Currency in circulation in Malawi

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1. Introduction

Currency in circulation (CU) refers to notes and coins held outside banks and is the most liquid monetary aggregate. Currency in circulation, together with demand deposits is a component of narrow money, movements of which are of interest to policy makers. CU dynamics are often considered as an indicator for monetization or demonetization of the economy. Two most relevant indicators showing the relative significance of CU in any economy are (1) share of CU in money supply and (2) ratio of CU to nominal gross domestic product, (Stavreski, 1998). For Malawi, these two indicators show high degree of cash utilization, not only compared to developed countries but also compared to other countries in the region (see Table 1). Therefore, the significance of CU in Malawi is highly pronounced compared to these other economies, a factor that calls for the need to closely monitor its trend. In other words, CU is more of an early indicator of the volume of transactions, future consumption and consequently the expected price dynamics in Malawi compared to those countries whose CU share in the overall money stock is low. Furthermore, there are other issues of concern for policy makers that may arise due to variations in currency in circulation. First, an increase in CU implies a decline in deposits and consequently a decrease in the availability of loanable funds for investment, which is crucial for general economic growth. Second, a boom in CU signals a red alarm as it stipulates inflationary pressures.

Motivation of this paper emanates from the observation that in the recent years, there has been a significant rise in currency in circulation, which poses an agent need to establish its main causes. The purpose of this study is therefore twofold. First, to establish the claim that currency in circulation has been rising. Second, to empirically quantify and give a full account of the reasons determining the dynamics and volatility of currency in circulation. Using annual data for the 1965-2004 period, this paper confirms that currency in circulation as a proportion of money stock has increased. From the initial estimation results, the paper establishes strong positive effects of inflation rate, underground economy activities, financial deepening on the CU/M2 ratio, and significant negative effect of interest rates on this ratio. The other highlight result from this study is the positive and significant association between small-scale agriculture produce and CU/M2 ratio.

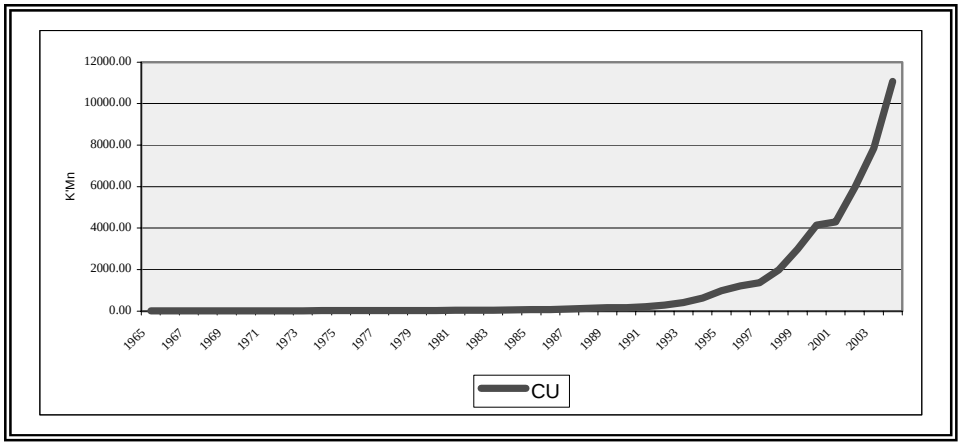
The rest of the paper is organised as follows. The next section shows major trends of currency in circulation in Malawi. In particular, we show whether the increase in currency in circulation really reflects a shift in demand or preference of holding cash relative to bank deposits. Section 3 presents in brief the literature review, where theoretical underpinnings of the estimated model and expected results are discussed. In section 4, we develop a standard currency demand model, while section 5 describes the time series

characteristics of the data used in the estimation exercise. Section 6 presents estimation results while section 7 concludes the paper, and put on offer some policy implications.

2. Behaviour of currency in circulation.

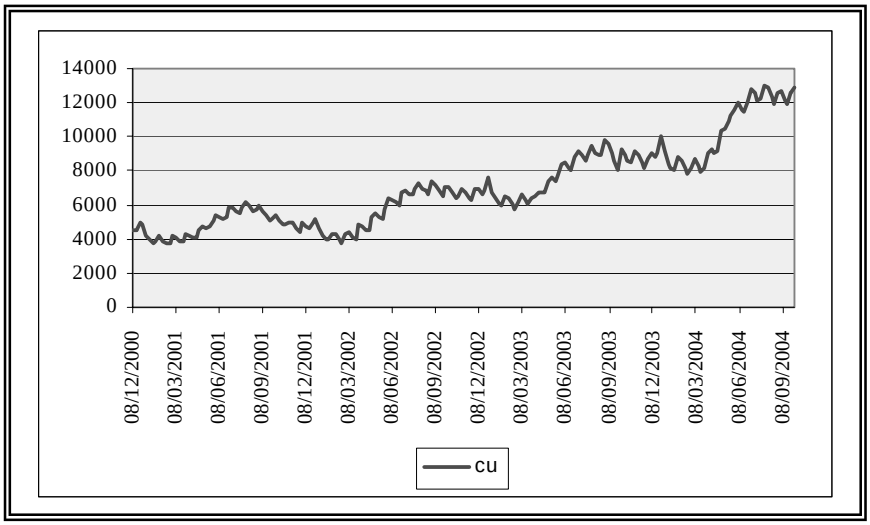
On an annual basis, currency outside banks (CU) has followed a geometric growth path as in Figure 1. This could be a mere reflection of the nominal economic growth and growth in other parameters such as the population.

Figure 1: Currency outside banks



However, the behaviour of currency in circulation becomes more fascinating if seen on a weekly, monthly as well as on a quarterly basis. Using weekly data from 8th of December 2000 to 1st October, 2004, Figure 2 below reveals that CU has followed a clear upward trend that mainly reflects the general expansion of economic activity in nominal terms.

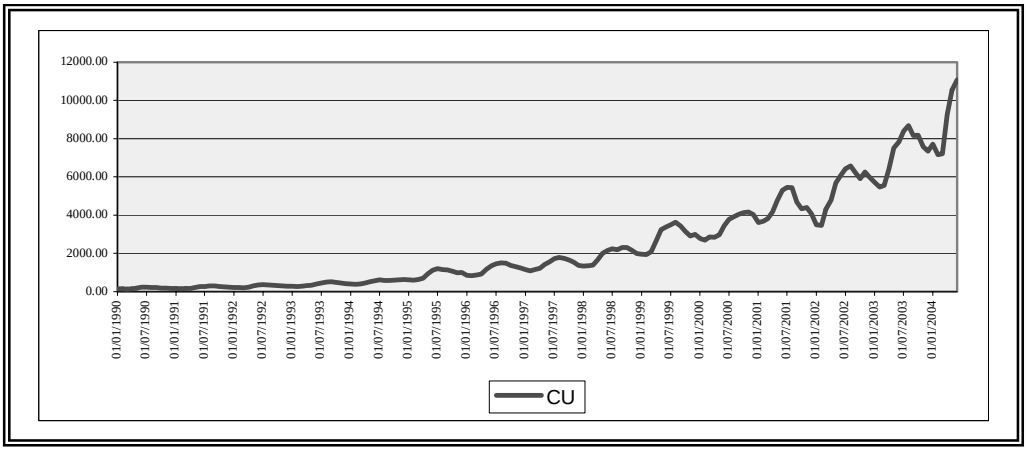
Figure 2: Weekly dynamics of Currency in circulation



There are, however, some pre-determined seasonal patterns in CU time series. First, the most marked seasonal pattern coincides with the tobacco-selling season (mid March to mid September) each year during which CU increases. Tobacco proceeds and agro-incomes of post harvesting and marketing season tend to bolster the demand for currency. Secondly, it is observed that the amount of currency outside banks increases during last (4^{th}) and first (1^{st}) weeks of the month as a result of salary payments. Thirdly, the amount of currency in circulation also seems to rise towards the end of the year, particularly around Christmas period when transaction demand for cash rises coupled with a number of Christmas related payments by employers (e.g. RBM Christmas bonuses).

Graphical representation of the behaviour of currency in circulation on a monthly basis also reveals some seasonal pattern, though slightly obscured as in Figure 3 below. A similar pattern is clear even using quarterly data. Clearly, the tobacco selling season and Christmas effects are evident.

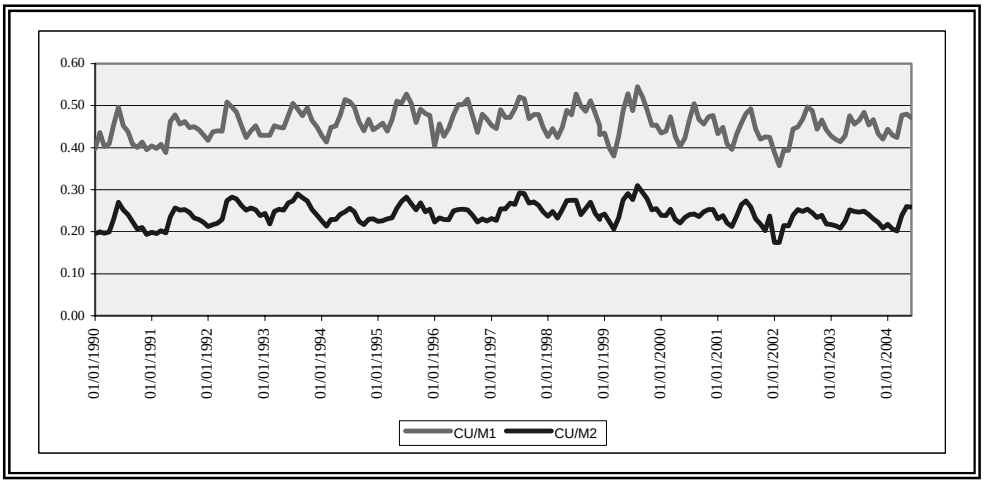
Figure 3: Monthly dynamics of Currency in circulation



However, in order to establish if the increase in currency really reflects a shift in demand or preference for holding cash relative to bank deposits, we need to look at CU/Money supply ratio. If this ratio is increasing, it implies that indeed the public has shifted its preference for cash. In other words, a progressively growing share of currency in circulation in M1 or M2 is an indicator of increased demand for banknotes and coins. We present the trend of CU/Money stock ratio on monthly and annual basis because the two may

have two different interpretations.[1] Figure 4 shows the trend in CU/M1 and CU/M2 ratios on a monthly basis from January 1990 to October 2004.

Figure 4: Currency outside banks as a proportion of narrow and broad money (monthly)

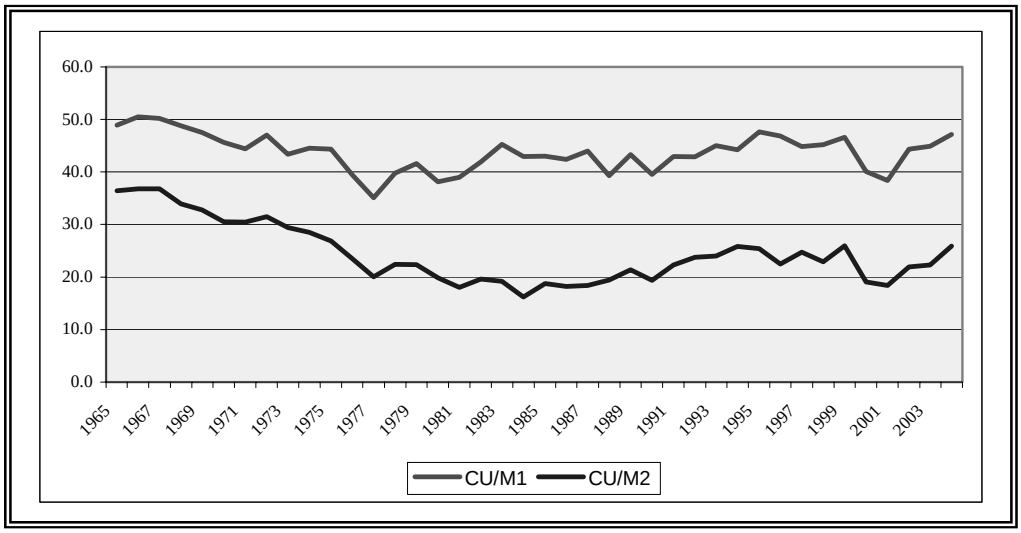


As shown here, it is almost proper to say that for this period, the share of currency in circulation in the overall money stock has remained relatively constant, however with substantial volatility that looks seasonal. With this claim, it is further proper to believe that the recent increase in this ratio (far right end of the graph) is just seasonal and is most likely to turn around in the immediate future, in which case, there is no cause for policy concern. On annual basis, however, the hypothesis that currency in circulation as a share

[1] Monthly and quarterly CU/Money stock series were almost identical and only one is, therefore, presented.

of total money stock is on the rise is much more vindicated as presented in Figure 5 for the 1965-2004 period.

Figure 5: Currency outside banks as a proportion of narrow and broad money (annual)



In general the ratio followed a declining trend during the 1965-1985 period. This can be explained by the financial system deepening following the opening of banks and branches across the country. From 1992 to 2000, the ratio seems to have risen and stayed high before dropping again in 2001. We attribute the 2001 drop to the 2000/01 drought. It is, however, evident from this graph that CU/M1 or CU/M2 ratio has been rising persistently since 2002. This indeed could be the source of concern and claim that currency in

circulation is rising, showing the shift in preference for cash relative to other monetary assets.

3. Literature review

Literature from both developed and developing countries has it that currency in circulation is a function of a number of things among which interest rate stands out prominently. Cabrero *et al.,* (2002) modelled the daily series of banknotes in circulation in the context of the liquidity management of the Euro system and confirmed the importance of interest rates as a determinant of CU. In simple terms, interest rate represents the opportunity cost of holding cash, and therefore, the higher the interest the lower the level of currency in circulation. In his study of currency in circulation in Macedonia, Stavreski (1998) also pointed out that the low opportunity cost for holding wealth in a form of cash, which is a result of low nominal interest rates on demand deposits is one cause of the high level of CU. He reports that "… due to inflation in the past, savers in Macedonia are used to high interest rates, so that current demand deposits are considered as unattractive and non-worthwhile form of holding money in commercial banks…"(page 10). With low demand deposit interest rates, the lost income of invested assets in form of cash instead of a bank account is relatively low in terms of advantages obtained from working with cash, such as high degree of liquidity.

Among other factors that included interest rates (as yield of non-cash financial assets), Nenovsky and Hristov (2000) also hypothesised real sector development (GDP growth) as a determinant of CU. As peoples' incomes increase in nominal terms, CU is expected to rise. Their study also revealed that one motive of demand for CU is economic agents' willingness to save or hoard in cash. They distinguished two forms of hoarding, one associated with the official economy and the other associated with the underground economy. Under the first form, the general public decides to voluntarily hoard a portion of their cash when income on alternative assets is smaller than transactions costs on portfolio transformation. Both Nenovsky and Hristov (2000) and Stavreski (1998) also agree on hoarding cash for servicing economic activity in the underground economy. Cash is the most suitable means of payment that leads to no trace when economic agents are trying to hide part of their activities in order to reduce tax base, and cash offers maximum degree of anonymity, which makes it an attractive form of financing illegal activities.

The under developed nature of the banking system and the insufficient development of non-cash payment instruments such as credit cards, debit cards and ATM cards have also been cited as causes of high cash utilisation in some countries, [Cassino *et al.*, (1997); Stavreski (1998)]. Electronic means of payment such as smart cards are stored value cards, which record an amount of credit and the amount spent using up that credit. These are

therefore, designed to replace small cash transactions, and therefore, are expected to reduce CU. It is therefore, expected that within the next few years the rising trend of CU in many countries will level off, and eventually decline as smart cards become widely used. On the use of ATMs, however, the picture is rather unclear. One would expect wider use of ATMs to result into a reduction of the demand for currency, as it makes moving with cash unnecessary. However, the other theory argues that ATMs have made cash more accessible, such that many transactions that were previously made by cheque (because cash was not readily available e.g. on weekends) can now be made by cash. Furthermore, the cost of carrying out many bank transactions, i.e. the bank transaction charges may create an incentive for customers to make small payment by cash to avoid these charges, and probably have also encouraged customers to make fewer but larger cash withdrawals, Cassino *et al.*, (1997, p27). Both these tendencies would increase the amount of currency demanded. It is therefore, not clear in literature whether the overall demand for cash will increase or decrease with the recent technological innovations. This is one contentious issue tested in this study.

4. Model Specification

The model estimated in this study follows a standard demand for money model that includes the traditional variables such as the real interest rates,

GDP growth, inflation and a measure of financial deepening. Rather than using the nominal value of CU as the dependent variable, we use the CU/Money stock ratio, which as pointed out earlier is a better indicator of whether there is a real shift in demand for currency, relative to other monetary aggregates. Apart from the traditional variables in the demand for currency models as mentioned above, the model also includes a proxy or an indicator of the underground economy, ATM transactions, the MALSWITCH card, an indicator of smallholder agriculture produce and a dummy variable for election years.

The importance and structure of the agricultural production is one other factor that needs consideration as one of the determining factors of currency in circulation. Agriculture is the mainstay of the economy and its share in the overall GDP is far much higher than for other countries in the region. It has been ascertained that significant amount of the agricultural produce belongs to products that are sold and paid in cash (fruits, cassava, vegetables, groundnuts etc). This requires high usage of cash compared to say production in other sectors that can be completely bought and paid in large quantities, through transferring money on the accounts of producers and consumers using cheques or electronic payment systems. Therefore, the increase in agricultural produce, especially the small-scale agriculture as a share in GDP may cause high usage of cash. This and all other factors mentioned here are

empirically tested using data covering the 1965-2004 period. However, due to data limitations, some of these factors are used in annual data based estimations only, while other factors are tested using both annual and monthly data. The general model estimated here takes the form

$$c = c(Y, r, m, u, T, s, D) \tag{1}$$

with the following expectations

$\frac{\partial c}{\partial Y} \geq 0$, $\frac{\partial c}{\partial r} \leq 0$, $\frac{\partial c}{\partial m} \geq 0$, $\frac{\partial c}{\partial u} \geq 0$, $\frac{\partial c}{\partial T} \leq \geq 0$, $\frac{\partial c}{\partial s} \geq 0$ and $\frac{\partial c}{\partial D} \geq 0$

where c = CU/Money stock ratio

Y = nominal GDP growth rate

r = the opportunity cost of holding cash (real and nominal)

m = financial deepening

u = indicator for the underground economy

T = vector of ATM and Smart card technology

s = smallholder agriculture as a proportion of agriculture production

D = dummy variables

This model is estimated using monthly and annual data, mainly because some data series (e.g. ATM and MALSWICH smart card) have very short history for legitimate econometric estimates. Furthermore, monthly as opposed to annual data allows quantification of the impact of some seasonal factors on the level of CU.

5. Data construction, modification and definition

As previously pointed out, c is CU/Money stock and CU/M2 is used. For Y, nominal GDP growth rate is used as an indicator of real sector developments. As for r, the real savings deposits interest rate (or inflation adjusted r) will be used in this exercise.[2] The financial deepening indicator m is constructed as narrow money (M1) divided by the broad money (M2). As for s, the ratio of smallholder agriculture produce to total agriculture production was used.

A much difficult task was to come up with a measure for the underground economy. Nenovsky and Hristov (2000) ascertained that the growing share of the largest two denominations in currency in circulation indicates that they are increasingly used for hoarding and servicing of the underground economy and not for transactions in the official economy. At the end of 1990, the two largest denominations (K50 and K20) comprised 54.7% of the currency in circulation. By the year 2003, this increased to 81.4%. This may, therefore, indicate an

[2] Nominal interest rate and inflation enter the monthly data based model specification separately.

increase in the underground economy in Malawi. The link between the proportion of the largest currency denominations and the underground economy can intuitively be supported by the observation that transactions in this sector are rarely done using smaller denominations.

In Equation 1, T is a vector comprising of two variables. The first variable captures ATM cash transactions, information on which will be obtained from all banks that operate cash dispensers. A questionnaire (attached) was sent to the banks, and only one commercial bank's information was received. The second variable captures information on the use of the MALSWITCH smart card. Lastly, the dummy variable $D_{elections}$ takes value 1 for general election years and one year before, and value 0 otherwise. This is to capture the impact of splashed campaign cash.

6. Estimation results

As is tradition, all variables used in the econometric estimation were tested for stationality using the ADF test.[3] Most of the series, including the dependent variable, c were I(0), and for those not satisfying this condition (e.g. inflation), their first differences were used in the regression model. Using annual data from 1965 to 2004, estimation results for Equation (1) are presented in Column 1 of Table 2 in the appendix. As seen here, almost 60 percent of the

[3] Results available upon request. This also applies to post-estimation residual as well as specification diagnostic tests.

variation in the share of currency in circulation in the total money stock is explained by the included variables in the estimated model. This is considerably high after removing the trending properties of the different time series in the model. In line with studies from other countries, the results confirm that a 1-percentage increase in saving deposit real interest rate leads to a 3.6 percent decrease in the CU/M2 ratio. Cash holders seem to respond accordingly to changes in the opportunity cost of holding their assets in cash form.

Other significant impacts in this model seem to come from the underground economy and the small-scale agriculture production. First, a one-percentage increase in the underground economy measure leads to a massive 13.2 percent increase in CU/M2 ratio. It is, however, important to treat this result with some caution because large currency denominations may always constitute a large proportion of currency in circulation. All the same, our result may indicate something that needs careful consideration. Second, the other significant variable, s shows that a 1-percentage increase in small-scale agriculture produce as a proportion of total agriculture production leads to a 2.8 percent increase in currency as a proportion of total money stock. The other variables (Y and $D_{elections}$) are not really significant in this model, while m is significant only at 10% level of precision.

In order to capture some seasonal factors affecting currency in circulation, the model was estimated for the second time using monthly data. This time two dummy variables were added to the model. The first dummy ($D_{tobacco}$) is equal to 1 for months during the tobacco marketing season and 0 otherwise. The second dummy ($D_{Christmas}$) takes value 1 for December every year and 0 for all other months in order to capture the impact of Christmas festivities on currency in circulation. This time we also add two variables in vector T, atm and Smart Card (sm), which because of their short history in Malawi, could not be appropriately included in the model based on annual data. The results are presented in column 2 of Table 2.

The first important thing to take note of is that now instead of using real saving interest rate (adjusting interest rate by inflation) we enter interest rate (r) and inflation rate (p) separately.[4] From the results, nominal interest rates on savings still play a significant role in determining CU/M2 ratio. A 1-percentage increase in saving rate leads to a 3.1% decline in CU/M2 ratio, while a 1-percentage increase in the change in inflation leads to a 1.2 percent increase in the CU/M2 ratio. The higher the inflation the more cash people demand for transaction purposes. Despite taking the expected sign (negative), the impact of the MALSWITCH smart card (sm) is not significant but at least it shows the nature of its effect on CU/M2 ratio. On cash dispensers, a 1-percentage

[4] This is mere to enjoy the pleasure of having a good enough sample size which was not there using annual data. For monthly data we could afford the loss of a single degrees of freedom.

increase in cash transactions leads to a 5.3 percent increase in the CU/M2 ratio.[5]

Of the two dummy variables, $D_{Christmas}$ and $D_{tobacco}$, only the later is significant in explaining movements in currency in circulation. As seen here a discrete change in dummy variable $D_{tobacco}$ from 0 (off selling season) to 1 (selling season) increases the CU/M2 ratio by a massive 75.5%. This is not surprising as it is a mere quantification of the seasonal oscillations exhibited in Figures 2, 3 and 4.[6]

6.1 Other unmeasurable factors

This section presents a qualitative analysis of some variables, difficult to measure but that may be important with regards to currency in circulation. From intuition, observation and experience, a number of other factors could well be identified to be possible driving forces behind the developments in currency in circulation. The first of these is the cash utilisation in the cross-border trade. As a result of the strength of the kwacha vis-à-vis currencies of the neighbouring countries, in particular the collapse of the Zimbabwe dollar has resulted into the kwacha being an unofficial (more or less) convertible

[5] However, caution should be exercised here as data on ATMs was available for one bank only and did not cover the full sample period of the study.

[6] For $D_{Christmas}$, we fail to confirm its effect on CU/M2 ratio mainly because during the sample period (1998-2003), there is less variability in this dummy as there are only 5 Christmas periods. Thus in the whole used sample, $D_{Christmas}$ = 1 is only 5 times. Thus why the standard error associated with this variable is so large, making it insignificant because the model is not certain about the result.

currency. A large part of the population from neighbouring countries, especially those living in the border areas have kwachas in their possession for transaction purposes. Though this is difficult to quantify, it is also difficult to disregard as a cause of the increase in CU.

Second, in this exercise, it seems proper to empirically test and quantify the impact of some local money lending practices such as *katapira*. This is informal and illegal cash lending system, normally at very high interest rates. In practice, people who lend money in the form of *katapira* tend to keep substantial amounts of their wealth in form of cash in readiness for business. An increase in this type of business activity could obviously shift the demand for cash. The initial suggestion was to visit remote markets in areas with a lot of cash holding such as those along lake Malawi and where there are no formal banking facilities. With time, therefore, there is need for a comprehensive study of this practice in Malawi.

Thirdly, it is also important to look at the impact of the mushrooming of small-scale, one-man businesses (vendors) in Malawi during the past few years. Just as is the case with small-scale agricultural produce, payment is completely in cash. The incentive to buy from vendors, most of whom may not operate bank accounts, also increases the demand of cash by consumers.

Again, due to time limitations, quantification of this phenomenon was impossible but it is likely to have a substantial impact on CU.

7. Conclusions and policy recommendations

These results are preliminary and just indicative. The picture portrayed here may change for example if more representative data from commercial banks on ATMs is available and for a longer period. These are also other statistical issues such as endogeneity problems that need to be addressed e.g. by using lags of the independent variables. This notwithstanding, it is confirmed that on an annual basis, there has been a shift in money stock holding in favour of currency in circulation. This has been particularly so from 2002. Using annual data, among other things, this study confirms findings from other studies that cash preference is a function of real interest rates. However, one striking finding here is the importance small-scale agriculture as a determinant of currency in circulation. This reflects the agriculture-dependent nature of the economy. Better performance of this sector injects cash in the economy and because of the lack of banking facilities in rural areas, most of the injected cash remains in circulation.

The message from empirical results using monthly data is similar, with interest rates, financial deepening, tobacco selling season dummy and inflation rate playing significant roles in determining movements in currency in circulation.

As expected, technological innovations in the banking system or payment systems, particularly cash dispensers (ATMs) have a significant impact on the overall level of currency in circulation, whereas no major impact seems to come from the MALSWITCH smart card, however, initial indications reveal its negative effect on the CU/M2 ratio.

Policy implications from these results are many. First, of late the Bank has reduced the bank rate and as is normally the case, all other interest rates were similarly adjusted. While the policy move has or is on course to achieve its intended goals, it has other side repercussions such as deposit taking capabilities by commercial banks. Currently, the minimum saving rate for the four major commercial banks averages around 7.5%. This against the current monthly inflation rate of 12.2 (for October 2004) leaves real savings rate of around –4.7% which rationally discourages savings mobilisation and consequent reduction in the availability of loanable funds for productive investment and economic growth. The public is most likely to hold their assets in cash rather than bank deposit form since the opportunity cost of doing so is essentially zero.[7] However, due to high inflation in the past, savers in Malawi were used to high interest rates so that current demand deposits are considered as unattractive and non-worthwhile form of holding money. It is

[7] From a very unrepresentative sample, the public would rather illegally hold foreign currency as a stole of value (in which case gains could accrue in the event of a kwacha depreciation) than maintaining a savings deposit account with a commercial bank.

time the public get used to lower interest rates as in other countries and on the belief that causality direction is from interest rates to inflation, the reduction in the bank rate could eventually lead to a drop in inflation and, therefore, an increase in the real interest rate.

Second, if the Bank intends to focus on reducing the CU/M2 ratio, intensification of smart card use and publicity could play an important role. The smart card is a direct alternative of cash as a means of payment so that its widespread use can directly reduce currency in circulation. This, as is the case in other countries could also reduce the positive impact of ATM transactions on the overall level of currency in circulation. Third, the overall civic education on the use of banking facilities, in rural areas as well as to small-scale business men (vendors) is important for increased deposit taking and, therefore, the reduction in the amount of currency in circulation.

Appendix: Tables

Table 1: Ratio of CU to M1 and GDP

Year	Country	CU/M1	CU/GDP
1999	Malawi	45.1	3.7
	Mozambique	31.7	0.1
	Zimbabwe	20.7	3.4
	South Africa	8.7	2.8
	United Kingdom	2.3	2.3
2000	Malawi	45.7	4.0
	Mozambique	28.8	0.1
	Zimbabwe	18.4	4.7
	South Africa	8.9	2.7
	United Kingdom	2.3	2.5
2001	Malawi	43.5	3.4
	Mozambique	30.1	0.1
	Zimbabwe	19.5	4.6
	South Africa	8.1	2.6
	United Kingdom	2.3	2.6
2002	Malawi	49.0	4.2
	Mozambique	30.3	0.2
	Zimbabwe	22.4	4.0
	South Africa	8.4	2.7
	United Kingdom	0.9	3.9

Source: International Financial Statistics Yearbook (2003), IMF

Table 2: Estimation Results-Annual and Monthly data

Dependent variable c = CU/M2	Annual Data	Monthly Data
α	0.566	-1.106
	(1.82)+	(0.52)
Y	0.010	0.026
	(1.41)	(1.42)
r	-0.036	-0.031
	(2.78)**	(3.02)**
p		0.012
		(2.18)*
m	0.127	0.234
	(1.75)+	(5.02)**
u	0.132	
	(4.20)**	
sm		-0.013
		(0.09)
atm		0.053
		(3.21)**
s	0.028	
	(2.27)*	
$D_{elections}$	0.005	
	(0.15)	
$D_{Christimas}$		0.252
		(0.73)
$D_{tobacco}$		0.761
		(2.59)*
c_{t-1}		0.531
		(10.3)**
c_{t-4}		-0.127
		(2.04)*
N	40	103

$\overline{R}^2$	0.588	0.693
F-statistic	7.54	36.44
D-W Statistic	1.99	1.87

Notes: t-statistics in parentheses, +, * and ** denote significance at 10%, 5% and 1% levels.

r represents real savings deposit interest rate in the annual data estimation only.

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