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Abstract

The purpose of the study is to examine whether financial reforms implemented in the 1980's and 1990's altered the pattern of aggregate consumption behaviour in Malawi. More specifically, the study questions whether financial reforms affected consumption behaviour by reducing the excess sensitivity of changes in consumption to changes in current income using the Permanent income hypothesis (PIH) framework. If it happens that excess sensitivity does not reduce, the paper explores further whether the failure is due to liquidity constraints or myopia. This study is unique from the rest in the sense that new constructed time series of financial reform indices are used in the estimation of the consumption function. The study finds that PIH of aggregate consumption behaviour does not exist in Malawi. Most of the consumers follow the "rule-of-thumb" of consuming their current income partly due to liquidity constraints. Although, we demonstrate that the effects of financial reforms on consumption behaviour are due to both liquidity constraints and myopia, the increase in consumption in Malawi can be explained along other factors than financial liberalisation. The excess sensitivities obtained are larger than what has been obtained in developed countries as well as other less developed countries. Liberalisation was implemented on the background of weak institutions and unstable macroeconomic environment.

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Keywords: Financial Liberalisation, Permanent Income Hypothesis, Linear Spline Function, Principal Component Analysis, Rule-of-Thumb.

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1 Introduction

Although, Malawi implemented financial reforms starting from 1987 under the structural adjustment programmes supported by the International Monetary Fund (IMF) and the World Bank, empirical work testing the effect of these reforms on aggregate consumption which forms 90% of gross domestic product (GDP) has not been investigated. The only studies well documented in the literature include the effects of liberalisation[1] on savings; on the banking industry; other industries and firms; monetary policy and formal and informal financial markets (Chipeta & Mkandawire, 1991; United Nations Development Programme, 1999; Chirwa, 2001; Chirwa & Mlachila, 2004; Kabango & Paloni, 2010; Ngalawa & Viegi, 2010).

In most of the studies mentioned above, the reform measures were expected to affect mobilisation of savings and investment through their effect on availability and allocation of credit. However, these studies demonstrate that savings and private credit declined while aggregate household consumption increased during the liberalisation period in the 1980's and 1990's in Malawi. In principal, liberalisation would have increased competition in the formal credit market and eased restrictions on borrowers. This would have expanded liquidity options of households who have the ability to smooth consumption. As Reinhart and Tokatlidis (2003) and Qi and Prime (2009) explain, relaxing the liquidity constraints on borrowers that used to be rationed out of the market, may lead to increase in aggregate consumption and decline in aggregate savings. Instead, the country experienced a decline in credit during liberalisation and shows very limited relationship with consumption pattern in Malawi. Therefore, these patterns of consumption and private credit provide motivation for further investigations of behavioural changes in aggregate consumption in Malawi.

In addition, establishing the type of consumption pattern that exists in Malawi will provide clear indications to understand the formulation of sound fiscal and financial policies. For instance, if this study will show that a significant proportion of consumers are unable to smooth consumption effectively because of liquidity constraints, then movements in current income may be an additional determinant of consumption. This would imply that changes in aggregate consumption expenditure will be more responsive to income changes induced by policy. Thus, government actions could be destabilising if consumption patterns are closer to liquidity constrained consumers also called 'rule-of-thumb' consumers than to those who can smooth their consumption overtime following the permanent income hypothesis.

Henceforth, the purpose of the study is to examine whether financial reforms implemented in the 1980's and 1990's have altered the pattern of aggregate consumption behaviour in Malawi. More specifically, the study questions whether financial reforms have affected consumption behaviour by reducing the excess sensitivity of changes in consumption to changes in current income using the PIH framework. If it happens that excess sensitivity does not decline, the paper

[1] Financial liberalization, financial reforms and financial deregulation mean the same in this study and are used interchangeably

explores further whether the failure is due to liquidity constraints or myopia. The study further attempts to provide explanations as to why liquidity constraint remains high despite implementing liberalisation in Malawi. This study is unique from the rest in the sense that new constructed time series of financial reform indices are used in the estimation of the consumption function. To the best of our knowledge, this is the first study to investigate these questions for a small country like Malawi.

Studies on the effect of financial liberalisation on consumption behaviour have mainly followed the seminal work of Hall (1978) on the Permanent Income Hypothesis (PIH). The hypothesis based on the representative agent consumption model proposes that aggregate consumption patterns respond to changes in permanent income. However, empirical work done by Flavin (1981) and Campbell and Mankiw (1989) found that apart from responding to permanent income, aggregate consumption also responds to changes in current income. Thus consumers can be categorised as either permanent income consumers or current income consumers. They argue that consumption expenditures seem to respond to predictable changes in income because some consumers encounter binding liquidity constraints in some period. Specifically, the liquidity constrained consumers are unable or unwilling to use financial markets to smooth consumption.

Blundell-Wignall and Browne (1991), Bayoumi (1993), Girardin, Sarno and Taylor (2000), Aron and Muellbaur (2000), Barrell and Davis (2007) have explained the link between excess sensitivity of current consumption to current income and liberalisation. They observed that liberalisation makes excess sensitivity (liquidity constraints) to decline and enhance consumption to track current income closely. However, in a situation of continued credit market imperfection despite liberalisation, the excess sensitivity of consumption to income may not decline and consumers will be forced to consume entirely out of current income. That is, consumers will be unable to borrow against future income and hence affect the consumption of significant fraction of consumers. Another reason why excess sensitivity may remain high during liberalisation is through rational expectation arguments. For instance, uncertainty about future income can induce consumers engaging in precautionary savings and increasing this uncertainty will increase savings and reduce consumption relative to income (Blundell-Wignall and Browne, 1991). Most of these arguments are based on the empirical findings from industrialised and emerging economies and very limited country specific studies have been conducted in Sub-Saharan Africa. Hence, one of the contributions of this paper is an empirical extension of Campbell and Mankiw's (1989) model on Malawi data and findings add to the empirical literature in Africa.

Attempts have also been made to explore factors behind the rejection of the PIH (Flavin, 1985; Shea, 1995; Drakos, 2002; Rao, 2005; Gomes and Paz, 2010). They have found that myopia, liquidity constraints and perverse asymmetry are important factors behind the failure of PIH. For instance, Shea (1995) explains that under myopia, aggregate consumption behaviour tracks current income and consequently consumption should increase and decrease in response to increases and decreases in the expected income, respectively. While under liquidity con-

straint, consumers are prevented from borrowing when income is temporarily very low. Accordingly, consumption is more correlated with predictable income increases than declines. Gomes and Paz (2010) in their study on Brazil have demonstrated that both factors can coexist. On the extreme side, Paz (2006) found that neither liquidity constraints nor myopia contributes to the failure of PIH but consumption is sensitive only to expected income declines which Shea (1995) called 'perverse asymmetry'.

Ang (2011) has argued further that liberalisation can reduce the response of current consumption to changes in current income in a country with stable macroeconomic background and good financial institutions. However, the current study only explains why liquidity constraints and myopic tendencies remain high despite implementing liberalisation in Malawi. Findings by Chipeta and Mkandawire (1991), United Nations Development Programme (1999), Chirwa (2001), and Malawi Financial Sector Assessment Programme (2007) show that Malawi experienced macroeconomic instability and weak financial institutions during the liberalisation period. They further elaborate that the financial sector is characterised by weak imperfect financial information, lack of proper legal financial systems and supervision, undeveloped credit markets and reliance on collateral requirements which exclude many participants in the formal financial systems. Hence, the formal financial sector may have not changed credit availability which may have impacted negatively on liquidity constraints in Malawi during liberalisation.

Various measures have been deployed to model the direct and interactive effects of financial reforms on economic activities. However, single country empirical studies on the impact of financial liberalisation provide mixed evidence (Barrell & Davis, 2007). The disparities in results partly may also be attributed to differences in the methodological innovations in the measurement of the proxy defining liberalisation indices. Recently, common approaches employed are the principal component analysis and the linear spline functions. The latter is mostly estimated jointly with consumption and debt function (Aron & Muellbauer, 2000). Thus, another contribution of this study is an attempt to construct the financial reform index for Malawi using the principal component analysis and the linear spline function. Most studies in Malawi use single proxies such as the ratio of private credit to GDP and dummy variables prior and post period of liberalisation. Therefore, constructed indices may help to address issues of comprehensive representation and accommodate the sequential institutional changes due to changes in financial sector policy reforms.

The rest of this paper is organised as follows: section 2 discusses a brief analysis of financial reforms and the construction of financial liberalisation indices in Malawi. Section 3 provides the empirical specification of the model to be used in the analysis. Data analysis and empirical results of the model are discussed in section 4 and 5, respectively. Section 6 concludes the study.

2 Brief overview of financial liberalisation in Malawi

2.1 Financial reforms

In Malawi, liberalisation of the financial sector started during the structural adjustment programmes supported by International Monetary Fund (IMF) and the World Bank (WB) in the 1980's. Liberalisation aimed at reducing direct government intervention while at the same time increasing the competition and efficiency in the operations of the financial sector. Measures of liberalisation included decontrolling interest rates, eliminating credit limits, reforming financial institutions, deregulating the financial sector, and adoption of indirect instruments of monetary policy (Chirwa, 2001; Chirwa & Mlachira, 2004). Accordingly, Malawi implemented many policy measures under liberalisation and we concentrate on those related to the study. For more information a brief historical aspect of financial liberalisation is outlined in annex 1[2].

Liberalisation of the financial sector started with the deregulation of interest rates in July 1987 (Chirwa, 2001). Prior to that the basic structure of interest rates was directly administered by the Reserve Bank of Malawi (RBM) with an aim of keeping the interest rates low in order to reduce government expenditures and promote private investment. In particular, commercial banks in Malawi were given the freedom to set their own lending interest rates starting in 1987. This was followed by the deregulation of the deposits rates in April 1988. By August 1988, preferential interest rates to the agriculture sector were abolished and full interest decontrol was done in May 1990. The significant objective of interest rate liberalisation was to influence and encourage borrowing and raise the cost of funds to all financial institutions. Consequently, as shown in Figure 1, there were upward trends of various nominal interest rates after the liberalisation but this happened on the background of high inflation and high income growth volatility. In addition, high interest rates in Malawi have generally been due to high levels of government borrowing of funds on the money market. The money market comprised of a high oligopolistic structure with only two banks which accounted for 90% of bank credit in the economy during the liberalisation period.

Malawi removed credit ceilings and rationing in 1989 (Chipeta & Mkandawire, 1991). By elimination of credit control, it was envisaged that further increase in private sector credit will be achieved. The removal of credit controls which constitute a liquidity constraint may imply that excess sensitivity will be reduced during liberalisation. Henceforth, the pattern of Malawi consumption will be smoothed during the liberalisation period and thereafter. However, RBM introduced the liquidity reserve requirement (LRR) ratio as the major monetary policy instrument in June 1989 (Sato, 2001). RBM started with 10% of LRR and thereafter it trended upwards until 2003. As in Chirwa and Mulachila (2001), banks in Malawi reacted to these high LRR by widening the interest rate spread and hence shifting the cost of refinancing requirements to the customers.

[2] Full details of financial liberalization in Malawi are documented by Chirwa & Mlachira, 2004.

Thus, the introduction of LRR can be seen as counter-productive as it might have restricted consumer credit absorption as the cost of borrowing increased. Simultaneously, government implemented open market operations (OMO) and the bank rate with Treasury bills, RBM bills, Local registered stock and repurchase agreements (repos) as main instruments of monetary policy (Sato 2001), due to inherently limited flexibility of the LRR. Despite some of these efforts, Figure 2 shows that private credit declined during the liberalisation period, but started improving in 2004.

Other reform policies involved the amendment of the RBM Act and Banking Act which were completed in 1989. After the revision of the Acts, privatisation and restructuring of banks and other financial institutions followed starting from 1990. This resulted in the expansion of banks from two in 1994 to nine in 2008 (Lea & Hanmer, 2009). In the foreign exchange market, Malawi adopted a floating exchange rate regime and removed exchange rate controls except for the capital account in 1994 (Sato, 2001). Due to potential volatility of foreign exchange experienced during the floating regime, Malawi adopted a managed floating exchange rate regime in 1995. The RBM was allowed to intervene to influence the exchange rate through sales and purchases of foreign currency, hence managing the exchange rate within a limited band. The band was removed later in 1998 in favour of a floating exchange rate regime (Mangani, 2011). The stock exchange officially opened in 1995 and listing of the first company took place in 1996. Despite this, capital markets are not fully developed and activities on the Malawi stock exchange remain limited

The important feature of financial reform on financial markets is the promotion of savings. Reinhart and Tokatlidis (2003) argue that the effect of real interest rates on consumption and savings depends upon the level of permanent income or wealth of the country. They contend that households first have to achieve subsistence consumption before other inter-temporal consumption choices are made. Hence, countries having high composition of subsistence consumption, consumption and savings will be insensitive to changes in real interest rates, consumption will decline and savings increase after an increase in real interest rates. From Figure 3, savings and consumption as a percentage of GDP instead declined and increased respectively during liberalisation period in Malawi. The decline in savings was largely experienced in the 1990's and reached negative 3% in 1994 from 14% in 1991; consumption on the other hand dropped in the 1980's and started increasing in the 1990's and thereafter.

Furthermore, liberalisation of the credit controls and ceilings indicate that not all households have access to credit. Hence, some consumers are not able to smooth their consumption overtime because they cannot afford to borrow from the formal financial sector. These liquidity constrained consumers determine their consumption and savings based on current income. Therefore, relaxing credit controls and improving credit availability may lead to consumption increases after the financial reforms (Reinhart & Tokatlidis, 2003). Accordingly, Figure 3 portray that Malawi experienced an increase in aggregate consumption and a decline in savings which according to Bayoumi's (1993) arguments may be attributed to increased liquidity coming from increased credit as a re-

sult of liberalisation. Private credit, however, declined during liberalisation. One important feature in Figure 1, 2 and 3 is the turnaround of the pattern of macroeconomic variables after 2006. In particular, we observe that inflation declined, private credit increased, economic growth increased, savings increased and consumption declined. It would be interesting to investigate what caused the turnaround of economic events after 2006.

Moreover, empirical findings in Malawi generally indicate that liberalisation has little effect on improving credit availability in Malawi (United Nations Development Programme, 1999). More specifically, the study found that the demand for bank credit was adversely affected by unfavourable economic environment of high budget deficits, large government demands for bank credit, high rates of inflation, high nominal rate of interest rate and a depreciating currency. In addition, low credit has been attributed due to structural issues which include unreliable power and water supplies, unsatisfactory state of internal road networks, and high transport costs. Other institutional set up problems observed include the fact that 90% of the Malawi population still remain unbanked and 85% of households are predominantly rural and employed in the agricultural sector (Malawi Financial Sector Assessment Programme, 2007). The banking system which forms a large share of the formal financial sector is still fragmented and repressed, mainly situated in urban areas and provide credit mostly to large-scale enterprises (Chipeta & Mkandawire 1991). Even where financial institutions have sufficient resources, lending to small-scale households is seen to be costly and considered a risky credit business.

The Malawi Financial Sector Assessment Programme (2007) has also provided additional factors that led to many Malawians having limited access to formal financial systems. Some of the operational factors include high cost of maintaining bank accounts because many Malawians cannot afford minimum balances due to low income levels, cash based payment systems and delays in loan processing and high cost of banking transfers. Other factors include the higher amount of securities that the banking system imposes on borrowers depending on their perception risks; weak microfinance sectors; limited export finance; existence of large informal sector and limited primary capital markets; and limited legal and regulatory frameworks. These factors have deprived many Malawians accessibility to formal financial systems and cause most household consumers to remain liquidity constrained even after financial reforms in the 1980's and 1990's.

This section has provided a few explanations as to why liquidity constrained consumers exist in Malawi. It is clear from existing literature that the liquidity constraint situation of consumers in Malawi did not improve during the liberalisation era. As discussed above, liberalisation is a process and cannot be specifically defined. Therefore, the study attempts to construct proxies for liberalisation in order to quantify the true picture of financial reforms in Malawi as discussed in section 2.2.

2.2 Financial liberalisation index

As observed from the review of financial reforms in Malawi in section 2.1, the financial liberalisation process has progressed in many stages and involved many policy reform measures. Hence, a concrete definition and measurement of financial liberalisation is difficult. In practice single indicators of financial liberalisation such as ratio of liquidity liability (M2) to nominal GDP, ratio of debt to GDP and ratio of domestic private credit to nominal GDP have been used as proxies for financial liberalisation (Beck, Demirguc-Kunt, & Levine, 2000). However, these single indicators are not comprehensive representations of financial sector development and constructing a financial liberalisation measure with various aspects of the deregulatory and the institution-building process of financial development is very difficult (Bandiera, Caprio, Honohan, & Schiantereli, 2000; Kelly & Mavrotas, 2008). Recently, studies have suggested the use of a financial liberalisation index constructed from principal component analysis (Gries, Kraft, & Meierrieks, 2009). However, Aron and Muellbauer (2000) have argued that the principal component technique does not link institutional information with behavioural responses. Instead, they have used the linear spline function estimated jointly with the consumption and debt function to accommodate the sequential institutional changes that due to changes in financial sector policy reforms.

Given these considerations, this study attempts to construct a financial reform index for Malawi employing both the principal component and the linear spline function using quarterly data from 1980q1 to 2009q4. The indices are specifically helpful in monitoring the pace of liberalisation and evaluating the impact of the policy on various aspects of the economy. After constructing the two financial liberalisation indices, the study also attempts to estimate the impact of financial liberalisation on consumption behaviour using the constructed indicators of financial liberalisation. Apart from estimating a consumption function with financial liberalisation indices obtained from principal component analysis and the linear spline function, the study will also estimate the consumption function using the ratio of private domestic credit to nominal GDP as an index.

2.2.1 Financial liberalisation Index from principal component analysis

Demetriades and Luintel (1997), Bandiera *et al.* (2000), Laeven (2003), and Shrestha and Chowdhury (2006) have attempted to construct financial liberalisation indices using the principal component analysis. Specifically, their approaches were based on assigning arbitrary dummies between 0 and 1 to construct a single index of liberalisation depending on the implementation status to each financial liberalisation policy variables. However, Groenewold, Peng, Li, and Fan (2008) have argued that the process of choosing dummies will be plagued by certain arbitrariness in the assignment of numbers to events. Therefore, we depart from this practice and compute the weighted average of the principal components directly from the three standard measures of financial

depth which include the ratio of liquidity liabilities (M2) to GDP, the ratio of domestic private credit (PC) to GDP, and ratio of commercial bank assets (CBA) to commercial bank assets plus central bank assets.

Following Shrestha and Chowdhury (2006) but using indicators of financial depth as discussed above, the composition of financial liberalisation (FLI) can be expressed as follows:

$$FLI1_t = w_1 PC_t + w_2 M2_t + w_3 CBA_t \tag{1}$$

where w_i is the weight of the component given by the respective eigenvector of the selected principal components. These three standard measures are translated into natural logarithms. After computations, Table 2 reports the eigenvalues of the three possible components as well as the proportion and cumulative proportion of the variation in variables explained by each. The first principle component explains over 65% of total variation and the second principal component explains over 26% of total variation. Hence, the first financial liberalisation index ($FLI1$) is estimated using the eigenvectors of principal component 1.

The series are graphed in Figure 4 and it is evident that financial sector development deteriorated starting from 1980 and became slightly stable during the implementation of financial reforms in 1987. Although, interest rates were decontrolled and credit rationing was removed, episodes of ups and downs were observed during the reform period. Some policy measures introduced such as the introduction of liquidity reserve ratio and limited initial conditions of institutional environment were counter-productive to the reform programme (refer to section 2.1). Other factors contributing to unsuccessful financial reform programmes included political change regime in 1992 and 1994, withdrawal of donor funding, fiscal indiscipline and drought during the reform period (Mangani, 2011). Financial reforms showed signs of positive contribution starting from 2005 coinciding with the new government in power.

2.2.2 Financial lliberalisation from linear Spline function

Following Aron and Muellbauer (2000), financial reform is proxied by a linear spline function. The coefficients of the spline function are estimated jointly with the consumption function. Theoretically and empirically, a macro-econometric consumption function would include an income term, a wealth term and a real interest rate term (Cappelen *et al.*, 2006). However, the wealth term is excluded due to weak data and the real interest rate term was not found to have significant impact in describing consumption. Musila (2002) estimated a consumption function in Malawi where wealth and real interest rate were tested as arguments but the equation did not perform satisfactorily. The national disposable income is used as income in the household sector adjusted for inflation.

Therefore, we include an indicator of financial liberalisation (FLI_t) in the consumption function as follows:

$$\Delta c_t = \mu + \lambda \Delta y_t + \alpha \left(y_{t-1} - c_{t-1} \right) + FLI_t + \varepsilon_t, \tag{2}$$

where c_t is the natural logarithm of consumption and y_t is the natural logarithm of income. α is speed of adjustment and ε_t is the white noise.

Following Aron and Muellbauer (2000), FLI_t in equation (2) is defined using the linear spline function which is expressed as a function of group of dummy variables for the period starting from 1980q1 to 1998q2 (see equation 3). Based on the history of financial liberalisation, dummies for the linear spline function are generated as follows. Financial reform started in 1987 and 0 is assigned prior to the liberalisation and 1 thereafter. By use of the quarterly data series, a 4 quarter moving average is created with predetermined moving average of dummies in 1987. D87 is defined as 0 prior to 1987 and 0.25 in the first quarter of 1987, 0.5 in the second quarter, 0.75 in the third quarter and 1 starting from fourth quarter and thereafter. D88 is defined as the 4 quarter lag of dum1987, d89 is the 8 quarter lag of d1987, this continues until we obtain d98 which will be 44 quarter lag of d1987. Then the linear spline function is defined as follows:

$$FLI_t = w_1 * d87 + w_2 * d88 + w_3 * d89 + w_4 * d90 + w_5 * d91 + w_6 * d92 + w_7 * d93 + w_8 * d94 + w_9 * d95 + w_{10} * d96 + w_{11} * d97 + w_{12} * d98 \tag{3}$$

The coefficients (w_i) in equation 3 are estimated from equation 2. Based on Aron and Muellbauer's (2000) arguments, only positive coefficients are used in the estimation of equation 3. They argue that negative coefficients indicate policy reversal in the implementation of financial liberalisation. Positive effects of liberalisation are not realised in economies practicing policy reversal because most households and firms lose trust and coherence in adopting government policies. After estimations, 5 positive coefficients of dummies out of 12 were used in estimating FLI_t in equation 3. The estimated FLI_t is plotted together with consumption function as shown in Figure 5. The results show that consumption has moved along with financial reform index except in 1994 at the time of political change regime. It will be interesting to see how the coefficients will behave in a more sophisticated consumption function with wealth variables and interest rates variables. Additionally, joint estimation with household debt function should also be considered in future after obtaining reliable data on domestic debt. This is work in progress to improve on the formulation of the consumption function and debt function that can be jointly estimated to obtain reliable coefficients that can be used to construct a formal financial reform index for Malawi.

We observe different performances between the principal component analysis and the spline function. The principal component shows that the actual implementation of liberalisation policies had negative effects on financial sector development which by implication may have led to non-effects of financial reforms on consumption. In section 2, we observed that some policy measures implemented were counter-productive to the reform programme. In addition, the financial reform programme was implemented under the background of unstable macroeconomic fundamentals such as high inflation, erratic economic growth and change in political regimes. However, we observe different scenario under the spline function. The changes in aggregate consumption pattern moved

along with financial reforms. Consumption is trending at the lower level than before liberalisation. But episodes of upward movements in consumption when financial reform improved contradict the permanent income hypothesis and liquidity constraint. This may imply that changes in consumption pattern arose during liberalisation following changes in the current income.

Nevertheless, in both methodologies, the outcomes after financial liberalisation beginning 2007 show that financial sector development improved. From Figure 1 and 3, private credit increased, savings rejuvenated and consumption decreased in line with the theoretical expectations. Several questions can be asked from this. Is this an element of reduction in liquidity constraints? Is this an element of reduction in myopic tendencies of consumers? Did Malawi introduce other policies such as institutional policies apart from financial policies which had positive effects on changing consumption pattern during this period? For instance, government may have implemented policies in agriculture, education and health that likely may have influenced household consumption behaviour. In order to answers such questions, there is need for a more dynamic macroeconomic model which will be an important topic for the next study.

3 Empirical specification of the model

In this study, we adopt the Euler-equation approach based on the work of Hall (1978) to analyse the development of aggregate consumption function. The model follows the solved-out consumption function set out in Campbell and Mankiw (1989) in which we allow for the presence of liquidity constraints as follows:

$$\Delta c_t = \mu + \lambda \Delta y_t + \theta rlr_t + \varepsilon_t, \tag{4}$$

where Δc_t represent the change of the log of aggregate consumption, Δy_t is the change of the log of aggregate income while μ and ε_t represent the drift and the error term, respectively. θ is the elasticity of substitution parameter and rlr_t is the real lending rate. The parameter λ represents the degree of excess sensitivity. This equation simply states that the change in consumption is a weighted average of the change in current income and the unpredicted changes in permanent income. Hence, the analysis of changes in consumption pattern will be based on the degree of excess sensitivity. Therefore, we test the hypothesis that $\lambda = 0$. If λ is significant and positive, it entails rejection of the permanent income hypothesis, that is consumption behaviour in Malawi follows a rule-of-thumb.

In theory, real interest rates (rlr_t) would also be expected to influence savings, and therefore consumption, with lower interest rates leading to increased consumption. However, actual trends of savings declined during liberalisation in Malawi (Figure 3). The interest rate structure is still non market determined due to high official oligopolistic financial structure and high government credit uptake. Hence, interest rate structure is likely to be controlled and consumer credits are likely to be low and lenders continue to use different criteria in credit rationing. Therefore, we assume constant elasticity of substitution but include

it in our estimations to testify non-impact of interest rates on consumption in Malawi.

After examining the level of excess sensitivity, we test whether this level declined during liberalisation period. We use indices of financial liberalisation constructed in section 3 because liberalisation involves many policy measures. On the understanding that we can obtain different outcomes using different indices, we allow for up to three separate parameters on the liberalisation indices to access different aspects of the evolution of consumption behaviour following liberalisation. In this context, we modify equation 4 to allow for liquidity constraints and financial liberalisation as follows:

$$\Delta c_t = \mu + \lambda \Delta y_t + \delta FLI_t + \varepsilon_t \tag{5}$$

where FLI_t is a proxy for financial liberalisation. Three proxies are used which include the ratio of private credit to GDP, constructed series of financial liberalisation from the principal component and constructed series from the linear spline function. It is anticipated that the size of excess sensitivity λ for Malawi will decline during the liberalisation period. As explained in the introduction, one reason for excess sensitivity is the existence of liquidity constraints. Therefore, a significant and reduced λ during the liberalisation period would show that financial liberalisation improved liquidity situation and hence changed the pattern of consumption in Malawi.

The hypothesis that excess sensitivity $\lambda = 0$ may be rejected and may not decline during the liberalisation period has prompted us to explore further factors behind the negative outcomes. Building from the work of Shea (1995) and others, we modify equation 4 further to isolate liquidity constraints effects in Malawi:

$$\Delta c_t = \mu + \lambda_1 DUM1 \Delta y_t + \lambda_2 DUM2 \Delta y_t + \varepsilon_t, \tag{6}$$

where $DUM1$ is a dummy variable for periods in which $\Delta y_t > 0$ and is a dummy variable for periods in which $\Delta y_t < 0$. Under liquidity constraint λ_1 should be positive, significant and greater than λ_t while under myopia λ_1 and λ_2 should be positive, significant and greater than zero.

However, estimating excess sensitivity λ using ordinary least squares (OLS) in all the models will yield biased and inconsistent coefficient because we are using expected variables in the equations. More specifically, permanent income hypothesis involves predictable components of income growth and real interest rates which are unobservable quantities (Campbell and Mankiw, 1990; Shea, 1995; Drakos, 2002; Wooldridge, 2009). Such simultaneous and error specifications can bring about the problem of endogeneity. Thus the explanatory variable Δy_t in equation 4 maybe correlated with ε_t. To address such endogeneity problem, the current study uses instrumental variables technique and two-stage least squares (IV –TSLS) employed by Campbell and Mankiw (1989).

In the IV-TSLS, we use the predetermined variables as instruments. Specifically, the lagged values of Δy_t are usually considered in the literature because the lagged variables are likely to be correlated with their current variables but not with the error term, since there were generated at an earlier point in time.

In addition, instrumental variables are used to control for the possibility that changes in current income might signal changes in permanent income. The first lags are not used in this study because consumption and income data are time averaging and may induce serial correlation between the variable and its first lag (Campbell and Mankiw, 1989; Bayoumi, 1993; Shea, 1995; Drakos, 2002). Instead, we use lags starting from the second lag period in order to circumvent this problem. The only problem is that the degree of predictability is somehow lost in the first stage of regression (Agell and Berg, 1996).

4 Data and descriptive statistics

The study uses quarterly data for the period 1987:1 to 2009:4 which was collected from International Financial Statistics (IFS) of IMF. Missing data was filled and consolidated from various in-country publications of the RBM, National Statistics Office (NSO) and from the Ministry of Development Planning and Cooperation (MDPC). Data series include real per capita national disposable income (total domestic consumption plus total national savings), real per capita household consumption, and bank lending interest rate. Real interest rates are calculated according to the formula $1 + r_t = (1 + i_t) / (1 + \pi_t)$, where r_t is real interest rate, i_t is nominal interest rate and π_t is inflation (Chipeta & Mkandawire, 1991; Paz & Gomes, 2010). Household consumption (consumption) and national disposable income (income) are collected annually in Malawi. In this regard, the series were interpolated using annual data to obtain quarterly series estimated using indices of seasonally adjusted money series (M1). As shown in Table 2, M1 was found to be highly correlated with consumption and income while the indices of industrial production (IIP) were not correlated with consumption and income.

Consumption and income variables were converted into natural logarithms. This makes the model estimated as the log-linear approximation to the true model. As shown in Table 3, consumption and income series were tested using the Augmented Dickey-Fuller test for stationarity and the Johanseen procedure for cointegration. The series were not stationary in levels and became stationary at first difference, that is there are integrated of order one I(1).

Using Johansen procedure, the series are not cointegrated at the 5% critical value; hence the null hypothesis of non-cointegration cannot be rejected. Thus the model is proven to be properly specified and can model the series in difference without losing important information in the estimated equation. It is also observed that estimations should use consumption data of non-durables and services and total disposable income or disposable labour income but Campbell and Mankiw (1990) found that the distinction is not very important. They obtained similar results empirically.

5 Empricial analysis

The estimated model on whether permanent income hypothesis exists in Malawi is represented in Table 4. First, we tested the quality of the instruments used in our estimations and results are reported in the first stage regressions. The test results show that each set of instruments has strong predicting power for both income growth and consumption changes. One noticing feature is that the absolute R^2 for consumption are smaller than R^2 for income, except when real interest rate is used as instrument. This provides evidence against the permanent income hypothesis in Malawi. Campbell and Mankiw (1990) have argued that such result is sometimes obtained because of the error in the measurement of the income growth. However, obtaining uncorrelated measurement error will not bias the IV estimates of λ but will reduce the predictability of income growth.

Second, we tested the validity of the instruments using the over-identifying restriction tests of the instruments and this method is equivalent to the Sargan test. The test is conducted across all models. The adjusted R^2 for a regression of IV residual on the instruments with p-values in brackets for a Wald test that all the coefficients are zero are reported in the last column of Table 4. In all the models, the test results show that there is no evidence against the restrictions in the models used for estimations. Hence, we can argue that the models are well specified.

Third, attempts have been made to address the issues of heteroskedasticity, serial correlation, stability of parameters, and testing for restriction in the use of instrumental variables to address the issue of over-identification in the Tables 5 and 6. Most of these tests show that all the standard errors and test statistics are heteroscedasticity, autocorrelation, and stability consistent.

Empirical results represented in Table 4 show that predictable movements in real income growth do exhibit significant explanatory power over consumption growth, evidence against the PIH in Malawi. That is, the excess sensitivity is much higher than what is generally observed in industrial countries as well as other less developed countries (Campbell & Mankiw, 1989 and 1990; Rao, 2005; Paz & Gomes, 2010). These findings show that almost 90% of households in Malawi are associated with liquidity constraints and cannot smooth their consumption pattern over time. Specifically, it implies that consumers in Malawi depend on current income for their current consumption. The strong effects of current income are consistent with how the economic system prevailed in Malawi. As observed in the literature, the country experienced low liquidity options such as credit unavailability and low savings. Credit markets are imperfect and there exist a considerable proportion of the population that cannot save or borrow because their incomes are very low and they possess limited nonhuman wealth.

The intertemporal substitution of consumption with respect to the real interest rate has also been estimated and the results have not been included in Table 4. The coefficients found were very small and insignificant in all models. We also found that when using lagged real interest rate as instruments, the

estimated coefficient λ is greater than 1 but significant. This may imply that model 4 suffers from specification problems (See Gomes & Paz, 2010). Thus, the predictive power of interest rates on consumption growth or income growth is not clear in Malawi. This confirms the explanation provided in the model specification in section 4.

The results in Table 5 show that the coefficients of the excess sensitivity remained high under all cases of financial liberalisation. In addition, the estimated coefficients under the three liberalisation proxies are insignificant, indicating that there has been very little contribution from financial liberalisation on the consumption behaviour in Malawi. The failure to find any evidence of financial market liberalisation in Malawi is also in keeping with prior expectations. Despite liberalising interest rates and removing credit controls, financial regulation concerning the authorisation of various financial activities was not fully implemented. This can partly be seen in the oligolopolistic tendencies that banks practices in Malawi and the high participation of government in credit uptake. In addition, financial reforms could not work in isolation with unstable macroeconomic environment and weak financial institutions. Therefore, the case of liquidity constraints remained strong despite efforts to decontrol interest rates and abolish credit allocations.

Following the rejection of permanent income hypothesis even during the liberalisation period, we estimated equation 6 in an attempt to clarify the sources of this rejection. The results in Table 6 show that both liquidity constraints and myopic tendencies are important factors behind the rejection of the PIH in Malawi. One possible reason for existence of liquidity constraints is non-effect of significant structural changes in the formal financial sector (particularly on the banking sector) which failed to improve on making credit availabile to most households. As explained in section 2.1, the financial sector was characterised by limited presence in rural areas and high cost of financial intermediation. In addition, apart from government taking up a lion's share of credit, the monetary authority implemented counter-productive monetary policy instruments such as the liquidity required reserve which controlled the accessibility of liquidity in the economy. This may have possibly hindered accessibility of finance for those household consumers capable of smoothing consumption. Malawians are also myopic in nature because they depend on current income for their daily living. A large population is located in the rural areas and characterised with low savings, very limited non-human assets and low income. This is the first time the estimation of such nature is found on Malawi though similar to what has been found by Gomes and Paz (2010) on Brazil. It is now evident that the reason for the failure of PIH in Malawi is either liquidity constraint or myopia.

In summary, a closer look at our data reveals drastic changes in some macroeconomic variables starting especially from 2005. The years after 2006 dramatically changed in the economic variables with persistent high increase in economic growth, credit resurgence and decrease in aggregate consumption. Hence, it is quite conceivable that there were other uncertainties or factors that affected consumption apart from financial policy measures implemented during liberalisation. Following the new political dispensation in 2004, Malawi may have

implemented other institutional policies apart from financial reforms. For instance, Malawi introduced the fertiliser subsidy programme which on record has contributed to bumper crop harvest in agriculture leading to high economic growth. Therefore, the households in Malawi may have responded to increased uncertainty or other factors which may have increased precautionary savings and hence reduced the level of current consumption in the economy and increased future consumption later. It would be interesting to analyse all these relationships using a dynamic macroeconomic model.

6 Conclusion

The study has found that PIH of aggregate consumption behaviour does not exist in Malawi. Most consumers are current income consumers (rule-of-thumb). They consume from "hand to mouth" and very little is left to smooth consumption in their life time. The magnitude of 90% of excess sensitivity implies that most consumers in Malawi are current income consumers and is much higher than what was found in US and UK but even higher than what was found in other Less-Developed countries like Fiji. Despite Malawi implementing financial reforms in the 1980's and 1990's, households in Malawi seem to link consumption to current income. It is further observed that there was no shift between the current income consumers and permanent income consumers. The excess sensitivity still remains high during the liberalisation period. The empirical findings have further argued that the main reason for the failure of the PIH is due to liquidity constraint which is manifested in the under development of the financial market and unstable macroeconomic conditions in Malawi. Weak financial institutions, both structural and operational have impacted negatively on the accessibility of financial resources for most Malawians. This is a bigger lesson for policy makers to consider in the preparation of the broad based financial reforms in future.

As reviewed in the literature, further research would be more interesting to investigate the turnaround of economic events after 2006. We have observed dramatic changes in the economic variables with persistent high increase in economic growth, credit resurgence, decrease in aggregate consumption and increase in savings. It would be interesting to model what uncertainties or factors that affected consumption and savings apart from failed financial liberalisation. In addition, it would be interesting to investigate if the established high level of liquidity constrained consumers (rule-of-thumb) in Malawi is included in the small macroeconomic dynamic model (sticky price) for Malawi. As reiterated in the literature, government action could be destabilising if consumption patterns are closer to the rule-of-thumb than permanent income hypothesis. In particular, it will be informative to investigate the impact of monetary policy or fiscal policy on current income consumers who do not borrow or save but follow a simple rule-of-thumb in Malawi.

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Table 1: Eigenvalue and Scores of Principal Components

Component /Variable	Eigenvalue	% of Variance explained	Cumulative % of variance explained	Score principal component 1	Score principal component 2
1	1.939	65	65	0.633	0.329
2	0.777	26	91	0.638	0.291
3	0.284	9	100	-0.438	0.899

Note: variables in chronological order are 1) PC, 2) M2, and 3) CBA

Table 2: Test for Serial Correlation

	M1	Income	Consumption	IIP
M1	1.000			
Income	0.993	1.000		
Consumption	0.954	0.956	1.000	
IIP	0.434	0.438	0.401	1.000

Note: Test for serial correlation so that currency in circulation can be used to calibrate the quarterly series of household consumption and national disposable income.

Table 3: Testing for Stationarity and Cointegration

Testing for stationarity		**Testing for Cointegration – Johansen Procedure**		
Variables	Dickey-Fuller Test	Null hypothesis	Trace test	p-value
c_t	-1.197 (0.673)	r=0.v r=1	10.712	(0.230)
Δc_t	-6.133 (0.000)	r=1.v r=2	1.881	(0.170)
$\mathbf{y_t}$	-0.907 (0.782)	Null hypothesis	Max-Eigen test	p-value
$\Delta \mathbf{y_t}$	-4.957 (0.000)	r=0.v r=1	8.831	(0.301)
		r=1.v r=2	1.881	(0.170)

Note: The testing null hypothesis is that the variable has a unit root I(1). The figures in parenthesis are p-values. In terms of cointegration, r is the number of cointegrating vector. Number of lags used is 1 in both cases.

Table 4: Estimate of λ Model for Malawi 1987q1 – 2009q4

Instrument	First Stage Regressions		λ estimate (s.e.)	Test of restrictions
	Δc_t equation	Δy_t equation		
Model 1 (OLS)			0.922***	
			(0.066)	
Model 2 (IV)	0.182	0.227	0.870***	-0.025
	(0.001)	(0.000)	(0.170)	(0.855)
Model 3 (IV)	0.199	0.262	0.815***	-0.030
	(0.000)	(0.000)	(0.120)	(0.942)
Model 4 (IV)	0.222	0.187	1.125***	-0.033
	(0.000)	(0.000)	(0.158)	(0.996)
Model 5 (IV)	0.180	0.247	0.914***	-0.040
	(0.001)	(0.000)	(0.098)	(0.830)
Model 6 (IV)	0.278	0.280	0.983***	0.008
	(0.000)	(0.006)	(0.110)	(0.428)

Notes: Three asterisks indicate 1% significance level and the figures in brackets are standard errors. The intercept and real interest rates (lending rate) were included as regressors in the estimation but results are not included in this table. In the first column of the table, model 1 is estimated using OLS while models 2 to 6 are estimated using two stage least squares. Model 2 uses three lags of income growth as instruments and model 3 uses three lags of consumption growth as instruments. Model 4 instruments are three lags of real interest rate. Model 5 instruments are three lags of income growth, consumption growth and error correction model for consumption and income. Model 6 instruments are three lags of income growth, consumption growth, real interest rate and error correction model for consumption and income. In the first stage regression, we report the adjusted R^2 statistics for the OLS regression of change in consumption and change in income on the instruments with p-values in brackets for the Wald test of the hypothesis that all coefficients are zero except the intercept.

Table 5: Estimated Results of $\Delta c_t = \mu + \lambda \Delta y_t + \delta FLI_t + \varepsilon_t$

	Model 1 OLS	Model2: IV	Model 2: IV - FLI1	Model 3: IV - FLI2	Model 4: IV - FLI3
μ	-0.003	0.003	-0.037	-0.029	0.039
	(0.008)	(0.008)	(0.065)	(0.045)	(0.058)
λ	0.933***	0.918***	0.932***	0.937***	0.927***
	(0.067)	(0.100)	(0.097)	(0.098)	(0.104)
δ			0.018	0.020	-0.307
			(0.034)	(0.036)	(0.425)
$\bar{R}^2$	0.795	0.794	0.786	0.787	0.786
D.W.	1.856	1.860	1.822	1.827	1.809
LM(1)	0.001	0.003	0.007	0.002	0.091
	(0.970)	(0.957)	(0.933)	(0.963)	(0.763)
ARCH (1)	0.0.314	0.312	0.315	0.314	0.329
	(0.575)	(0.596)	(0.575)	(0.580)	(0.566)
Ramsey's	0.108	0.025	0.063	0.087	0.151
RESET	(0.915)	(0.980)	(0.950)	(0.931)	(0.881)
Test of	-	-0.040	-0.045	0.046	-0.053
Restriction		(0.273)	(0.878)	(0.886)	(0.933)
$H_0: \lambda = 0$					
$H_a: \lambda \neq 0$					

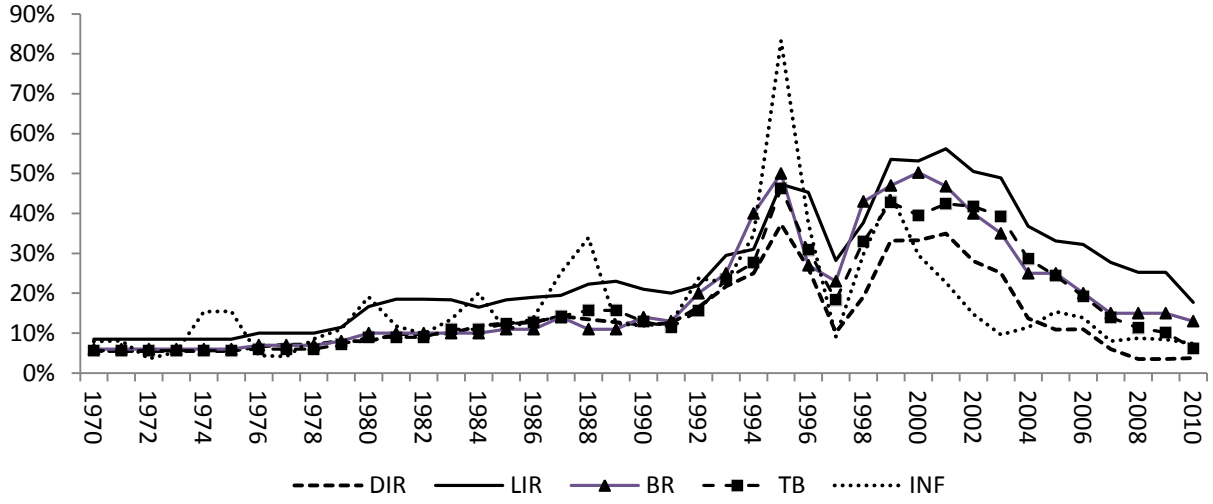
Note: Three (two) asterisks indicate 1% (5%) significance level and the figures in brackets of λ and δ are t-statistics. LM (1) test for serial correlation and ARCH (1) test for heteroskedasticity coefficients are observed R-squared and in brackets are p-values. Test for parameter stability was done using Ramsey's RESET test and in testing for over-identification restrictions the adjusted R^2 for a regression of IV residual on the instruments with p-values in brackets for a Wald test that all the coefficients are zero was also conducted. Instruments for models 2 to 6 are lagged variables of consumption, lagged variables of income, and an error correction model.

Table 6: Estimated Results of $\Delta c_t = \mu + \lambda_1 DUM1_t \Delta y_t + \lambda_2 DUM2_t \Delta y_t + \varepsilon_t$

	Model 1 (OLS)	Model 2 (IV)	Model 3 (IV)	Model 4 ((IV)	Model 5 (IV)
μ	-0.009	-0.030	-0.018	-0.017	-0.030
	(0.013)	(0.113)	(0.020)	(0.018)	(0.023)
λ_1	0.999***	1.302	1.115***	1.105***	1.343***
	(0.106)	(1.488)	(0.258)	(0.243)	(0.292)
λ_2	0.892***	0.850*	0.861***	0.867***	0.0.897***
	(0.121)	(0.469)	(0.167)	(0.167)	(0.158)
$\bar{R}^2$	0.793	0.774	0.791	0.791	0.765
D.W.	1.870	1.932	1.891	1.888	1.941
LM(2)	0.006	0.058	0.018	0.016	0.070
	(0.938)	(0.810)	(0.894)	(0.901)	(0.792)
ARCH (1)	0.325	0.503	0.367	0.362	0.550
	(0.569)	(0.478)	(0.545)	(0.548)	(0.458)
Ramsey's	1.623	0.108	0.807	0.675	0.035
RESET	(0.108)	(0.914)	(0.422)	(0.501)	(0.972)
Test of	-	-0.142	0.002	-0.039	-0.015
Restriction		(0.631)	(0.149)	(0.361)	(0.281)
F-Statistics	0.309	0.054	0.437	0.401	0.377
$H_0: \lambda_1 = \lambda_2$	(0.580)	(0.817)	(0.510)	(0.528)	(0.244)

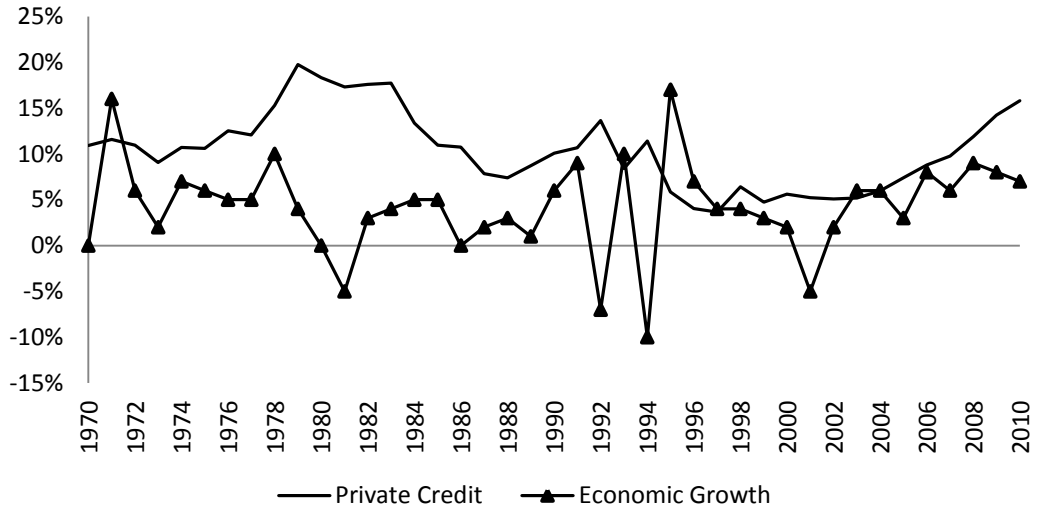
Note: One, two, and three asterisks indicate 10%, 5%, and 1% significance level, respectively and the figures in brackets alongside the coefficients are t-statistics. In the diagnostic part, the figures in brackets are p-values. Other diagnostic estimates were conducted as included in the table. Under myopia, H_0: $_1 =$ $_2$ and $_1 > 0$, $_2 > 0$, while under liquidity constraint H_o: $_1 >$ $_2$ and $_1 > 0$.

Figure 1: Trend of Various Interest Rates and Inflation



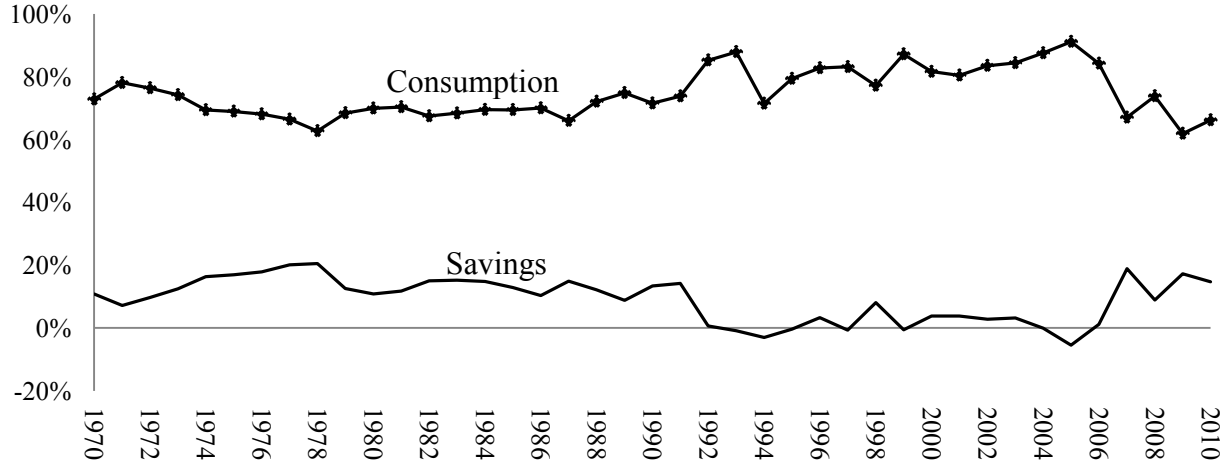
Note: Data obtained from IMF-IFS, World Bank Indicators and RBM Financial and Economic Reports. INF, DIR, LIR, BR and TB stand for inflation, deposit interest rate, lending interest rate, bank rate and Treasury bill, respectively.

Figure 2: Economic Growth and Private Credit



Source: Data used from IMF-IFS, World Bank Development Indicators and RBM Economic and Financial Review. Private credit is calculated as percentage of GDP and economic growth is percentage changes of real GDP.

Figure 3: Savings and Consumption as % of GDP



Source: Data used from IMF-IFS, World Bank Development Indicators and RBM Economic and Financial Review

Figure 4: Financial Reform Index using Principal Component Analysis

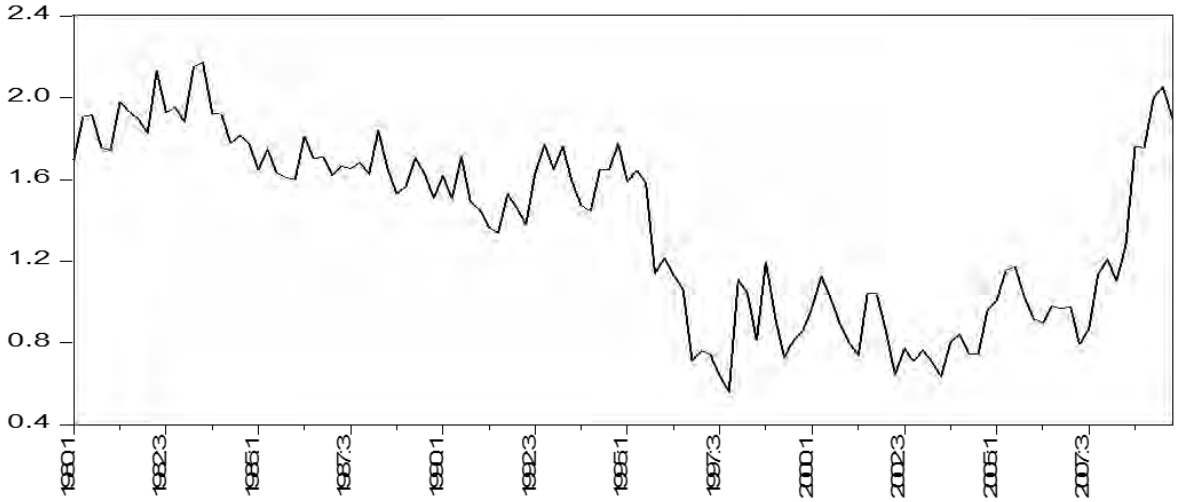
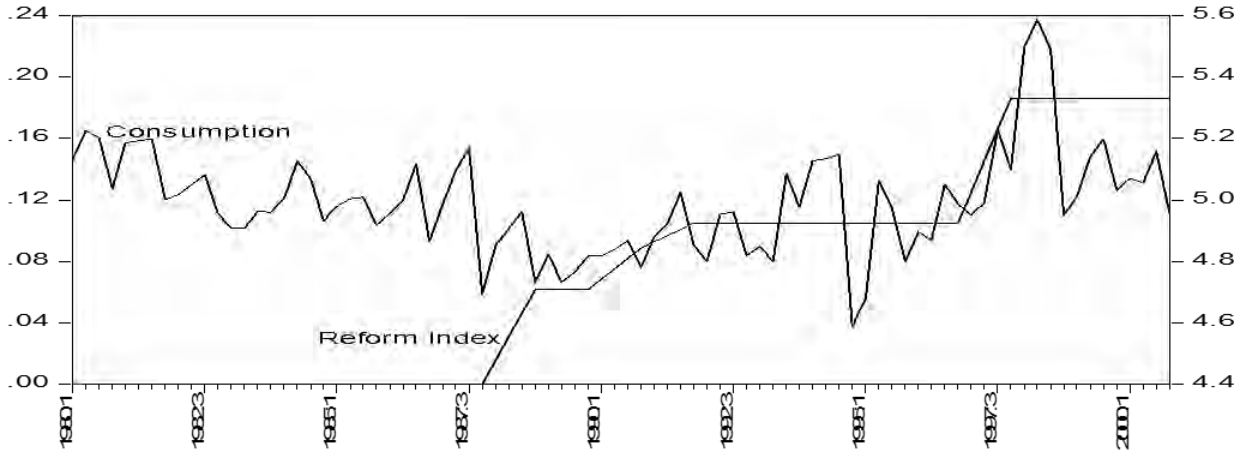


Figure 5: Consumption and Financial liberalisation Index



Annex 1: Financial Liberalisation in Malawi 1987-1998

Period	Policy Measures
	1. Liberalisation of Interest Rates
July 1987	Commercial banks started setting their own lending interest rates
April 1988	Deposit rates were deregulated
August 1988	Preferential interest rates to the agricultural sector were abolished
May 1990	All interest rates became fully liberalised
	2. Directed credit
1988	Credit ceilings and credit rationing were removed
1990	Preferential lending to Ministry of Agriculture was abolished
	3. Cash Reserves and Liquid Assets Requirements
June 1989	LRR ratio introduced at 10% of commercial bank liabilities with commercial banks earning interest rates on reserves
December 1990	LRR ceased to earn interest rates
1997	LRR was changed from daily to monthly average and RBM started paying interest rate on reserves
August 1998	LRR changed back to daily observance by commercial banks and RBM ceased to paying interest rates on reserves
	4. Competition in the financial markets
1989	Review of RBM Act and Bank Act leading to deregulation of entry into the banking sector
March 1998	Entry and incorporation of continental discount house and introduction of interbank market lending among commercial banks
	5. Open Market Operations
1991	Treasury bills introduced
1990	RBM bills introduced
	6. Exchange Rate Liberalisation
January 1971	British pound/Malawi pound par value system
February 1971	Malawi Kwacha introduced and pegged to the pound at two to one
November 1973	Peg to a weighted average of the pound and the US Dollar
June 1975	Peg to the SDR
January 1984	Peg to a weighted basket of seven currencies
1990	Complete liberalisation of foreign exchange allocation
February 1994	Free floating (with intervals of managed float)
	7. Liberalisation of capital account
February 1995	Malawi stock exchange established (limited liberalisation of capital markets)