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Labour Productivity and Money Demand Behavior in Zanzibar

Mamudu Daffay[a]*, Salma Saleh Ali[b]

[a]*PhD. Lecturer, Faculty of Arts and Social Sciences', Department of Economics, Zanzibar University, P.O.Box 2440 Zanzibar, Tanzania*

[b]*Master Candidate, Zanzibar University, Department of Economic Statistics, Office of the Chief Government Statistician, Zanzibar, Tanzania*

[a]*Email: papaishmaeldaff@yahoo.com*

[b]*Email: salmaharassy@gmail.com*

Abstract

This study examines the relationship between labour productivity and money demand behaviour in Zanzibar. We estimate a model with a ARDL specification and bound test for the cointegration and the long run relationship. This paper also offers support to the explanation that if policy-makers are able to conduct proper monetary policies in a timely manner, they might necessarily influence labour productivity permanently following "well-understood" policy rules as the two variable have a positive relationship. Finally, our evidence also points out that causality relationship is from labour productivity to money demand.

Keywords: Autoregressive distributive lag; Error correction; Money demand; Labour Productivity.

1. Introduction

Studying Labour productivity performance is not only highly feasible but also highly important in developing countries where labour is 4.5 times more labour productivity outside of agriculture than in it. In general, Tanzania experienced growth in labour productivity and Total Factor Productivity for the whole period. Also Tanzania has demonstrated a slightly higher labour productivity growth than the Eastern Africa average, but it remains below the sub-Saharan Africa average.

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* Corresponding author.

Labour productivity is a revealing indicator of several economic indicators as it offers a dynamic measure of economic growth, competitiveness, and living standards within an economy [8]. Measurement of labour productivity provides us with sources of reference to benchmark productivity of organizations. Labour productivity is another indicator selected for assessing performance of the enterprises in Zanzibar. Although Total Factor Productivity (TFP) is a more robust indicator for this assessment, only labour productivity and capital input ratio are used here to indicatively gauge the efficiency of enterprises in Zanzibar [17]. Zanzibar's aim by the year 2020 was to improve labour productivity in order to push development. Specifically, emphasis placed on analysing and researching the optimal productive working hours, quality of services and goods, labour relations as well as labour efficiency with regard to community development (Zanzibar Research Agenda 2015 – 2020). Thus, Zanzibar vision 2020 in stimulating economic development has set goals and strategies which include promoting labour productivity through the use of modern technology, training and the use of experts to give on the job training in order to raise the level of growth and development [12]. The simple measure of labour productivity is output per worker. The advantage of this method is that it takes into account variations of number of hours worked per worker, rather than the numbers of employees, as the measure of labour input. Variations in the labour productivity can naturally make a great impact on national economy and productivity. Lack of safety, lack of skills, improper quality of materials, inadequate wages and communication barriers mainly raise the psychological stress levels of the workers hence limit their productivity. Central banks' primary target in economies is to maintain price stability and control money demand in the circulation and subsequently support economic growth, full employment and effective utilization of resources as result efficiency in labour productivity. Thus, the demand for money plays a major role in macroeconomic analysis, especially in selecting appropriate policy. If demand for money becomes elastic, increases in the money stock will fail to further lower interest rates and, therefore, fail to stimulate investments and economic activity, thus we pose a simple question in this paper: Does money demand behaviour have impacts on labour productivity which exist in Zanzibar? The demand for money in the economy as a whole is just the sum of all the individual demands for money by the people in the economy. Therefore, it depends on the overall level of transactions in the economy and on the interest rate. The overall level of transactions in the economy is hard to measure, but it is likely to be roughly proportional to nominal income. Money is demanded for different transactions, and the money demand is a function of prices, interest, and monetary base. But the money demanded for the transaction purposes is interest inelastic. The demand for money approaches are mainly divided into the following two approaches; The classical economists have given their views of demand for money. The money demand and velocity of circulation of money decides the price level and volume of transaction. If the price level is higher than volume of transaction effects, the stock of money and velocity of circulation declines. The equation is presented as follows; MV=PT.On the other hand, Cambridge approach stressed that the demand for money is decided by the price level and the actual holding of cash balances and nominal money. It can be defined as Md= KPY. It is this approach that was prescribed in this study.

2. Empirical models

Very many studies have been done in Tanzania about money demand and also on labour productivity. The empirical results from the studies in this area show inconclusive relationship between human capital and Money demand behaviour, including studies conducted in different countries in the world in general and for Tanzania

and Zanzibar in particular. Moreover, a handful of studies were focused on particular factors which have significant influences on productivity alone including; [6,3,5,16], while others studies focused on money demand separately including [4,10,15,1]. hence indicating that studies in this area can be divided into two categories, namely labour productivity centred and money demand centred. These studies did not relate labour productivity with the demand for money. therefore, our paper intends to determine the relationship on the subject matter of labour productivity and the money demand behaviour in the Zanzibar context. Effective labour is different from physical labour because the former is computed by considering labour quality whether by educational attainment, training attended or skill acquired. The speculative demand for money, helped this study to relate to component of the money demand and labour productivity, as it indicated that labour productivity depend positively on the level of money demand and other control variables used in this study. We depicted these relationships by simply employing the ARDL regression model. The study used ARDL model of regression analysis to investigate the influence of the independent variables on the dependent variable. The underlying objective is to determine whether Money Demand and other independent variable are significant determinant of the Zanzibar Labour Productivity. The adoption of the ARDL technique is preferable when dealing with variables that are integrated of different order, I(0), I(1) or combination of the both and, robust when there is a single long run relationship between the underlying variables in a small sample size [11]. The major advantage of this approach lies in its identification of the co-integrating vectors where there are multiple co-integrating vectors. The long run relationship of the underlying variables is detected through the F-statistic (Wald test). In this approach, long run relationship of the series is said to be established when the F-statistic exceeds the critical value band. The ARDL is more efficient when the sample size is small and finite as it will obtain unbiased long run estimates. The general form of the ARDL (p , q) model is specified as follows;

$$Y_t = \gamma_{0i} + \sum_{i=1}^{p} \delta_i Y_{t-i} + \sum_{i=0}^{q} \omega_i X_{t-i} + \varepsilon_{it} \qquad (1)$$

$Where: Y_t$ *is a vector and the variable in* (X_t) *are allowed be purely* $I(0)$ *or* $I(1)$ *or cointegrated;*

the δ *and* ω *are coefficients;* γ *is the constant;* $i = 1,2, \ldots\ldots k; p, q$ *are optimal lag orders;*

ε_{it}*is a vector of the error term* $-$ *unobserved zero mean white noice vector process series*

The bounds test for cointegration was performed on the conditional ARDL (p , q_1 q_2 q_3 q_4) model with five variables, ARDL model was therefore formulated as:

$$\begin{aligned}\Delta\left(\ln lpr_t\right) = {} & \beta_{01} + \beta_{11} \ln mdb_{t-1} + \beta_{21} \ln exr_{t-1} + \beta_{31} \ln \inf_{t-1} + \beta_{41} \ln ngdp_{t-1} \\ & + \sum_{i=1}^{p} \alpha_{1i} \Delta\left(\ln lpr_{t-1}\right) + \sum_{i=1}^{q} \alpha_{2i} \Delta\left(\ln mdb_{t-1}\right) + \sum_{i=1}^{q} \alpha_{3i} \Delta\left(\ln exr_{t-1}\right) \\ & + \sum_{i=1}^{q} \alpha_{4i} \Delta\left(\ln \inf_{t-1}\right) + \sum_{i=1}^{q} \alpha_{5i} \Delta\left(\ln ngdp_{t-1}\right) + \varepsilon_{1t}\end{aligned} \qquad (2)$$

3. Analysis

The quarterly data used in our study are published data for the period of twenty years (2000-2019) and are provided by the Bank of Tanzania Economic bulletin, Office of Chief Government Statistician-Zanzibar and Ministry of Labour, Empowerment, Elders, Women and Children of the Revolutionary Government of Zanzibar. The data series for the money demand and labour productivity were calculated for used in the study. Labour productivity was calculated by taking the ratio of nominal GDP to the number of employed persons, while for the money demand, we use the product of the National income (which was proxy by the nominal GDP) and the short term lending interest rate. There was the need to know the underlying process that generates our time series variables, since Non-stationary variables might lead to spurious regressions. Furthermore, the causality between dependent variable and independent variables were examined using Granger causality test. But before we could pre-diagnose the variables, visual observation of the data shows that the key variables exhibit a similar trend as indicated in figure one.

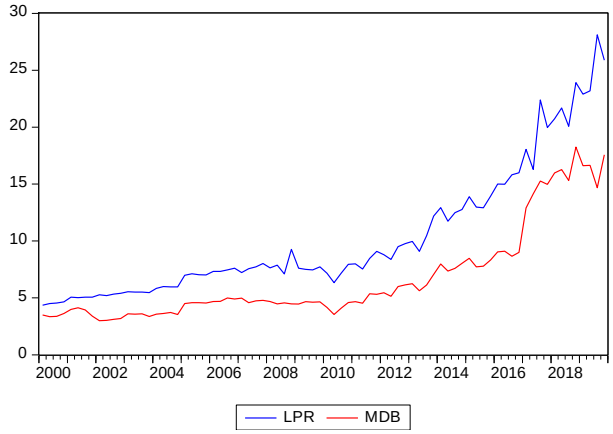

Figure 1: first picture

The growth trend in Money demand and labour productivity in Zanzibar have a similar pattern, this means that these two variables have generally been increasing, particularly since 2010. Running a regression while some factors in the model are non-stationary is likely to lead to spurious regression and inconsistent results and therefore inferences based on such data are likely to be meaningless. Due to such concern, the variables in the models were tested using Phillips-Perron unit roots test (a generalization of the Augmented Dickey-Fuller (ADF) procedure). And the results obtained are presented in the table below;

From the table, it was clear that though Inflation was stationary at level, the rest of the variables only became stationary after taking first difference. Having established that there were variables which were of orders I (0) and I (I), what follows was confirmation of whether there is an existence of a cointegrating relationship between the dependent and the explanatory variables. Therefore, ARDL (bounds test approach to co-integration) was utilized in this study. We do not use the Johansson cointegration test because the variables were integrated at different orders. Hence the bound test proposed by [13].

Table 1: Phillip-perron unit root test

unit root test					
Variables	level		first difference		order of integration
	coefficients	p value	coefficients	p value	
Exchange rate	-0.082621	0.9470	-9.902059	0.0000	I(1)
Inflation	-3.470007	0.0114	-5.811114	0.0000	I(0)
Labour productivity	4.704638	1.0000	-15.19328	0.0001	I(1)
Money Demand	1.022643	0.9965	-9.669973	0.0000	I(1)
Nom. GDP	2.523373	1.0000	-11.54670	0.0001	I(1)

From the bound test results, if cointegration is confirm, both the short and long run (ARDL and VECM) model should be specified. If the series are cointegrated, it implies that there is a long run relationship. if that is the case, such series can be combined in a linear fashion because, if there are shocks in the short run which might affect movement in the individual series, in the long run their will be convergence; hence the need to estimate both the short and long run model (ARDL and VECM). The result of the ARDL model is presented in the table below.

Table 2: Short run model

Method: ARDL

Selected Model: ARDL(1, 0, 0, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(LPR(-1))	0.065761	0.085559	0.768598	0.4447
LOG(MDB)	0.125463	0.063448	1.977421	0.0519
LOG(EXR)	-0.034230	0.082807	-0.413375	0.6806
LOG(INF)	-0.023325	0.020119	-1.159321	0.2503
LOG(INF(-1))	0.035986	0.029175	1.233439	0.2215
LOG(INF(-2))	-0.045175	0.020395	-2.214982	0.0300
LOG(NGDP)	0.788909	0.113153	6.972059	0.0000
C	-7.967256	0.974479	-8.175913	0.0000

*Note: p-values and any subsequent tests do not account for model selection.

From the output of the ARDL test, we develop the bound test in order to determine whether there is cointegration. The null and alternative hypothesis of the bound test state that:

H_o : There is no cointegration between the variables

H_1 : H_0 is not true

The result of the test is presented below;

Table 3: Bound test for co-integration

ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.229454	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

The bound test for co-integration revealed that labour productivity and the regressors in the model have a long-run relationship since they were co-integrated. Therefore, VECM model was utilized for the long-run parameters estimates of the model. The estimates long run was specify as follows;

$$\begin{aligned}\Delta\left(\ln lpr_t\right) &= \beta_{01} + \beta_{11}\ln mdb_{t-1} + \beta_{21}\ln exr_{t-1} + \beta_{31}\ln \inf_{t-1} + \beta_{41}\ln ngdp_{t-1} \\ &+ \sum_{i=1}^{p}\alpha_{1i}\Delta\left(\ln lpr_{t-1}\right) + \sum_{i=1}^{q}\alpha_{2i}\Delta\left(\ln mdb_{t-1}\right) + \sum_{i=1}^{q}\alpha_{3i}\Delta\left(\ln exr_{t-1}\right) \\ &+ \sum_{i=1}^{q}\alpha_{4i}\Delta\left(\ln \inf_{t-1}\right) + \sum_{i=1}^{q}\alpha_{5i}\Delta\left(\ln ngdp_{t-1}\right) + \lambda ECT_{t-1} + \varepsilon_{1t}\end{aligned} \quad (3)$$

The results of the model estimation are presented in the following table;

From the estimation, it is reveal that the speed of adjustment is negative and significant. Indicating that the series can be combined in a linear fashion because, if there are shocks in the short run which might affect movement in the individual series, in the long run their will be convergence. Our findings supported that of [5], by demonstrating a long-term relationship between all variables though the direction of this relationship in the long-term was determined towards labour productivity. Furthermore, the long run coefficient suggests that money demand and nominal GDP have a positive and significant influence on labour productivity, while inflation and exchange rate both have a negative influence on labour productivity, though inflation had

significant influence while exchange rate had insignificant influence. this paper support the argument by [18], that inflation has an effect on labour productivity, suggesting that policy makers targeting inflation should follow labour productivity. like in [7], we indicated that exchange rate appreciation had a negative effect on labour productivity.

Table 4: Cointegrating and long run model

ARDL Cointegrating And Long Run Form
Dependent Variable: LOG(LPR)
Selected Model: ARDL(1, 0, 0, 2, 0)

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(MDB)	0.023373	0.115434	0.202478	0.8401
DLOG(EXR)	0.042788	0.168409	0.254072	0.8002
DLOG(INF)	-0.018199	0.018845	-0.965730	0.3375
DLOG(INF(-1))	0.046147	0.018360	2.513481	0.0143
DLOG(NGDP)	0.872273	0.164552	5.300907	0.0000
C	-8.686545	0.998009	-8.703870	0.0000
CointEq(-1)	-1.018474	0.116903	-8.712103	0.0000

Cointeq = LOG(LPR) - (0.1343*LOG(MDB) -0.0366*LOG(EXR) -0.0348*LOG(INF) + 0.8444*LOG(NGDP))

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MDB)	0.134294	0.066431	2.021548	0.0470
LOG(EXR)	-0.036640	0.089059	-0.411412	0.6820
LOG(INF)	-0.034803	0.014259	-2.440815	0.0172
LOG(NGDP)	0.844440	0.102098	8.270889	0.0000

The Granger-Causality test is conducted in order to examine whether one determinant variable is useful in forecasting short-run relationship with other variables. we perform the Granger-Causality test in order to find out the existence of causality linkage among the variables in the study. Our result reveals a unidirectional causality running from labour productivity to money demand. Moreover, supporting [10], [9], our results revealed that exchange rate have short-run impacts on money demand running from exchange rate to money demand. We also identify a unidirectional causality running from exchange rate to labour productivity and nominal GDP and from nominal GDP to money demand. We also identify a bidirectional causality between

labour productivity and nominal GDP.

Table 5: Pairwise Granger Causality

Pairwise Granger Causality Tests Sample: 2000Q1 2019Q4 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LPR does not Granger Cause EXR	78	0.29699	0.7439
EXR does not Granger Cause LPR		2.91705	0.0604
MDB does not Granger Cause EXR	78	0.33884	0.7137
EXR does not Granger Cause MDB		4.84573	0.0106
NGDP does not Granger Cause EXR	78	0.74169	0.4799
EXR does not Granger Cause NGDP		4.00690	0.0223
MDB does not Granger Cause LPR	78	1.51867	0.2258
LPR does not Granger Cause MDB		6.06627	0.0037
NGDP does not Granger Cause LPR	78	3.54014	0.0341
LPR does not Granger Cause NGDP		4.54678	0.0138
NGDP does not Granger Cause MDB	78	6.58266	0.0024
MDB does not Granger Cause NGDP		0.05413	0.9473

4. Suggestions and Conclusion

Economists have long suspected that money demand and labour productivity are tightly linked. Economic theory offers a useful toolkit for analysing the relationship between labour productivity and money demand. In a simple economic model, the relationship between labour productivity growth and increase money demand behaviour with the growth of product wages is mediated by changes in the share of national income going to labour. The results presented in this paper support this position. In fact, stability of money demand is prerequisite for any policy-driven change in monetary variables to have predictable effect on labour productivity [2]. Moreover, the ARDL - VECM model, which captures short-run and long run dynamics of labour productivity as a dependent variable indicated a positive and significant relationship in the long run. From our findings, it was evidence that a 1% rise in people's desire to hold money will result in a 0.13% rise in their productivity; As we demand more money to pay for labour, the request for workers to be more productive will grow loud and it will lead to more products being produced, this in turn leads to increase in the transaction in the

economy and definitely increases in the Nominal GDP. We observed that a rise in nominal GDP by 1% could in fact trigger a 0.84% more productivity, while a 1% rise in inflation or exchange rate both have a 0.03% adverse effect on productivity. In Zanzibar, Key results area B in which projects and programmes implemented focused at creating a strong human resource base with the right knowledge skills, attitudes and values, all of which enhance productivity and competitiveness, was the highest prioritized project in the long term period by Zanzibar poverty reduction plan, Zanzibar strategy for growth and reduction of poverty I to III. Hence there was massive rise in labour productivity and money demand between 2016 to 2018 in Zanzibar, which might be attributed to huge construction projects. Such as new public offices (Office of Chief Government Statistician, Zanzibar Utility Regulatory Authority and Ministry of Land, "Michenzani" Mall, "Mapinduzi" Square), new school buildings and hospitals, airport terminal 3 and so on [14]. We observed that the contributions of the independent variables to labour productivity are small; less than a percent. We suggest therefore, an investigation using human capital, believing that labour productivity will be increased if there is adequate skills and knowledge, advanced technology and so on, as it impacts on an economy will be tremendous, pushing workers to ask for more wages, hence the money demand increases and eventually labour productivity will rise.

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