Monetary Conditions Index for Uganda

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Abstract
This paper describes and defines the concept of Monetary Conditions Index, its construction and estimation for Uganda. The paper highlights the need to adopt an additional operating target to augment the current use of base money. In the Reserve Money Programme, changes in the monetary base and broad money aggregates are used as predictors of the ultimate target. The monetary condition index serves to complement this analysis by allowing timely calculation and examination of its components to examine the imminent effect on inflation; providing information on indicative policy adjustments that would be required to maintain conditions and limit the potential for inflationary pressures in future periods; and incorporating both the interest rate and exchange rate channels of the monetary policy transmission process on the domestic economy. As an operating target it is clear that the index provides a basis for the monetary authorities to alter market expectations with a time-consistent and transparent operation of monetary policy linked to a single objective.

KEY WORDS: Monetary Policy; Monetary Conditions Index; Uganda

1. INTRODUCTION
Central banks world over have used numerous indicators to measure the stance of monetary policy. These indicators include monetary aggregates, credit aggregates, short-term interest rates, index of minutes of Federal Open Market Committee (FOMC) introduced by Friedman and Schwartz (1963) and later by Romer and Romer (1989), monetary policy index developed by Bernanke and Blinder (1992), and Bernanke and Mihov (1998), and Monetary Conditions Index (MCI) first constructed and used by the Bank of Canada. Central banks of Canada, Sweden, Norway, and New Zealand, among others have included and in some instances fully adopted the use of monetary conditions index in their monetary policy frameworks.

The MCI is a simplified numerical indicator of the relative “tightness” or “looseness” of monetary policy. It captures the degree of pressure that monetary policy exerts through interest rate and exchange rate changes in the economy, and hence inflation. An MCI is specified as a weighted average of the measured effects of interest rate and exchange rate changes on the final target.

The MCI was constructed by central banks in response to a need to identify alternative variables to function as either intermediate or operating targets and information variables in the conduct of monetary policy, motivated by the weakened relationship between monetary aggregates and inflation, and the desirability of explicitly measuring the influence on exchange rate developments on output and inflation.

This paper focuses on the development and estimation of an MCI for Uganda to improve the existing monetary policy framework. The theoretical argument in support of alternative information variables in the conduct of monetary policy for Uganda is validated empirically by various studies that describe the inflationary process in Uganda. For instance, Kasekende and Mugume (2009) find that the deviation of money supply from its long run trend marginally affects inflation, with a coefficient of about 0.0001 for headline inflation and 0.0009 for core inflation. These coefficients are quite small, implying that 100% deviation of money supply from its long-run path, would cause headline and core inflation to increase by about 0.01%. Further, using structural vector autoregressive approach, Mugume (2010) find that changes in money stock seem to have no significant effect on output and inflation in the short-run.
In view of the above findings, it’s evident that there is a weakened relationship between monetary aggregates and inflation in Uganda and this conclusion lends support to the search for alternative information variables for the analysis of monetary policy in Uganda and therefore warrant the current focus of estimating the relative impact of both interest rate and exchange rate changes on inflation combined in a Monetary Conditions Index (MCI). An MCI recognizes the impact of exchange rates in small open economies and focuses analysis of the combination of interest rates and exchange rates that may be important in understanding the economy’s behavior.

It is clear that the MCI provides a basis for the monetary authorities to alter market expectations with a time-consistent and transparent operation of monetary policy linked to a single objective. The rest of the paper is structured as follows: Section 2 provides an assessment of the current monetary policy framework in Uganda and outlines the thrust to improve the framework, including the need for a monetary conditions index. Section 3 discusses the examination and estimation of an MCI for Uganda. Section 4 presents the use of MCI in the current monetary policy framework. Concluding remarks are presented in Section 5.

2. UGANDA’S MONETARY POLICY FRAMEWORK
Bank of Uganda (BOU) has been implementing the Reserve Monetary Programme (RMP) monetary policy framework since 1993. In the RMP, base money has been used as the operating target, while broad money was used as the intermediate target. The use of RMP was motivated by three reasons: first, information on the real economy was limited, and was only available with a considerable lag. With the RMP, the data on base money and other monetary aggregates was readily available with a shorter lag. Second, there existed underlying economic relationships between monetary aggregates, output and inflation. Third, empirical evidence at the time had indicated a stable money demand function and a predictable money multiplier between monetary base and broad money.

Since the adoption of the reserve money program, inflation has been controlled, declining from double-digit levels of 66% in June 1992 to single-digit levels as indicated in Figure 1. The
impressive inflation outturn during this period is largely a result of the continued pursuance of prudent monetary and fiscal policies. The lack of fiscal dominance, in conjunction with close coordination between the monetary and fiscal authorities contributed significantly to bringing down inflationary expectations. Thus, based on the inflation outturn, one can conclude that the RMP was effective in stabilizing the domestic price level.

**Figure 1: 12-month change in CPI and growth in monetary aggregates**

![Graph showing 12-month change in CPI and growth in monetary aggregates](image_url)

Source: Bank of Uganda

Despite this favourable inflation performance, the RMP faces a number of challenges. The RMP relies on the links between monetary aggregates both as intermediate and operating targets and inflation. The reliance on the measures of base money and the broad money aggregate M2 assumes that their relationship to inflation is stable and predictable. However, like in other economies that have undergone liberalization and transformation of the financial sector, the stability of the money demand function cannot be taken for granted. As indicated in the Figure 1 above, it can be observed that even after the transition from high inflation to lower inflation rates, monetary aggregates continue to expand at a faster rate than prices.

The instability in velocity resulting from changes in the financial system has weakened the relationship between output and prices and the nominal growth rates in broad money aggregates. Consequently, the money multiplier, which links base money and broad money, has also become very unstable. This has at times necessitated BOU to revise the desired base money path in order to live within the programmed levels.
In 2007, BOU introduced some flexibility in the implementation of the RMP framework. The monetary target was now defined as an objective via the Net Domestic Assets (NDA). This was coupled with a benchmark objective for reserve money assorted of a +/- 5 percent variation margin. This was expected to enable BOU test the limits of non-inflationary monetary expansion, while providing discretionary freedom to revert to a tighter observance of the planned monetary path. The rationale for such a move was to provide flexibility to deal with changes in the money velocity and the multiplier arising from transformation in the economy and the financial sector in particular. In addition, it was to allow flexibility to respond to unexpected shocks such as large foreign exchange inflows.

Again in 2009, the BOU introduced reforms to the monetary targeting framework. This reform was aimed at “making the monetary targets more flexible and to provide greater emphasis on daily liquidity management” (Brownbridge 2010). There are now proposals in place to reform the current monetary policy framework by replacing it (the RMP) with some form of transitional monetary policy framework dubbed inflation targeting light, which will eventually lead to the adoption of a fully fledged inflation targeting framework in the near future.

Inflation Targeting Light (ITL), which is commonly practised in most emerging market economies, incorporates some key features of a fully fledged inflation targeting framework. The adoption of ITL framework by BOU will therefore necessitate changes to the intermediate and operating targets of monetary policy in addition to introducing a monetary policy rule or reaction function, which links changes in the intermediate target to changes in the operating target. The operating target should signal the stance of monetary policy. Therefore an effective operating target should be one which must be under the control of the central bank; must give an accurate indicator of the stance of monetary policy; and must be effective in the transmission of monetary policy.

Central banks have used various variables as operating targets: (i) short term interest rates – “the interest rate the BOU potentially has the most control on a daily basis is the interbank rate. The BOU could control the interbank rate by setting a corridor for the use of standing deposit and
lending facilities, together with sales of repos and reverse repos which target an interest rate” (Brownbridge 2010); (ii) long-term interest rates such as the 91-day TB rate; (iii) a combination of variables in what is referred to as Monetary Conditions Index (MCI).

In an open economy, monetary policy transmits to output and inflation through two important channels: the interest rate channel and exchange rate channel. The former operates through the impact of interest rates on the level of expenditures, investment and subsequently domestic demand. A change in the official interest rate (repo rate in Uganda) affects the money market rates. The change in the money market rates in turn is transmitted to the bank lending and saving rates, which in turn affects the investment behavior of firms, consumption behavior of households and consequently the level of the country’s income and inflation.

The inclusion of the exchange rate in an MCI is motivated by the empirical support of the role of exchange rate in determining inflation in small open economies (Dueker and Fischer, 1996; Lattie, 2010; Kesriyeli and Kocaker, 1999). Exchange rate movements, indirectly affects aggregate demand and the spending pattern of economic agents through its impact on the relative price of tradable and non-tradable. A depreciation of the exchange rate for instance makes domestic products relatively cheaper for foreign buyers, consequently raising aggregate demand, which in turn induces an increase in the domestic price levels. Indirectly, however the exchange rate changes can affect the rate of inflation through prices of imported goods. In an open economy, the costs of imports are integral components of the firm’s costs and households’ consumption functions. Other things being constant, a depreciation of the shilling increases the shilling price of imported inputs and consequently the total costs of production. Hence, in a small open economy, the exchange rate is another important channel through which monetary policy actions are transmitted to inflation and output.

An MCI for Uganda is therefore composed of the nominal effective exchange rate (NEER) index and a short term interest rate (interbank money market rate). Empirical justification for broadening Uganda’s monetary policy framework has emerged from previous work. Based on the structural vector autoregressive approach, Mugume (2010) find the following: (i) that a tight monetary policy results in increased lending interest rates and a shock in lending interest reduces
economic activity. However, a shock in lending interest rates has no significant effect on inflation. The impulse response functions indicate that the monetary policy shock on lending interest rate is quite persistent. (ii) the paper however, finds that there seem to be neither a significant monetary policy effects on the exchange rate nor a significant exchange rate effect on output and inflation. In addition, the paper finds that changes in money stock seem to have no significant effect on output and inflation in the short-run.

Furthermore, using a VEC approach, Anguyo (2008) finds that in the long-run pass-through effect from nominal depreciation is significant, however, movements in exchange rate have a low impact on inflation. The impulse response functions indicate a low degree of exchange rate pass-through effect to domestic prices that dies out after a short period of about four (4) months. Using the Augmented Philips Curve approach to analyse the determinants of inflation in Uganda, Kasekende and Mugume (2009) find some weak effect of the exchange rate annual inflation. They find that 100 percent depreciation of the exchange rate would result in an annual inflation increase of 0.3 percent. Further, Kasekende and Mugume find that the depreciation of the exchange rate increases headline and core inflation with coefficients of 0.0001 and 0.0009 respectively, suggesting that 100% exchange rate growth would result in headline and core inflation increasing by about 0.01% and 0.09%, respectively. It is therefore evident from these empirical evidences that some combination of interest and exchange rates would be beneficial to the monetary policy decision process and this goes a long way in justifying the need to develop an MCI for Uganda.

3. EXAMINATION AND ESTIMATION OF MONETARY CONDITION INDEX

3.2 Computation of weights
Defining relative weights for the MCI requires an examination of the econometric relationships between inflation and other economic variables. Several approaches in the literature have been used to study the relationship between inflation and other economic variables for the purpose of estimating weights for the MCI. This paper adopts an approach consistent with a small open economy like Uganda coached around the work on New Zealand by Nadal-De-Simone and Richard (1996). The applied model is designed to take into account the effects of imported
inflation on domestic prices, which stems from changing input costs and the additional component of the exchange rate variability. Furthermore, the removal of capital restrictions by Uganda in 1994 has made the economy susceptible to free capital movement, and accordingly, the country experiences effects where interest rate and exchange rate differentials are inadequate to attract and maintain funds within the domestic economy.

The reduced form inflation equation is thus specified as follows:

\[ P_t = \beta_0 + \beta_1 r_t + \beta_2 e_{t-1} + \beta_3 p_{t-1}^* + \beta_4 \bar{y}_t + \beta_5 E_{t-1} P_{t-1} + \varepsilon_t \]  

(1)

where

- \( r_t \) = real interest rate
- \( e_t \) = the exchange rate
- \( p_t^* \) = foreign price
- \( \bar{y}_t \) = potential output
- \( \varepsilon_t \) = disturbance term

Equation in (2) above is appealing in the context of a small open economy since external shocks have always affected the Uganda economy. The equation defines the effects of foreign prices and interest rates on the domestic price level. Given the underlying economic structure of small open economies, this equation is consistent with their vulnerability to external shocks. However and interestingly, the inclusion of the effect of the foreign interest rate on the domestic price level would imply that the capacity of the domestic monetary authority to alter domestic monetary conditions is limited, in so far as the foreign interest rate and exchange rate movements are its determinants (Lattie, 2000).

Domestic prices respond to exchange rates changes. Small open economies which implement flexible exchange rate regimes inevitably face this type of economic relationship as the patterns of production and consumption frequently reflect the demand for imported goods. It is therefore
expected that as the exchange rate depreciates, or there are expectations for depreciation in the
domestic currency, domestic prices will move in tandem with the adjustments in exchange rates.

### 3.2.1 The Data

Monthly data for the period October 1999 to March 2010 are used for the estimation of the
inflation determination model. All data for the domestic variables were obtained from the Bank
of Uganda database, except data on CPI, which were obtained from the International Monetary
Fund International Financial Statistics database. The choice of this was determined based on the
time when Uganda’s quarterly estimates of GDP were available.

Potential output is derived by applying to the domestic quarterly GDP series the Hodrick-
Prescott (HP) filter. A smoothing parameter, $\lambda$ of 14,400 was used to transform current output to
its long-run path. Since there is no existing measurement for Uganda’s monthly GDP, monthly
GDP series were obtained by interpolating quarterly GDP. The interpolation method may
generate statistical biases in the estimated coefficients and caution needs to be exercised in
interpreting regression results and their ultimate use for policy analysis. Other variables included
are the real effective exchange rate, $e$ (defined as product of the Uganda shilling per US$ and
ratio of the domestic and foreign prices), and the consumer price index. The foreign variables
used are the weighted consumer price index for selected Uganda’s trading partners, $p^*$. Expectations for domestic prices are defined as the three-month moving averages of inflation,
represented as $E_{t-1} P_{t+1}$. Interest rates are the real 91-day TB rates for Uganda. Monetary
aggregate, M2 comprises of currency in circulation, demand and time and saving deposits.

### 3.2.2 Estimation of the model

There are a number of econometric issues in the construction of MCI which need to be
addressed. These include dynamics, non-stationarity, cointegration and parameter constancy
among others. To allay these fears, we start by investigating the time series properties of the
data. Using the standard Augmented Dickey and Fuller (1979, 1981) method according to Hall’s
(1994) sequential rule, we test for unit roots in the individual series. The test results indicate that
all the variables are $I(1)$. 
We then proceed to test the existence of a cointegrating relationship between the variables using the Likelihood ratio test of the maximal eigenvalue and trace of stochastic matrix as proposed by Johansen (1988). We find one cointegrating relationship. The Full Information Maximum Likelihood Method of Johansen (1988) is used to estimate long run parameters of the objective function. This method uses the vector autoregressive methodology to estimate the model having non-stationary time series data. The estimated coefficients on exchange rate and interest rates used derive weights which are then used in the construction of MCI.

One approach to formulating the dynamic error correction function is the Vector Autoregressive (VAR) system adopted by Johansen (1988) and Johansen and Juselius (1990). It can be represented by the following function:

\[ X_t = \sum_{i=1}^{k} \Pi_i X_{t-i} + \mu_t + \Phi D_t + \varepsilon_t \]  

where \( X_t \) is a vector of variables included in the model, \( \mu_t \) is constant term, \( D_t \) is a vector of dummy variables and \( \varepsilon_t \) is iid(0, \( \Lambda \)) disturbance term. From this model, using \( \Delta = 1 - L \), where \( L \) is the lag operator, we can deduce the following dynamic error correction model:

\[ \Delta X_t = \Gamma_t \Delta X_{t-1} + \ldots + \Gamma_{k-1} \Delta X_{t-(k-1)} + \Pi X_{t-k} + \mu_t + \Phi D_t + \varepsilon_t \]  

where \( \Gamma_t = -I + \Pi_1 + \ldots + \Pi_i \), \( i = 1, 2, \ldots, k \)  
and \( \Pi = -I + \Pi_1 + \ldots + \Pi_k \)

The error correction model above captures the short-run dynamics as well as long run properties of the inflation model because it includes variables both in levels and in differences. Under the assumptions, all the variables included in the model are stationary. Therefore, this model can be estimated with the ordinary least square method [Granger and Lee (1989)]. However, the term \( \Pi \) is a cointegrating matrix, which consists of the long-run stable relationship among the rate of inflation, interest rate, exchange rate and loading vector. It implies that this relationship between
the variables is stable and can be used for forecasting purposes and policy analysis. The long-run estimates are presented in Table 1 below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG(REER(-1))</td>
<td>-0.1031</td>
<td>0.0413</td>
</tr>
<tr>
<td>LOG(KCPI(-1))</td>
<td>-0.6232</td>
<td>0.0808</td>
</tr>
<tr>
<td>GDPGAP(-1)*100</td>
<td>0.0077</td>
<td>0.0024</td>
</tr>
<tr>
<td>RR91(-1)</td>
<td>0.0039</td>
<td>0.0011</td>
</tr>
<tr>
<td>EXD1(-1)</td>
<td>-0.0728</td>
<td>0.0149</td>
</tr>
<tr>
<td>LOG(M2(-1))</td>
<td>-0.2529</td>
<td>0.0445</td>
</tr>
<tr>
<td>DUM0809(-1)</td>
<td>0.0462</td>
<td>0.0153</td>
</tr>
<tr>
<td>TREND(97M07)</td>
<td>0.0041</td>
<td>0.0008</td>
</tr>
<tr>
<td>C</td>
<td>0.3477</td>
<td></td>
</tr>
</tbody>
</table>

Note: Standard errors are in parenthesis; \( T = 111 \) [2001M01 - 2010M03], \( = 0.943 \), \( = 0.932 \), \( = 0.0048 \) REER is the real effective exchange rate, KCPI is the Kenya CPI, GDPGAP is the GDP gap, RR91 is the real 91-day TB rate, EXD1 is the expected inflation, DUM0809 is a dummy variable for extra-ordinary year of 2008/09 FY and TREND (97M07) is time trend to captured all other omitted variables.

where the symbols \( T \), \( \), and \( \) denote the sample size of the estimation period, the squared multiple correlation coefficient (R-Squared), the adjusted version thereof and the estimated equation standard error, respectively.

The one-month lagged exchange rate variable has a positive coefficient that is consistent with theory a priori since any depreciation in the exchange rate is likely to translate directly into increases in domestic prices, assuming that monetary policy does not act through interest rate adjustments to constraint money growth. Theory suggests, too, that exchange rate movements should act as a switching mechanism between aggregate demand for non-tradable relative to tradable. If for instance, there is a real depreciation in the exchange rate, this should cause lower demand for tradable goods by domestic agents, while potentially inducing greater supply of tradable, assuming there are no inelastic supply conditions in domestic economy.
Further, the results show that current inflation is influenced by its own expected value. The interest rate (real 91-day TB rate) variable is statistically significant at the 5% level and has the correct sign implying. However, however, the magnitude of its impact is minimal. This implies that although the effect of interest rates is not significant, its role in domestic monetary decisions remains important in Uganda.

Domestic output has the correct sign and is statistically significant – typical of developing economy like Uganda – implying that an increase in domestic output causes the rate of growth of domestic prices to decline. The coefficient on the foreign price variable is statistically significant implying that an increase in foreign prices tends to cause increases in domestic prices (via prices of imports) as a result of substitution effects. In the same vein, an expectation of an increase in domestic inflation has a significant effect on domestic prices. The effect of growth in broad money, M2 on domestic inflation is significant and has the correct sign.

A dummy variable, $Dum0809$ ($dum0809 = 1, 200804:200909, dum0809 = 0, otherwise$) is introduced to capture the effect of significant increases in headline inflation that was witnessed between April 2008 and September 2009. The coefficient on the dummy is significant, justifying its presence in the model.

The weights for the computation of the MCI are chosen to reflect the effects that changes in the monetary policy instruments have on inflation. Thus, the weight in the index represents the relative impact of exchange rate and interest rate changes on inflation. Where the MCI is used as an operational target, the weights are intended to reflect the linkages between the operating target and the final objective, with changes in the index indicating the likely changes in the final target.

The relative weights of the index are measured by the coefficients on the exchange rate and the interest rate variables, respectively in the estimated equation (7) above. These coefficients are 0.103 and 0.004, respectively. Thus, a 1% change in the exchange rate exerts a much greater influence on domestic prices over time than a 1% change in the interest rate. Using these coefficients, the relative weights on the exchange rates and interest rates, respectively are 0.96
and 0.04, respectively. Note that each MCI is scaled in such a way that its weights sum to unity (i.e., $w_e + w_r = 1$).

### 3.2 Monetary Conditions Index

The monetary conditions index is the weighted sum of changes in the nominal short-term interest rate ($r$) and the nominal exchange rate ($e$), relative to their values in a base period. It is noted that while Bank of Uganda typically defines an interest rate signal through the repo rate, the Treasury bill rate represents the most widely or frequently used rate (Lattie 2000). In this paper, the interest rate used is the nominal 91-day TB rate ($R$), while the nominal bilateral trade-weighted exchange rate (NEER) is used to represent the exchange rate.

Algebraically, the MCI is specified as:

$$MCI_t = w_e (e_t - e_0) + w_r (R_t - R_0)$$

where $t$ is a time index, $t = 0$ is the base period, $w_R$ and $w_e$ are the respective weights on the exchange rate and the interest rate. Variables in lower case denote logarithms. Usually, the exchange rate is in logarithms or in percent deviations from its baseline value, whereas the interest rate is in levels.

### 3.3 Examining the estimated MCI for Uganda

A tightening or loosening of monetary conditions in the Ugandan economy can be measured by the computed MCI relative to average values of the exchange rate and interest between July 2005 and June 2006, when conditions in the exchange rate were relatively stable. A decline in the interest rate potentially increases liquidity, which in turn exerts upward pressure on domestic prices. A decline in the interest rate therefore signals a loosening of monetary conditions. On the other hand, depreciation in the exchange rate increases costs of production and this creates increasing pressure on domestic prices. An increase in the MCI is interpreted as a loosening of monetary conditions.

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1 For Uganda, the base period values are the average values for 2005M07 – 2006M06 (period of relative stability), determined on the basis of standard deviation.
Another useful interpretation of the movements in the MCI is that it signifies a change in the relative attractiveness of assets denominated in Uganda shilling relative to foreign currency assets. Thus, an increase in the MCI would be consistent with a weakening in the demand for Uganda shillings which can be corrected by a combination of exchange rate stabilisation and interest rate increases.

As a policy indicator, the MCI aims at tracking the relative effects of interest rate and exchange rate changes on inflation. In Uganda’s case, movements in the index are symmetrical to the fluctuations in the exchange rate as shown in Figure 1. Periods of sharp depreciations in the exchange rate coincide (upward movements) with loosening of monetary conditions, while periods of relative stability produce a stable index. Between January 2001 and May 2003, the MCI first declined sharply, indicating tightening of monetary conditions before rising steadily, signaling a general loosening of monetary conditions. September 2008 to July 2009 witnessed a steady rise in monetary conditions, signaling a general loosening of monetary policy.

**Figure 2: Monetary Conditions Index for Uganda**

Figure 3 shows the two components of the MCI: The nominal 91-day TB rate and the Nominal Effective Exchange Rate (NEER). The period between January 2001 and March 2003 saw both the interest rate and exchange rate moving in the same directions. Initially (Period up to March 2002), there was a general tightening of monetary policy as exchange rate appreciated, interest
declined to bring the exchange rate to its original level. Thereafter, the exchange rate depreciated steadily as the interest rate rose steadily to offset the instability in the exchange rate. The period between April 2004 and August 2008 witnessed conditions where the interest rate remained relatively stable, while the exchange rate movements were marked by episodes of instability.

Figure 3: Components of the Monetary Conditions Index for Uganda

4. USING THE MCI IN THE CURRENT MONETARY POLICY FRAMEWORK

In the RMP framework, changes in the monetary base and monetary aggregates are used as predictors of the ultimate target. The MCI serves to complement this analysis by allowing timely calculation and examination of its components to examine the imminent effect on inflation; providing information on indicative policy adjustments that would be required to maintain conditions and limit the potential for inflationary pressures in future periods; and incorporating both channels of the transmission process – interest rate effects on the domestic economy and exchange rate effects influenced by both domestic and foreign conditions.

Since the estimated index mirrors the movements in the exchange rate, the pertinent question at this juncture is whether or not the computed index broadens the information base required for monetary policy formulation. To respond to this question, we examine the two calculated MCIs (Figure 4), one defining the effect of interest and exchange rate changes relative to the identified
base period (MCI composite), and the other, the pure impact of the changes in the exchange rate from the same base (MCI_NEER).

Figure 4: MCI and Movement in the NEER.

In the first instance, sharp appreciation and depreciation are observed in the exchange rate during January 2001 to January 2002 and February 2002 to May 2003, respectively. During these periods, the movements in interest rates were not sufficient and effective in offsetting the impact of an exchange rate appreciation and depreciation, respectively on the domestic monetary conditions (see Figure 2 & 3). As a result, the MCI composite first declined sharply (January 2001 to January 2002) before rising steadily (February 2002 to May 2003). Further, it is noted that during this period, there is only marginal differences between the calculated indexes, which suggests that monetary conditions are most likely unaffected by interest rate changes when there exists unstable conditions in the foreign exchange market.

Alternatively, during periods of moderate exchange rate movements (April 03-April 04) with the interest rate mimicking movements in the exchange rate (declining interest rates to offset appreciation pressures on the exchange rates and rising interest rates to offset a depreciation of the exchange rates). During this period, the distinction in the calculated indexes is clearly noticeable. Thereafter, the interest rate effects die out through to 2010. This analysis suggests that there are distinct circumstances where monetary policy directed through interest rate changes were effective or ineffective in controlling inflation, and depended largely on the nature of the adjustments in the exchange rate. During periods with moderate exchange rate changes,
interest rates changes were effective in guiding monetary policy, while during high exchange market movements, the role of interest rate adjustments were less effective.

From the foregoing analysis, it is certainly clear that domestic interest rates are not significant in influencing the monetary transmission process in Uganda. The literature on the transmission process indicates that an increase in interest rates is likely to prove more effective in reducing inflation only where the financial sector is developed. Naturally, a sound financial system enhances the monetary policy process, as banks not only interpret, but also act appropriately to alter their balance sheets to adequately mirror the prevailing stance of monetary policy. In a weak banking system, the central bank’s expectations of the linkages between policy instruments and economic activities become uncertain, rendering it increasingly difficult to set and adjust policy parameters appropriately. Further, the effectiveness of policy instruments will diminish as banks become unable to respond to monetary policy signals through appropriate and timely balance sheet adjustments.

The MCI is by no means a precise measure of the effects that changes in exchange rates and interest rates exert in the domestic economy, but also represent a reasonable indicator of future inflation movements (Figure A1 in the Appendix). An examination of the contemporaneous linkage between the MCI and inflation shows positive correlation (Table A1) in which the MCI acts as a satisfactory information variable in defining future movements of inflation.

It is certain that identifying the source of exchange rate shocks is critical to the BOU’s monetary policy framework. However, where a case is made for using the combined index, an exogenous shock to the exchange rate, for example, creates disorderly market conditions that would fuel a sharp depreciation and a loosening of monetary conditions. This would require tactful and timely policy adjustments to maintain a relatively stable monetary index. Using the MCI, the need for monetary policy tightening would show up directly from the index, since it would show the easing resulting from currency depreciation. Note however, that the index cannot define the

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2 The test for the association between these variables indicates that there is a strong correlation between inflation and the monetary conditions index, and hence satisfactorily establishes some dependence between both variables as shown in Table A1 in the Appendix.
magnitude of change required, but practically serves as an economic barometer continuously measuring the degree of inflationary pressures within the economy.

The case is therefore made for adopting the combined index rather than the sole movements in the exchange rate. The focus of monetary policy within the current environment is to achieve simultaneous stability in the foreign exchange and money markets that will maintain low and stable inflation and output. To this end, changes in the exchange rate would not be sufficient intermediate target since it only includes one side of the economy, and the central bank would be limited in effecting timely changes in interest rates to temper the effects of exchange rate changes. MCI thus broadens the span of monetary policy assessment to include interest rate and exchange rate targeting to maintain a stable index, and by extension low inflation and output.

5. CONCLUDING REMARKS

The principal recommendation of this paper is that both the interest rate and exchange rate should be used in examining the changes in monetary policy and the impact on the final target - inflation. Further, in the process of estimating the MCI ratio and then deriving an index, support was obtained for the long-standing view that stability of the exchange rate will create and facilitate better macroeconomic fine-tuning. In Uganda, like most developing countries the underlying market permits the effect of exchange rate changes to have immediate and direct impact on domestic prices. In this regard, it is imperative that as soon as exchange rate shifts occur (from whatever source), adjustments should be made to offset the fluctuations. The MCI facilitates this timely assessment and adjustment since it may be continuously calculated and examined more frequently than other intermediate variables such as M2 and M3.

This paper also highlights the need to adopt an additional operating target to augment the current use of base money. While it may not be superior to using the exchange rate as an intermediate target, as an operating target it is clear that the index provides a basis for the monetary authorities

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3 The current MCI calculate changes in nominal variables. A limitation in using the nominal index as an intermediate target is the relatively short horizon that it covers. To extend the period of focus, an index defined in real terms, measuring the changes in real variables from their base periods would be more useful, although in the short-term the nominal should serve as well as a real MCI. However, the calculation of a real MCI is going to be hampered even more by the absence of appropriate data (Lattie, 2000).
to alter market expectations with a time-consistent, transparent operation of monetary policy linked to a single objective. While the results of this paper support the adoption of the MCI to augment policy decisions, alternative means of assessment may be required to look at other issues e.g. short term interest rate and reserve money, etc. Also, the current work is only the beginning of an ongoing process for defining the relative weights for an MCI and it needs to be supplemented through the examination of alternative estimation methods, accompanied by rigorous tests for stability in weights.

Lastly, the adoption of the MCI as an operating target would need to be combined with more sophisticated inflation targeting than currently practised. The ability to forecast inflation six to eight quarters ahead and to associate these targets with movements in the MCI would set the stage for elevating the MCI to a more permanent place.
References


ANNEX

Figure A1: Movements in MCI and Inflation in Uganda

Table 1A: Correlation Matrix between MCI and Inflation in Uganda

<table>
<thead>
<tr>
<th>Probability</th>
<th>Core Inflation</th>
<th>Headline Inflation</th>
<th>Composite MCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Inflation</td>
<td>1.000000</td>
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</tr>
<tr>
<td>Headline Inflation</td>
<td>0.757921</td>
<td>1.000000</td>
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</tr>
<tr>
<td></td>
<td>13.69787</td>
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<td></td>
<td>0.00000</td>
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<tr>
<td>Composite MCI</td>
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<td>0.631562</td>
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<td>9.603717</td>
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Table 2A: Correlation between 12-month change in CPI and 12-month change in Money

<table>
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<tr>
<th>Probability</th>
<th>Base Money</th>
<th>M2</th>
<th>PSC</th>
<th>Headline Inflation</th>
<th>Core Inflation</th>
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