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Savings and investment in Malawi: a causality test

Abstract

In this paper the authors examine the causal relationship between savings and investment in Malawi during the period of 1973-2011. Specifically, the study aims to establish whether savings Granger-cause investment in Malawi, or whether it is investment that Granger-causes savings in Malawi. Unlike some of the previous studies, the current study uses the recently introduced ARDL-bounds testing approach, and the ECM-based causality model to examine this linkage. The empirical findings of this study show that there is a long-run unidirectional causal flow from investment to savings, and short-run bidirectional causality between savings and investment. The study, therefore, recommends that in the short run, policies aimed at removing the impediments to both savings and investment should be implemented. However, in the long run more emphasis should be placed on pro-investment policies, in order to stimulate economic growth.

Keywords: savings, investment, ARDL-bounds testing approach, Malawi.
JEL Classification: C32, E21, E22, F32.

Introduction

Savings and investment both play an important role in determining a country's growth rate and economic development, as predicted by the various growth models, which acknowledge that capital accumulation is essential for sustainable economic growth. The exact nature of the causal relationship between savings and investment, however, still remains an issue of debate in the literature to this day.

One strand of literature asserts that the growth process sets in motion a self-reinforcing mechanism, through which anticipated growth encourages investment. In turn, an increase in investment leads to an increase in output and income, which then leads to an increase in savings (Schmidt-Hebbel et al., 1994, 1996). Thus, domestic investment leads to savings. Another strand of the literature has its origins in McKinnon's (1973) complementarity hypothesis, which asserts that, in order for there to be investment, there must be an accumulation of savings. Thus, according to this theory, domestic savings lead to domestic investment.

Ascertaining the nature of the relationship between domestic savings and investment guides economic policy. For instance, if growth in an economy is characterized by a savings-driven investment mechanism, then policies should be implemented that are aimed at promoting domestic savings, which would, in turn, stimulate investment, and subsequently, economic growth. If on the other hand, growth is investment-driven, then policies aimed at stimulating economic growth by increasing savings would not be effective – if only a small portion of investment results from domestic savings. In such a scenario, policies should be directed at removing the impediments to investment instead (Erden, 2005; Esso and Keho, 2010; Mishra and Jain, 2012).

Unfortunately, most of the existing literature on developing countries is based on cross-sectional and cross-country studies. The problem with such studies is that they lump together different countries, with different economic characteristics; and they do not account for the factors that are specific to individual countries (see Odhiambo, 2009a; 2009b). There is, therefore, a need for country-specific studies to: (1) Determine the mechanism through which savings and investment affect economic growth in developing countries; and (2) ascertain the responsiveness of domestic investment to any changes in domestic savings.

To address this issue in Malawi, the current study investigates the direction of causality between savings and investment – using the recently developed autoregressive distributed lag (ARDL) bounds-testing approach. The rest of the paper is organized as follows: Section 1 provides an overview of the trends in domestic savings and investment in Malawi. Section 2 reviews the literature; while Section 3 discusses the estimation techniques used in the analysis, as well as the regression results. Lastly, the final section concludes the study.

1. Overview of savings and investment trends in Malawi

Although Malawi implemented financial liberalization policies from the late 1980s[1], the savings rate has remained relatively low, peaking at 20% of GDP during the pre-reform period of 1977-78. Kabango and Paloni (2011) note that the implementation of financial liberalization policies in Malawi has played a significant role in improving the financial system intermediation and competitiveness. Most of the commercial banks went as far as creating

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[1] In an effort to reduce the monopolistic powers enjoyed by the few banks in the market; and hence, to create a competitive environment in saving mobilization and intermediation.

specialized windows for lending to small and medium enterprises, in an effort to make credit more available, and ultimately to stimulate economic growth.

However, the reforms were implemented during a period of high inflation rates, which negatively affected real interest rates, and consequently discouraged savings. Real interest rates fell from an average of 4.5% between the pre-reform periods of 1980-1987 to an average rate of 0.9% during the reform period of 1988-1997. During the latter period, the domestic savings rate declined drastically, with the economy experiencing a number of years when the savings rate was negative. The average savings rate fell to 4.8% of GDP, compared to the average of 13.2% of GDP experienced during the pre-reform period.

In addition, in the years 1992 and 1993, foreign aid to Malawi was withdrawn by donors – in an effort to force political change[1]. This led to economic contraction, with GDP growth falling to -10.2% in 1994; while the savings rate declined to -3% of GDP. Interestingly, investment increased to 29% of GDP that year. During the reform period, the authorities also implemented the Poverty Reduction Growth Facility (PRGF) program under the guidance of the International Monetary Fund (IMF), with which donors aligned their aid disbursement. However, the donors once again withdrew their aid during the period of 2002-2004, when the country failed to meet the requirements of the program. This resulted in further declines in savings, reaching the lowest levels recorded of -5.5% of GDP, as government had to depend on domestic resources for its expenditure purposes. Although GDP growth fell to 2.8% during 2005, investment was at 22.7% of GDP.

During the latter years of the reforms (from 2006), the economy experienced an increase in the savings rate, as donor aid was re-instated and the country benefited from debt cancellation under the heavily indebted poor countries initiative (Mwabutwa et al., 2013). The savings rate increased to an average rate of 8% of GDP from 2006 to 2011.

Another contributing factor to the low savings rate in Malawi is the fact that the level of financial exclusion is relatively high, as in many other African countries (see African Development Bank, 2013). Approximately 17% of adults in Malawi have an account at a formal financial institution; while more than 50% of the adult population are financially excluded. High costs, the lack of sufficient revenue, and the distance travelled to reach a bank, are some of the reasons cited for not having a formal account. Most households either save at home, or rely on community-based savings groups, such as Savings Clubs, Rotating Savings and Credit Associations (ROSCAs), or Accumulated Savings and Credit Associations (ASCAs).

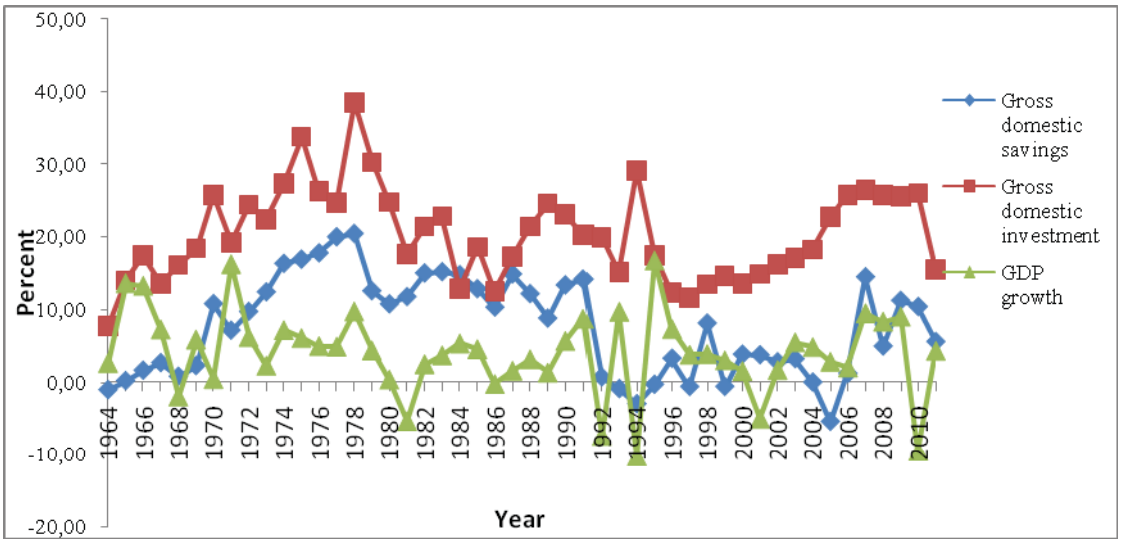
In an effort to promote savings behavior among the financially excluded in Malawi, the government initiated the Community Savings and Investment Promotion (COMSIP) program in 2003; this was designed to assist community savings groups in financial management, savings mobilization, credit management, business development services to expand sustainable community savings and investment institutions, among other things. Despite such initiatives, the savings rate has remained relatively low in the country, averaging at 4.7% of GDP during the years 2000-2011.

From an economic point of view, the limited ability of the financial sector to channel savings to the most profitable investment opportunities has hindered economic growth to some extent. However, investment has remained well above the savings rate throughout the period considered, peaking at 38% of GDP in 1978 (see World Bank, 2014b). This is an indication that most of the domestic investment is financed through foreign savings. During the pre-reform period, investment averaged 18.5% of GDP, which was a decline from the 1970s average of 27%. However, there was an insignificant change in the levels of investment during the reform period, averaging at 19.5% of GDP. The average investment rate was at 24.4% of GDP during the period of 2006-2011, indicating a slight improvement in the investment rate.

One factor that has been cited as hindering investment in Malawi is the lack of access to credit by domestic firms, especially small and medium enterprises (SMEs). While 96% of the SMEs have a bank account in Malawi, only 39% had outstanding loans with a financial institution. Furthermore, as of 2009, approximately 76% of firm investment was financed internally, in contrast to the mere 13% financed by banks (World Bank, 2014a). Figure 1 shows the trends in gross domestic savings and investment[2] (as a percentage of GDP) in Malawi, as well as the GDP growth rates for the period of 1960-2011. As highlighted in this figure, the domestic savings in Malawi have been gradually increasing since independence, in 1964.

[1] Foreign aid inflows to Malawi provide close to 40% of resources to support the national budget (Mwabutwa et al., 2013).

[2] Gross domestic investment is defined as gross capital formation.



Source: Own computation using data from the World Bank (2014b).

Fig. 1. Savings, investment & GDP growth

2. Literature review

The debates on the relationship between domestic savings and investment are mostly centred on the "Feldstein-Horioka puzzle," which brought to light two conflicting theories on the link between these two economic variables. On the one hand, McKinnon's (1973) complementarity hypothesis implies that investment is predominantly self-financed. As such, potential investors would need to accumulate savings prior to investing (Fry, 1978; Moore, 2010). On the other hand, the inter-temporal theory of the current account implies that in a small open economy, domestic savings need not to be channelled towards domestic investment, as they may be better invested abroad.

McKinnon's (1973) complementarity hypothesis is likely to hold in a closed economy[1], where the nation as a whole can save only as much as its income. In order to increase its savings, the nation would need to reduce its consumption expenditure – at a given level of income. In turn, increases in domestic savings would be translated into increases in domestic investment. In such a scenario, national saving would equal domestic investment ex post (Obstfeld and Rogoff, 1995; Schmidt-Hebbel et al., 1994, 1996).

In contrast, the inter-temporal theory of the current account implies that, in an open economy, with free capital mobility, national savings need not equal domestic investment. This is because the determinants of these two variables are different. Saving depends on income and wealth; while investment depends on profitability and risk. Moreover, under free capital mobility, the savings' behavior of economic agents is influenced by international opportunities for investment, since agents tend to invest in the most profitable investment anywhere in the world (Obstfeld and Rogoff, 1995). Similarly, if national savings fall short of the desired level of domestic investment, a country can borrow the additional funds from abroad. As such, it is possible for savings and investment to differ ex ante.

Feldstein and Horioka (1980)[2], however, found evidence of very high correlations between domestic investment and savings in 16 OECD countries. This contradicts the predictions of the above two theories, in that the authors found a strong positive relationship between savings and investment in a sample of *industrialized* countries. They therefore, concluded that capital was relatively immobile within and between countries, at least in the long run. Any changes in the domestic savings rates were matched by corresponding changes in domestic investment.

There are varying opinions on the explanation for the positive correlation between domestic savings and investment in the "Feldstein–Horioka puzzle," which are independent of capital mobility. Firstly, given that savings and investment are both endogenous variables, it has been argued that it is possible for a third variable, or even policy reactions to cause changes in both the domestic savings rate and investment – independent of the two variables. As such, the savings-investment link may be heterogeneous across individual countries (Feldstein

[1] or in financially constrained developing countries with limited intermediation.

[2] and later, Feldstein and Bacchetta (1991).

and Horioka, 1980[1]; Obstfeld, 1986; Dooley et al., 1987; Baxter and Crucini, 1993; Montiel, 1994; Obstfeld and Rogoff, 1995; Schmidt-Hebbel et al., 1994, 1996).

Many researchers have followed the seminal work of Feldstein and Horioka (1980), when investigating the relationship between domestic savings and investment in different countries. These include studies by Dooley et al. (1987), Miller (1988), Wong (1990), Montiel (1994), Jansen (1996), Mamingi (1997), Coakley et al. (1999), Isaksson (2001), De Vita & Abbott (2002), Kasuga (2004), Cooray and Sinha (2005), De Wet and Van Eyden (2005), Erden (2005), Afzal (2007), Aka (2007), Kollias et al. (2008), Cyrille (2010), Esso and Keho (2010), Li (2010), Mishra (2011), Verma and Saleh (2011), Mishra and Jain (2012) and Ramakrishna and Rao (2012).

Studies on developed countries include those by Miller (1988), Jansen (1996), De Vita & Abbott (2002) and Kollias et al. (2008), to name a few. Miller (1988) used co-integration tests to investigate the saving-investment link in the USA for the period of 1946-1987. The author found that co-integration existed between investment and savings rates under fixed exchange rates, but disappeared under flexible rates.

Jansen (1996) used an error-correction model to investigate the relationship between savings and investment in 23 OECD Countries for the period of 1951-1991, and found that the variables were co-integrated. De Vita and Abbott (2002) used the ARDL Bounds-testing approach to analyze the saving-investment link in the USA for the period of 1946-2001. They found that investment and savings were co-integrated. However, the correlation weakened during the more liberalized floating exchange rate periods. Kollias et al. (2008) made use of the ARDL Bounds-testing approach to analyze the saving-investment link in 15 EU countries, and found a weak association between savings and investment across the countries.

The studies on developing and newly industrialized countries generally found a weaker association between savings and investment in developing countries; while in some cases, no long-run relationship was detected between the variables. These studies include those by Wong (1990), Montiel (1994), Mamingi (1997), Sinha (2002), Cooray and Sinha (2005), De Wet and Van Eyden (2005), Erden (2005), Afzal (2007), Aka (2007), Esso and Keho (2010), Li (2010), Verma and Saleh (2011), Mishra and Jain (2012), and Ramakrishna and Rao (2012).

Wong (1990), for instance, made use of cross-sectional analysis to investigate the relationship between savings and investment in 45 developing countries for the period of 1975-1981. The author found evidence of high correlation between saving and investment, which were attributed to large non-traded goods sectors. On the other hand, Montiel (1994) found evidence of weak correlation between savings and investment in developing countries. The author used OLS techniques to investigate the saving-investment link in a sample of 63 developing countries for the period of 1970-1990, and concluded that a substantial number of developing countries were financially open. These findings were thus in line with the predictions of the inter-temporal theory of the current account.

Mamingi (1997) used the Fully Modified Ordinary Least Squares (FMOLS) technique to investigate the saving-investment link within a sample of 58 developing countries for the period of 1970-1990. The author found that saving-investment correlations were lower for middle-income countries than they were for low-income countries. The author also concluded that developing countries were financially open.

Sinha (2002) used VAR analysis and Granger causality tests to test the saving-investment link in 11 Asian countries. The author found that savings and investment had a long-run relationship only in Japan and Thailand. In the short run, savings led investment in Sri Lanka and Thailand; while investment led savings in Hong Kong and Myanmar. Lastly, there was a bi-directional causality for Malaysia and Singapore.

De Wet and Van Eyden (2005) used panel analysis to investigate the saving-investment link in 36 sub-Saharan African countries for the period of 1980-2000. They found evidence of low savings rates in most of these countries. As such, they concluded that foreign aid and FDI flows were significant in determining investment in the region.

Erden (2005) investigated the direction of causality between savings and investment in Turkey, using a bivariate vector error-correction model (VECM) for the period of 1963-2002. The author found that savings led investment in the pre-reform period; however, this relationship ceased when the economy became relatively open. Thus, the predictions of the inter-temporal theory of the current account hold true in Turkey.

Afzal (2007) found evidence of unidirectional causality from savings to investment in Pakistan and

[1] However, for the OECD countries, none of these variables significantly changed the relationship between savings and investment when included in the specification.

Sri Lanka, bidirectional causality in South Africa, and no causality in India, the Philippines, Malaysia and Iran. In addition, he found no evidence of a long-run relationship between the variables in seven of the other countries.

Aka (2007), using the Markov-Switching vector autoregressive (VAR) model, found that causality ran from savings to investment in Côte d'Ivoire, but not in Ghana, for the period of 1960-1998. In addition, the author found evidence of a dynamic regime-dependent link between saving and investment, with correlation being high during the low volatility regime in Côte d'Ivoire; whereas in Ghana, it was high in the high volatility regime.

Esso and Keho (2010) used cointegration and Granger-causality tests to investigate the saving-investment link in UEMOA countries. They found that a long-run relationship between savings and investment exists only in three out of the seven UEMOA countries. Similarly, Verma and Saleh (2011) made use of the ARDL bounds-testing procedure, to investigate the relationship between savings and investment in Saudi Arabia, and found that no long-run relationship existed between the two variables.

As in previous studies, the findings of both studies were thus in line with the predictions of the inter-temporal theory of the current account. Mishra and Jain (2012), using cointegration and Granger-causality tests for the period of 1950-2011, found that savings and investment Granger-caused economic growth in India, but not vice versa. In addition, they found evidence of savings-led growth in the country. Ramakrishna and Rao (2012) used co-integration tests to investigate the relationship between savings and investment in Ethiopia for the period of 1974-2009. They found no evidence of a long-run relationship between these two variables.

These findings provide further supporting evidence that in a small open economy with free capital mobility, national savings need not to be correlated with domestic investment.

Other studies include those by Dooley et al. (1987), Coakley et al. (1999), and Kasuga (2004). Dooley et al. (1987) analyzed the saving-investment link in a sample of 14 Industrial countries and 50 developing countries for the period of 1960-1984. They found evidence of high correlations between savings and investment for the industrialized countries; while the developing countries showed a weaker association.

Similarly, Coakley et al. (1999) used cointegration tests to analyze the relationship between savings and investment in a sample of 23 OECD countries and 44 least-developed countries (LDCs). They found that the correlation between savings and investment was smaller for LDCs than it was for the OECD countries.

Lastly, Kasuga (2004) used a sample of 23 OECD countries and 79 developing countries to investigate the saving-investment link. The author found evidence of a high correlation between savings and investment in the OECD countries; while the developing countries showed no evidence of any positive association between the variables.

3. Estimation techniques and empirical analysis

3.1. Cointegration analysis: the ARDL-bounds-testing procedure. Unlike some of the previous studies, this study uses the recently introduced ARDL-bounds-testing approach, based on Pesaran and Shin (1999), and Pesaran et al. (2001), to examine the long-run relationship between savings and investment in Malawi. The model can be expressed as follows (see also Odhiambo, 2009a; 2014):

$$\Delta SAV_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta SAV_{t-i} + \sum_{i=0}^{n} a_{2i}\Delta INV_{t-i} + \\ + a_3 SAV_{t-1} + a_4 INV_{t-1} + \mu_{t1}, \quad (1)$$

$$\Delta INV_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\Delta INV_{t-i} + \sum_{i=0}^{n} \beta_{2i}\Delta SAV_{t-i} + \\ + \beta_3 INV_{t-1} + \beta_4 SAV_{t-1} + \mu_{t2}, \quad (2)$$

where SAV = Savings (% of GDP); INV = Investment (% of GDP); μ_t = white noise-error term; Δ = first difference operator. The data used in this study are annual time-series data from 1973 to 2011. The data were obtained from the World Bank's World Databank (previously known as the World Development Indicators Online).

Based on equations (1) and (2), we can conduct the bounds test for the long-run relationship between savings and investment. Pesaran and Pesaran (1997) and Pesaran et al. (2001) provide two sets of critical values for a given significance level. The first set of critical values assumes that all the variables included in the ARDL model are I (0); while the second set of critical values assumes that the variables are I (1).

3.2. Causality model. The following causality model used in this study can be expressed as follows (see also Odhiambo, 2009a):

$$\Delta SAV_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta SAV_{t-i} + \\ + \sum_{i=0}^{n} \delta_{2i}\Delta INV_{t-i} + \delta_3 ECM_{t-1} + v_{1i}, \quad (3)$$

$$\Delta INV_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{1i}\Delta INV_{t-i} + \\ + \sum_{i=0}^{n} \lambda_{2i}\Delta SAV_{t-i} + \lambda_3 ECM_{t-1} + v_{2i}, \quad (4)$$

where ECM_{t-1} is the error correction term lagged one period; and v_{1t} and v_{2t} are mutually uncorrelated

white-noise residuals. While the "short-run" causal effects are determined by the F-statistics, the "long-run" causal relationships are determined by the coefficients of the error-correction terms.

3.3. Empirical analysis. *3.3.1. Stationarity tests.* The results of the stationarity tests reported in Table 1 show that both savings and investment are non-stationary in levels. Therefore, the variables are not integrated of order zero [i.e. I (0)]. The variables were latter differenced once, before performing the stationarity tests again. Both savings and investment were then found to be stationary. Therefore, the variables are integrated of order one [i.e. I (1)].

Table 1. Stationarity tests of variables

Variable	Phillips-Perron (without Trend)		Phillips-Perron (with Trend)		Dickey-Fuller-GLS (without Trend)		Dickey-Fuller-GLS (with Trend)	
	Level	1st Diff	Level	1st Diff	Level	1st Diff	Level	1st Diff
SAV	-1.50	-7.96***	-2.59	-7.78***	-1.58	-5.02***	-2.55	-5.15***
INV	-0.89	-6.80***	-2.75	-6.57***	-1.18	-4.07***	-1.63	-4.19***

Note: *** denotes 1% level of significance. The trunsaction lag for the PP tests is based on the Newey and West (1987) bandwidth. Critical values for Dickey-Fuller GLS test are based on the Elliot-Rothenberg-Stock (1996, Table 1).

3.3.2. Co-integration test. The results reported in Table 1 confirm that savings and investment are not integrated of order 2 [i.e. I (2)] or higher. Hence, we can now use the ARDL-bounds testing approach to examine the long-run relationship between these two variables. In order to conduct the test, we first determine the order of lags of the differenced variables included in the savings and investment equations, using the Schwartz-Bayesian Criterion (SBC). The results of the SBC tests (not reported here) show that the optimal lag for the savings equation is one (1); while that of the investment equation is two (2). Having established the optimal lags, the bounds F-test was then applied to equations (1) and (2), in order to establish a cointegration relationship between savings and investment. The results of the bounds test are reported in Table 2.

Table 2. Bounds F-test for cointegration

Dependent variable	Function		F-test statistic			
SAV	SAV(INV)		5.580747***			
INV	INV(SAV)		0.800584			
Asymptotic critical values						
	1 %		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Pesaran et al. (2001), p. 300, Table CI(ii) Case II	4.94	5.58	3.62	4.16	3.02	3.51

Note: *** denotes statistical significance at the 1% level.

The results reported in Table 2 show that there is a long-run relationship between savings and investment in the savings equation, but not in the investment equation. This finding can be confirmed by the F-statistic that is significant in the savings equation, but not in the investment equation.

3.3.3. Analysis of causality test based on the error-correction model. The results of the ECM-based causality test are reported in Table 3[1].

Table 3. Granger non-causality test

Dependent variable	Causal flow	F-statistics [P-value]		ECM [t-statistic]
		SAV	INV	
Savings (SAV)	INV → SAV	-	7.814 (0.001)***	-0.449 [-2.39]**
Investment (INV)	SAV → INV	9.616 (0.000)***	-	-

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

The causality results reported in Table 3 show that investment Granger-causes savings – both in the short-run and in the long run, in the savings equation. The results also show that there is a short-run causal flow from savings to investment, in the investment equation. The long-run causality is supported by the coefficient of the lagged value of the error-correction term, which has been found to be negative and statistically significant. The short-run causality, on the other hand, is supported by the F-statistic in the savings equation, which is also statistically significant, as expected. The short-run feedback causality from savings to investment, however, is supported by the F-statistic in the investment equation, which is also found to be statistically significant.

Conclusion

The debate regarding the relationship between savings and investment has been a subject of discussion for decades. To this day, there is no consensus as to whether savings Granger-cause investment, or whether it is investment that Granger-causes savings. In the current study, we examined the dynamic causal relationship between savings and investment in Malawi for the period of 1973-2011. The study made use of the ARDL-bounds testing approach to cointegration and the ECM-based causality model to examine this linkage. The results of the analyses show that there is short-run bidirectional causality between savings and investment in Malawi. In addition, there is evidence of a long-run

[1] The direction of causality in this case is determined by the significance of the coefficient of the lagged error-correction term and the F-statistic on the explanatory variables (see also Odhiambo, 2014).

unidirectional causal flow from investment to savings. This finding is not surprising given the low savings rates in Malawi. The study recommends that in the short run, policies aimed at removing the impediments to both savings and investment should be implemented. However, in the long run, more emphasis should be placed on pro-investment policies, in order to stimulate economic growth.

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