Financial sector reforms and private investment in Malawi: an ARDL-bounds testing approach

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Abstract: This study attempts to examine the impact of financial sector reforms (proxied by interest rate liberalisation) on private investment in Malawi, using the ARDL bounds testing approach. The study is motivated by the conflicting results that have been reported in the literature in recent years on the efficacy of interest rate liberalisation in developing countries. The study seeks to answer one critical question: does interest rate liberalisation spur private investment in Malawi? The empirical results of this study reveal that interest rates have a positive and significant impact on private investment in the short-run, but not in the long-run. The study, therefore, recommends that interest rate reforms should be intensified in Malawi in the short-run. However, in the long-run, the monetary authorities should keep an eye on the interest rates, in order to ensure that they remain within the acceptable threshold.

Keywords: Malawi; interest rate reforms; private investment; ARDL bounds testing approach.

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1 Introduction

The relationship between financial sector reforms and investment in developing countries has drawn much attention in the recent literature. Although a number of developing countries have liberalised their financial sectors in recent decades – with the aim of
promoting savings, investment and economic growth, few studies have been done to empirically examine the dynamic relationship between financial sector reform and private investment in these countries. In particular, studies on Sub-Saharan African countries, like Malawi, are very scant.

The theoretical relationship between financial sector reforms and investment can be linked to the theoretical underpinning of McKinnon (1973) and Shaw (1973) – also known as the McKinnon-Shaw hypothesis. According to these authors, a low or negative real rate of interest discourages savings, and hence reduces the availability of loanable funds, which ultimately constrains investment. The McKinnon (1973) hypothesis, for example, argues that low interest rates discourage people from holding money or other financial assets – because of the low incentives for holding such assets. According to the McKinnon (1973) hypothesis, a rise in the rate of interest increases the volume of financial savings through financial intermediaries, which, in turn, raises investment funds – a phenomenon he called the ‘conduit effect’ (see also Odhiambo, 2004). The realised investment in this case increases because of the greater availability of funds through increased savings, which is caused by a rise in interest rates. In other words, investment in this theory is constrained by the availability of loanable fund savings, rather than the demand for investment funds (see also Odhiambo, 2004).

Financial sector reforms in Malawi, like those in many other Sub-Saharan African countries, are still in the developing stage. Financial liberalisation was first implemented in Malawi in 1987 – with the liberalisation of the lending rate, and later the deregulation of the deposit rate in 1988 (see also Mlachila and Chirwa, 2002). In 1989, the liberalisation was intensified. Like many other African countries, there was heavy framework intervention in the financial sector before liberalisation via credit- and interest-rate controls. In 1989, the liberalisation of the financial sector in Malawi was intensified. In 1990, the bank rate, which was linked to an official auction-bill rate, was introduced, which culminated in the removal of credit ceilings in 1991. The liberalisation policy continued to 1994; and in 1998, the Commercial Bank of Malawi became the first bank to be listed on the Stock Exchange. Following the liberalisation of the financial sector, several foreign exchange bureaux were opened; and by December 1998, there were about 20 foreign-exchange bureaux. Currently, there are about 12 commercial banks licensed to operate in Malawi. In addition, there are two other financial institutions.

Although some previous studies have attempted to examine the relationship between financial reforms and investment in a number of Sub-Saharan African countries, the majority of these studies are somewhat outdated; and they suffer from a number of weaknesses. For example, the majority of the previous studies on this subject have used either the residual-based co-integration test, associated with Engle and Granger (1987), or the maximum-likelihood test, based on studies by Johansen (1988) and Johansen and Juselius (1990), to examine the long-run relationship between financial reforms and investment. Yet, these techniques have been found to be inappropriate, especially when the sample size is too small (see Narayan and Smyth, 2005; Odhiambo, 2009a).

Furthermore, some of the previous studies have relied on the cross-sectional data; yet, it is now clear that the cross-sectional data approach does not satisfactorily address the country-specific issues (see Ghirmay, 2004; Quah, 1993; Casselli et al., 1996; Odhiambo, 2009b, 2014b, amongst others). It is against this backdrop that the current study attempts to investigate the impact of financial reforms on private investment in Malawi using the newly introduced autoregressive distributed lag (ARDL)-bounds testing approach. To our
knowledge, this may be the first study in recent times to fully explore the impact of financial reforms in Malawi – using the modern time-series techniques.

The ARDL-modelling approach, which was originally introduced by Pesaran and Shin (1999), and later extended by Pesaran et al. (2001), has been found to be superior to previous co-integration tests, such as the residual-based technique by Engle and Granger (1987), and the full-maximum likelihood (FML) test based on Johansen (1988, 1991), and on Johansen and Juselius (1990) – especially when the data sample is relatively small (see also Odhiambo, 2014b).

The remainder of this paper is organised as follows: Section 2 presents the theoretical and empirical arguments that underpin the relationship between financial reforms and investment in developing countries – as presented in the literature. Section 3 deals with the empirical model specifications, the estimation technique, as well the empirical analysis. Section 4 concludes the study.

2 Literature review

There exist two channels through which financial liberalisation may lead to an increase in the quantity and quality of investment (Thornton, 1990; see also Odhiambo, 2004). One is that higher interest rates increase the availability of domestic credit to finance investment. The second potential channel is through McKinnon’s (1973) hypothesis of the complementarity of money and physical capital. In this hypothesis, it is argued that because investment projects are lumpy, investors must accumulate their investment balances in the form of deposits until the required amount of principal is reached. The more attractive the returns on deposits, the more willing investors are to accumulate them. Specifically, it is argued that under financial repression, the limited supply of credit is likely to be rationed across projects, according to criteria that do not correspond with any social returns.

De Melo and Tybout (1986), for instance, argue that, when interest rates are decontrolled, two types of improvements may be induced. Firstly, a larger volume of investment can be financed, because savings have increased. If international capital movements have been also liberalised, additional funding becomes available from abroad in the form of capital inflows, as well. Secondly, projects with expected returns below the new market-clearing rate will drop out; while previously rationed high-return projects are afforded the opportunity to compete for funds.

In a study in 12 Asian developing countries, Fry (1981a) found that the ratio of domestic credit to nominal GNP is positively and significantly related to real interest rates. Fry (1981b) gave similar results for seven Pacific Basin developing countries. In an earlier study, Fry (1980) found a strong positive and significant relationship between the availability of domestic credit and investment in a pooled time-series study of 61 developing countries.

However, one question that has emerged from the literature is: whether the mechanism through which financial liberalisation affects economic growth is based on the level of productivity – or on the volume of investment. While studies, such as those of Kapur (1976) and Mathieson (1980), argue that increased growth is the result of an increase in the quantity of investment, McKinnon (1973) and Shaw (1973) maintain that increased growth results not only from increased quantities, but also from the quality of
investment. Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Levine (1992), and Saint-Paul (1992) present theoretical models, in which the gains from increased financial development stem from increased efficiency in the allocation of investment, rather than from a larger volume of investment.

On the empirical front, a number of studies have been conducted on the relationship between financial reforms and investment in a number of countries, but with conflicting results. Warman and Thirwall (1994), while examining the relationship between interest rates, savings, investment and growth in Mexico during the period 1960 to 1990, found the net effect of interest rates on investment to be negative. Geng and N’Diaye (2012), while examining the determinants of corporate investment in China, found that financial sector reform, which deregulates and raises real interest rates, as well as appreciates the real effective exchange rate, actually lowers investment and helps rebalance growth away from exports and investment. Osei-Assibey and Baah-Boateng (2012) examined the McKinnon-Shaw hypothesis in Ghana during the period 1970 to 2005. The authors found that while there is a statistically significant and positive relationship between real deposit interest rates and financial savings, as well as between bank credit and financial savings, the net effect of a real deposit rate on investment is negative. Morisset (1993), while examining whether financial liberalisation really improves private investment in developing countries, found that although the effect of financial liberalisation on the quantity of investment was weak (and even negative in some tests), in Argentina, the effect on the quality of investment was consistently positive. Agrawal (2004) examined whether higher interest rates lead to higher investment (and growth) in four East Asian countries. The author found that the investment rate went up with interest rates, going up to 9% in all of the four studied countries, but started declining at still higher rates, in two of the countries. Overall, the author found that the optimal policy was close to McKinnon’s restrained financial liberalisation policy: i.e., liberalisation with the upper limit (at about 6% or 7%) on the interest rates.

Apart from the above-mentioned studies, there are a number of studies, the findings of which show that there is an overwhelming positive relationship between interest rate and investment. Athukorala (1998), for example, while examining the relationship between interest rates, savings and investment in India, using the 1955 to 1995 data, found that higher interest rates seem to stimulate private investment in India. Dupor (2001), while assessing the relationship between investment and interest rate policy, found that a temporary exogenous increase in the nominal interest rate causes a temporary increase in investment. Bo and Sterken (2002) analysed the joint impact of interest rate vitality and debt on firm investment using a panel of Dutch listed firms during the period 1984 to 1995. Their findings show that the cross-effect of the interest rate vitality on investment is positive. Galindo et al. (2007) used firm level panel data from 12 developing countries to examine whether financial liberalisation improves the efficiency with which investment funds are allocated. They found that financial liberalisation does increase the efficiency with which investment funds are allocated. Shetha and Chowdhury (2007), while using the ARDL-modelling approach to examine the financial liberalisation hypothesis in Nepal, also found that the real interest rate affects investment positively.
3 Estimation techniques and empirical analysis

3.1 Empirical model specification and estimation techniques

The empirical model used in this study is based on the McKinnon (1973) and Shaw (1973) hypotheses, which posit that an increase in interest rate leads to an increase in savings (investible funds); and this eventually leads to an increase in investment. Consequently, the impact of financial sector reforms on private investment is examined by regressing the level of private investment on interest rates (a proxy for financial-sector reforms), government investment, real GDP, inflation and the real exchange rate.

The variable, deposit interest rate (D), is meant to capture the impact of financial reforms on the level of private investment. The coefficient of this variable is expected to be positive, according to the McKinnon-Shaw hypothesis. The real GDP(y) is another important determinant of private investment. The coefficient of real GDP is expected to be positive and statistically significant. The inflation rate is another determinant of private investment. This variable is expected to capture the impact of macro-economic uncertainty on private investment. High inflation rates are usually associated with macro-economic instability. When the inflation rate is too high, investors become nervous, especially when the rate remains uncontrolled over a protracted period of time. The coefficient of inflation is, therefore, expected to be negative and statistically significant.

The government-investment variable (GOVINV) has been included in the private investment model, in order to examine the relationship between public and private investment; that is, to establish whether public investment has a positive impact on private investment. The relationship between public investment and private investment, however, remains ambiguous. Public investment can boost private investment by increasing private returns through the provision of infrastructure, such as communication, transport and energy, amongst others. However, public investment can also crowd out private investment, if the additional public investment is financed by a deficit, which leads to an increase in interest rates, credit rationing and a tax burden (see Ouattara, 2004). Blejer and Khan (1984), by decomposing public investment into infrastructural and non-infrastructural investment, demonstrated that while government investment in infrastructure is complementary to private investment, non-infrastructural investment is not (Asante, 2000).

Finally, the real exchange rate (REXR) variable is included in the model, in order to capture the impact of depreciation on investment. An increase in real exchange rate leads to an increase in the price of imported capital and intermediate goods, which leads to a contraction in investment (see Serven and Solimano, 1992; Fry, 1995; Agrawal, 2000). However, according to Van Wijnbergen (1982), the net effect of real exchange-rate depreciation may be ambiguous. While exchange rate depreciation encourages investment in tradable goods, it actually discourages investment in domestic goods.

The empirical model used in this study can, therefore, be expressed as follows:

\[ PINV = f[D, GOVINV, y, INF, REXR] \]

where
PINV the ratio of private investment to GDP
D deposit interest rate
GOINV the ratio of government investment to GDP
y real GDP
INF inflation
REXR real exchange rate.

This study uses the recently developed ARDL-bounds testing approach to examine this linkage. The ARDL-modelling approach, which was originally introduced by Pesaran and Shin (1999), and later extended by Pesaran et al. (2001), has numerous advantages (see also Odhiambo, 2009a, 2014a). The first advantage is that, unlike other co-integration techniques, the ARDL does not impose a restrictive assumption that all the variables under study must be integrated to the same order. This implies that the ARDL approach can be applied, regardless of whether the variables are integrated of order one [I(1)], order zero [I(0)], or fractionally integrated. The second advantage of ARDL is that it is suitable, even if the sample size is small. The third advantage is that the ARDL technique generally provides unbiased estimates of the long-run model and valid t-statistics – even when some of the regressors are endogenous (see also Harris and Sollis, 2003). The ARDL model for cointegration in this case is conducted by taking in turn each variable as a dependent variable (see also Narayan and Narayan, 2004). The ARDL model used in this study can be expressed as follows (see Odhiambo, 2014a):

\[
\Delta \ln PINV_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{4i}\Delta \ln PINV_{t-i} + \sum_{i=0}^{n} \lambda_{5i}\Delta \ln D_{t-i} + \sum_{i=0}^{n} \lambda_{6i}\Delta \ln y_{t-i} \\
+ \sum_{i=0}^{n} \lambda_{7i}\Delta \ln INF_{t-i} + \sum_{i=0}^{n} \lambda_{8i}\Delta \ln GOINV_{t-i} + \sum_{i=0}^{n} \lambda_{9i}\Delta \ln REXR_{t-i} + \lambda_7 \ln PINV_{t-1}
\]

(2)

where \( \mu_t \) = white noise error term; \( \Delta \) = first difference operator; \( n \) = lag length; \( \lambda_0 \) = constant; \( \lambda_{10}, \lambda_{11}, \lambda_{12}, \lambda_{13}, \lambda_{14}, \lambda_{15} \) and \( \lambda_{16} \) represent the short-run dynamics; and \( \lambda_7, \lambda_8, \lambda_9, \lambda_{10}, \lambda_{11} \) and \( \lambda_{12} \) represent the long-run coefficients.

Based on the ARDL model specified in equation (2), the following the error-correction model can be specified:

\[
\Delta \ln PINV_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{4i}\Delta \ln PINV_{t-i} + \sum_{i=0}^{n} \lambda_{5i}\Delta \ln D_{t-i} + \sum_{i=0}^{n} \lambda_{6i}\Delta \ln y_{t-i} \\
+ \sum_{i=0}^{n} \lambda_{7i}\Delta \ln INF_{t-i} + \sum_{i=0}^{n} \lambda_{8i}\Delta \ln GOINV_{t-i} + \sum_{i=0}^{n} \lambda_{9i}\Delta \ln REXR_{t-i} + \lambda_7 ECM_{t-1} + \epsilon_t
\]

(2)

where \( ECM_{t-1} \) = the lagged error-correction term obtained from the long-run equilibrium relationship; \( \lambda_7 \) is the speed of adjustment parameter; and \( \epsilon_t \) = the white noise error term.

The data used in the study, which covers the 1980 to 2012 period, were obtained from the World Bank World Development Indicators (2014) and the International Financial
Statistics Yearbook (2014). The data from the various issues of the Reserve Bank of Malawi Economic Reviews were, however, used to supplement these two databases.

3.2 Empirical analysis

3.2.1 Unit – root tests

Although the ARDL-bounds testing approach does not require that variables to be integrated of the same order, it is not applicable if the variables are integrated of order two \([I(2)]\) or higher. For this reason, it is vital to conduct a unit-root test, in order to ensure that the variables are not integrated of order two \([I(2)]\) or higher. For this purpose, the current study uses the Phillips-Perron and the DF-GLS class of tests. The results of the unit-root tests at level are reported in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Phillips-Perron (PP) test</th>
<th>DF-GLS test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No trend</td>
<td>Trend</td>
</tr>
<tr>
<td>In PINV</td>
<td>–0.462153</td>
<td>–2.260460</td>
</tr>
<tr>
<td>In D</td>
<td>–0.289326</td>
<td>–1.968577</td>
</tr>
<tr>
<td>In GOVINV</td>
<td>–0.043167</td>
<td>–3.071193</td>
</tr>
<tr>
<td>In y</td>
<td>–0.954621</td>
<td>–3.09915</td>
</tr>
<tr>
<td>In INF</td>
<td>0.015937</td>
<td>–2.450450</td>
</tr>
<tr>
<td>In REXR</td>
<td>–1.256020</td>
<td>–3.108053</td>
</tr>
</tbody>
</table>

The results reported in Table 1 show that overall the variables used in this study are non-stationary at levels. Consequently, the variables are difference once, in order to perform stationarity tests on differenced variables. The results of the stationarity tests on differenced variables are presented in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Phillips-Perron (PP) test</th>
<th>DF-GLS test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No trend</td>
<td>Trend</td>
</tr>
<tr>
<td>Δln PINV</td>
<td>–6.168624***</td>
<td>–6.007149***</td>
</tr>
<tr>
<td>Δln D</td>
<td>–3.043249***</td>
<td>–3.658282**</td>
</tr>
<tr>
<td>Δln GOVINV</td>
<td>–6.983312***</td>
<td>–6.867356***</td>
</tr>
<tr>
<td>Δln INF</td>
<td>–6.870105***</td>
<td>–6.837033***</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Based on the results reported in Table 2, both the Phillips-Perron and the DF-GLS tests show that all the variables used in this study are integrated or order 1. In other words, none of the variables is integrated of order two. Consequently, we can proceed to test for co-integration using the ARDL-bounds testing approach.
3.2.2 Co-integration test – ARDL-bounds test

Having confirmed that the variables included in this study are integrated of order one (I(1)), the next step is to test for the co-integration relationship – using the ARDL-bounds testing procedure, which involves two steps. In the first step, we obtain the order of lags on the first differenced variables from the unrestricted models, by using the Akaike-information criterion (AIC). The AIC has been found to be preferable to other lag selection approaches, especially when the sample is small (see also Liew, 2004). In the next step, we proceed to conduct the F-test with each variable as the dependent variable, in order to infer which variables are long-run forcing variables in the determination of the long-run equilibrium relationship [see Payne et al., (2011), p.142]. The results of the F-statistics, together with the bounds-test asymptotic critical values are reported in Table 3.

Table 3  Bounds F-test for co-integration

<table>
<thead>
<tr>
<th>Function</th>
<th>F-test statistic</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>F(InPINV</td>
<td>In D, In y, In INF, In GOVINV, In REXR)</td>
<td>4.1053**</td>
</tr>
<tr>
<td>F(InD</td>
<td>In PINV, In y, In INF, In GOVINV, In REXR)</td>
<td>1.7178</td>
</tr>
<tr>
<td>F(In y</td>
<td>In PINV, In D, In INF, In GOVINV, In REXR)</td>
<td>0.7077</td>
</tr>
<tr>
<td>F(InINF</td>
<td>In PINV, In D, In y, In GOVINV, In REXR)</td>
<td>2.4838</td>
</tr>
<tr>
<td>F(InGOVINV</td>
<td>In PINV, In D, In y, In INF, In REXR)</td>
<td>1.6187</td>
</tr>
<tr>
<td>F(InREXR</td>
<td>In PINV, In D, In y, In INF, In GOVINV)</td>
<td>1.5939</td>
</tr>
</tbody>
</table>

Asymptotic critical values

<table>
<thead>
<tr>
<th></th>
<th>1%</th>
<th>5%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I(0)</td>
<td>I(1)</td>
<td>I(0)</td>
</tr>
<tr>
<td>Pesaran et al. (2001, p.301), Table CI(iv) Case IV</td>
<td>3.50</td>
<td>4.63</td>
<td>2.81</td>
</tr>
</tbody>
</table>

Note: **Denotes statistical significance at the 5% level.

The results reported in Table 3 show that the calculated F-statistic is higher than the critical F-statistic, when the private investment (PINV) is the dependent variable, but not when the other variables (D, y, INF, GOVINV, and REXR) are the dependent variables. As shown in Table 3, the calculated F-statistic in the PINV function (4.1053) is higher than the upper bound critical value of 3.76 at the 5% level. This shows that there is a unique co-integrating vector among the variables in the private investment function. It shows that co-integration among these variables only exists when private investment (PINV) is the dependent variable. It also shows that the independent variables in the private investment model (i.e., D, y, INF, GOVINV, and REXR) are indeed long-run forcing variables in the determination of the long-run equilibrium (see also Payne et al., 2011).

3.2.3 Estimated ARDL models: the long-run and short-run ECM model

Having confirmed the existence of a stable long-run relationship between private investment and its explanatory variables, the next step is to derive the long-run and the short-run coefficients of the explanatory variables. The long-run results are reported in Table 4 (Panel A); while the short-run dynamics are reported in Panel B.
### Table 4  Private investment function

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Coefficient</th>
<th>T-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Estimated long-run coefficients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable: Private investment (PINV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In D</td>
<td>–0.02903</td>
<td>–0.162</td>
</tr>
<tr>
<td>In GDP</td>
<td>–1.2851</td>
<td>–1.62</td>
</tr>
<tr>
<td>In GOVINV</td>
<td>–1.0270**</td>
<td>–2.59</td>
</tr>
<tr>
<td>In INF</td>
<td>–0.3555**</td>
<td>–2.04</td>
</tr>
<tr>
<td>In EXR</td>
<td>–1.4254**</td>
<td>–2.29</td>
</tr>
<tr>
<td>C</td>
<td>35.4109</td>
<td>1.66</td>
</tr>
<tr>
<td><strong>Panel B: Error correction representation for the selected ARDL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent variable: Private investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>–0.3006**</td>
<td>–2.29</td>
</tr>
<tr>
<td>Δln PINV(–1)</td>
<td>0.89033**</td>
<td>2.56</td>
</tr>
<tr>
<td>Δln PINV(–2)</td>
<td>0.6960**</td>
<td>2.750</td>
</tr>
<tr>
<td>Δln D(–1)</td>
<td>0.62362*</td>
<td>1.79</td>
</tr>
<tr>
<td>Δln D(–3)</td>
<td>0.55208**</td>
<td>2.15</td>
</tr>
<tr>
<td>Δln GOVINV</td>
<td>1.7432***</td>
<td>3.92</td>
</tr>
<tr>
<td>Δln GOVINV(–2)</td>
<td>1.6048**</td>
<td>2.33</td>
</tr>
<tr>
<td>Δln GDP(–1)</td>
<td>3.1195*</td>
<td>1.80</td>
</tr>
<tr>
<td>Δln GDP(–2)</td>
<td>6.0606**</td>
<td>2.32</td>
</tr>
<tr>
<td>Δln INF</td>
<td>–0.38516**</td>
<td>–2.16</td>
</tr>
<tr>
<td>Δln INF(–2)</td>
<td>–0.54356**</td>
<td>–2.50</td>
</tr>
<tr>
<td>Δln REXR</td>
<td>–0.9035</td>
<td>–1.51</td>
</tr>
<tr>
<td>ECM(–1)</td>
<td>–0.941363**</td>
<td>–2.55</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.712445</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>2.478</td>
<td></td>
</tr>
<tr>
<td>Prob (F-Statistics)</td>
<td>0.050</td>
<td></td>
</tr>
</tbody>
</table>

Notes: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The results reported in Table 4 show that there is a positive relationship between interest rates and private investment in the short-run, but not in the long-run. Specifically, the results show that a 1% increase in interest rate (lagged one period and three periods) leads to a 0.62% and a 0.55% increase in private investment (respectively) in the short-run, but not in the long-run. The short-run results are supported by the coefficient of the interest rate in Panel B, which has been found to be positive and statistically significant; while the long-run results are supported by the coefficient of the interest rate in Panel A, which was found to be statistically insignificant.

The results of government investment show that although government investment has a positive impact on private investment in the short-run, in the long-run, its impact is largely negative. This finding is supported by the coefficient of the government investment, which was found to be negative in Panel A, but positive in Panel B. The
results show that a 1% increase in government investment results in a 1.74% increase in private investment in the short-run, but a 1.03% decrease in private investment in the long-run.

The results of real GDP show that real GDP has a positive impact on private investment, but only in the short-run. This is confirmed by the coefficient of the real GDP variable, which is positive and statistically significant in Panel B, but not in Panel A. The results show that a 1% increase in real GDP (lagged one period and two periods) increases private investment in the short-run by 3.12% and 6.06%, respectively.

The results of inflation show that inflation has a negative effect on private investment – both in the short-run and in the long-run. This is confirmed by the coefficient of the inflation variable, which is negative and statistically significant in Panel A and Panel B. The results show that in the short-run, a 1% increase in inflation reduces private investment by 0.39% in the short-run, and by 0.36% in the long-run.

Figure 1  Plot of cumulative sum of recursive residuals (see online version for colours)

Figure 2  Plot of cumulative sum of squares of recursive residuals (see online version for colours)
Finally, the results of the exchange rate show that there is a long-run negative relationship between the real exchange rate and private investment in Malawi. This is supported by the coefficient of the real exchange rate variable in Panel A, which is negative and statistically significant. Specifically, the results show that a 1% depreciation of the Malawian Kwacha relative to the dollar leads to a 1.43% decrease in private investment in the long-run. However, in the short-run, the exchange rate has no significant impact on private investment in Malawi. The study also finds that the error-correction term is negative and statistically significant, as was expected. The results of the error-correction term reported in Panel B show that about 94% of the discrepancy between the actual and equilibrium values of private investment is corrected in each period. The results of the diagnostic tests (not reported here) also show that, generally, the regression model conforms to the basic model assumptions. The choice of the functional form is also found to be correct. Likewise, the stability tests based on CUSUM and CUSUM Squares reported in Figures 1 and 2 show that the parameters in the private investment equation are stable during the sample period.

4 Conclusions

This study has examined the dynamic relationship between interest-rate reforms and private investment in Malawi. The study uses the recently developed ARDL-bounds testing approach to examine this linkage. The study was motivated by the painful experience that some developing countries have had with the liberalisation of interest rates, as well as the conflicting results that have emerged in the literature in recent years on the efficacy of interest-rate liberalisation in developing countries. The study has sought to answer one critical question: Does interest rate liberalisation spur private investment in Malawi? To our knowledge, this may be the first study of its kind to empirically examine the impact of financial sector reforms on private investment – using the recently developed ARDL bounds testing technique. The empirical results of this study reveal that the interest rate has a positive and significant impact on private investment in the short-run, but not in the long-run. Specifically, the study finds that a 1% increase in the interest rate (lagged one period and three periods) leads to a 0.62% and a 0.55% increase in private investment (respectively) in the short-run, but not in the long-run. The study, therefore, recommends that policy towards flexible interest rates should be encouraged in Malawi in the short-run, in order to boost investment via increased loanable (investible) funds. However, in the long-run, the monetary authorities should keep an eye on the interest rates, in order to ensure that they remain within the threshold (i.e., below the market clearing level). This is because there is a threshold level of interest rate above which further increases deter investment by attracting risky borrowers; but below which, it encourages investment via increased savings. Other results show that:

1. a 1% increase in government investment leads to a 1.74% increase in private investment in the short-run; but it leads to a 1.03% decrease in private investment in the long-run
2. a 1% increase in the real GDP (lagged one period and two periods) increases private investment in the short-run by 3.12% and 6.06%, respectively
a 1% increase in inflation reduces private investment by 0.39% in the short-run, and by 0.36% in the long-run.

4 a 1% depreciation of the Malawian Kwacha, relative to the dollar, leads to a 1.43% decrease in private investment in the long-run.

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