONCLUSION

The aim of this research is to analyse the effect of systematic risk factors on profitability of cassava in Zanzibar. The study exclusively evaluates the fluctuation of systematic risk factors and analyse the extent to which systematic risk factors affect the profitability of cassava in Zanzibar. The selected systematic risk factors in this research include real GDP, inflation rate, interest rate and broad money and profitability presented as sales margin. The study used annual time series data from 1985-2016. An Ordinary Least Square Model (OLS) is used to analyse the extent to which systematic risk factors affect the profitability of cassava farming in Zanzibar.

RECOMMENDATIONS

The finding of the study shows inflation, lending interest rate and broad money has negative significant effect on a sales margin, meaning that an increase in inflation rate, interest rate and broad money can lead to a decrease in sales margin. The government should closely monitor and prudently manage the macroeconomic variables. The government should reduce interest rates because when the lending interest rate is too high, access to finance is low to farmers. The Tanzania government should reduce money supply to the minimum amount to increase profit margin. The government should reduce inflation to reduce cost of production, hence, increase profit. The government of Tanzania to reduce inflation and money supply, it should impose tight monetary policies and expand the proportion of money in the economy from informal to formal transaction. Government should also initiate and provide exporting cassava incentives for farmers, so that, they produce more in order to increase external market.

The study also recommends that cassava producers in Zanzibar should be aware of the changes in macroeconomic variables in order to gain sufficient profit. They should also start to export casava instead of relying only in the local markets. Moreover, producers of cassava should export because increasing money supply and GDP does not increase demand of cassava instead reduce demand that reduce profit margin.

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