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INTERPRETING SUSTAINABLE DEVELOPMENT GOALS FOR 2030: IMPLICATIONS FOR MALAWI

BY

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¹The views expressed in this paper are those of the Author and do not reflect the views of MCA-Malawi or its affiliates. The paper is aimed at generating a debate on how the United Nations sustainable development goals can be more effective. The first obviously were not and there is need to critically think about how achievable the next ones will be for poor economies like mine. For any meaningful comments that you may have please send them to my email as this is still work in progress.

INTERPRETING SUSTAINABLE DEVELOPMENT GOALS FOR 2030: IMPLICATIONS FOR MALAWI

Abstract

The paper assesses the likelihood of Malawi achieving its post-2015 sustainable development goals by 2030, especially goal number 1 of eradicating extreme poverty. The results show that for Malawi to eliminate extreme poverty of less than \$1.25 a day from an estimated 74.4% in 2015 to as low as 1.0% in 2030; real GDP per capita is expected to grow at a rate of 21% p.a. If this is to be achieved, Malawi will be expected to invest approximately US\$136 billion within the post-2015 period in order for real incomes to increase to levels that eliminate extreme poverty. These are extreme and very hard growth conditions to be achieved for a low-income economy like Malawi; especially when the average growth in real GDP per capital during the period 2010-2014 averaged 1.6% p.a. The study concludes that concerted efforts and significant financial support from the global community is required and needs to be put in place as quickly as possible if countries with high poverty incidences like Malawi are to achieve this ambitious goal of eliminating extreme poverty by 2030.

Keywords: Malawi; Post-2015 Sustainable Development Goals; Extreme Poverty; Economic Growth

JEL Classification: N17, E17, O11

1. Introduction

In September 2015, member states agreed to a post-2015 development agenda for sustainable development at a United Nations Summit held in New York. In this agenda, seventeen sustainable development goals were adopted through consensus and generally focus on eliminating poverty, promoting peace and shared prosperity and environmental sustainability. Development agencies are quickly adapting to this new agenda by changing their development strategies to align to the

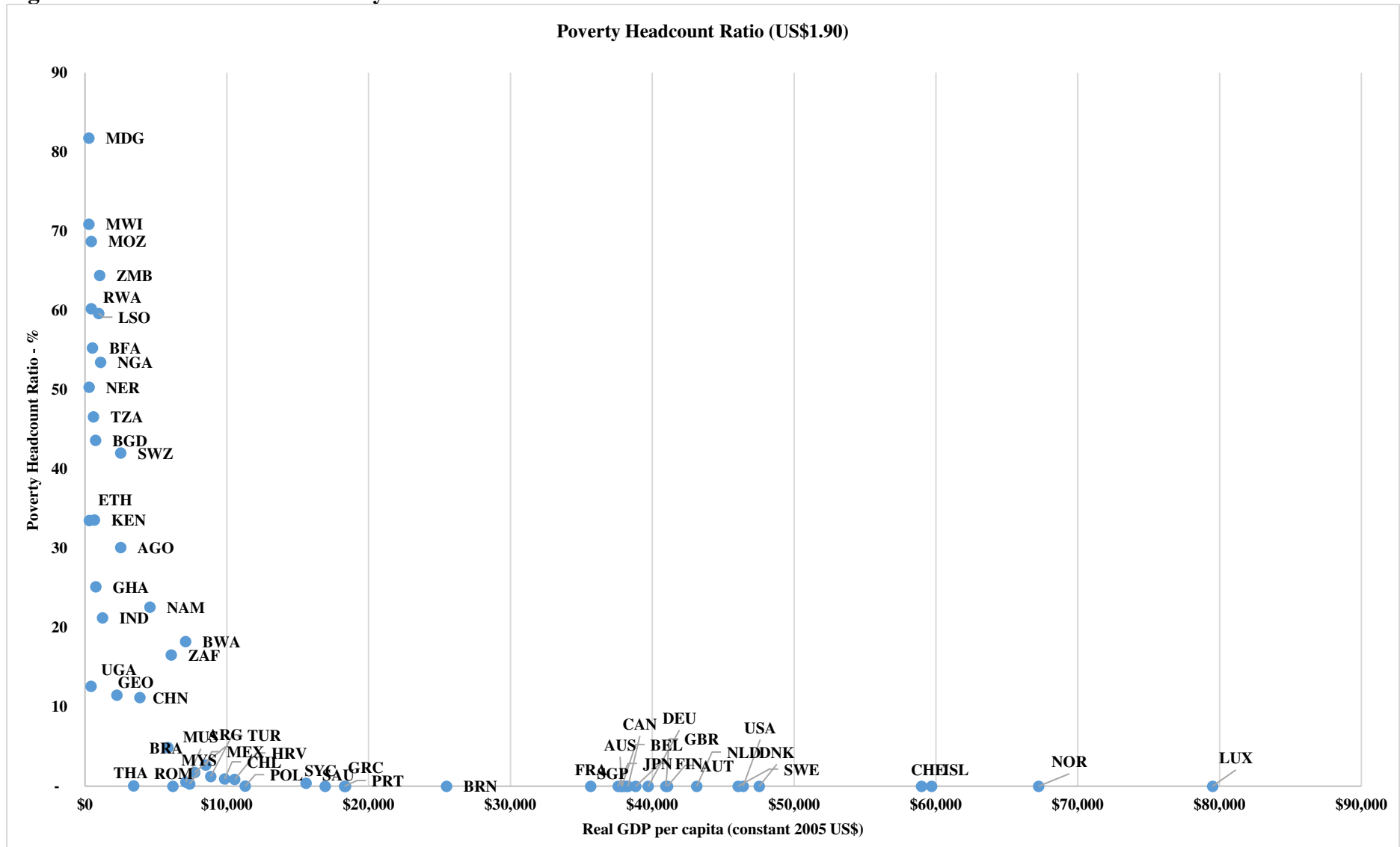
post-2015 sustainable development goals. In particular, the World Bank aligned this new thinking in 2013 by focusing on twin development goals: to end extreme poverty; and shared prosperity².

Goal 1 of the post-2015 sustainable development goals (SDGs) aims at ending extreme poverty in all its forms by 2030 (The President of the General Assembly, 2015). According to the UN definition, extreme poverty comprise of people living on less than US\$1.25 a day at the ruling power purchasing parity (PPP). The World Bank, on the other hand, defines extreme poverty as those living on less than US\$1.90 a day (World Bank, 2015a, 2015b). This is a daunting challenge especially bearing in mind that in the current decade poverty levels based on the new definition especially in poor countries has more than doubled.

Figure 1 illustrates income and poverty levels for selected low, middle and high income economies in the world. The results reveal that there is an inverse correlation between real GDP per capita and poverty headcount ratios where high (low) poverty levels are associated with low (high) income levels. The results also show that countries that experience poverty headcount ratios of more than 25% are in the low-income to low-middle income category. According to the Poverty and Equity Database (World Bank, 2015a), the top five poorest countries in the world with a poverty headcount ratio of less than \$1.90 a day of the total population included Madagascar (82%); Malawi (71%); Mozambique (69%), Zambia (64%); and Rwanda (60%). For the SDGs not to be ephemeral, it is important for countries to know each year's projected levels of poverty and what efforts are required in order to eliminate those poverty levels. In order to end extreme poverty, it is, therefore, very important that countries know what they are up against as well as know what key areas they need to invest in order to achieve this goal by 2030.

² See <http://blogs.worldbank.org/futuredevelopment/twin-goals>

Figure 1: World Income and Poverty Headcount Levels



Source: World Bank, 2015a, 2015b

In order to tackle this development challenge, development practitioners have called for inclusive growth strategies to be adopted. This entails the need to ensure that economic performance at the macroeconomic level should trickle down to the microeconomic level. This includes ensuring that individuals at all levels benefit from economic growth performance and not only a few individuals. Thus, development effectiveness calls for prudent planning of programs/projects to ensure that sustainable benefits accrue to all poverty levels especially those below \$1.25 a day.

Establishing linkages between macroeconomic and microeconomic levels requires adopting a prudent approach that is country-specific. In this study, we use Malawi as a case study where we first discuss the key macroeconomic determinants of growth; and then use their estimated elasticities to make forecasts on poverty headcount ratios for the post-2015 SDGs period using household-level data. The paper suggests a two-pronged approach. First, country-level macroeconomic determinants of growth and their elasticities should be determined. This involves running growth equations that are robust with long-run level relationships established between the dependent variable (real GDP per capita) and its set of regressors. Second, the elasticities from the growth equations are used to make annual growth projections on household-level real expenditure aggregates obtained from household surveys to determine future levels of poverty.

The rest of the paper is divided as follows. Section 2 discusses the methodological approach used to measure inclusive growth and forecast poverty ratios. Section 3 discuss poverty headcount projections and forecasts covering the period 2015-2043 to quantify what Malawi is up against in order to achieve the SDGs by 2030; that is, at what rate of real GDP per capita growth is needed for Malawi to eliminate extreme poverty. Section 4 provides some policy implications for Malawi and the role that the global development community is expected to play during the SDG period. Section 5 discuss some challenges that Malawi faces based on the requirements to eliminate extreme poverty. Lastly, Section 6 present concluding remarks.

2. Methodology

In this section, we present the methodology used to make projections both at the macroeconomic and microeconomic levels. At the macroeconomic level, the study presents empirical results from a recent study that investigated the key macroeconomic determinants of economic growth in Malawi. The results are replicated in table 1 below (see, Chirwa and Odhiambo, 2016, p. 18).

Table 1: Estimated Results (Short- and Long-run Coefficients)

Malawi: Panel 1 – Estimated Long-Run Coefficients (Elasticities) [Dependent Variable: Log of Real GDP per capita, $\log(GDPPC)_t$]				
Regressor	Coefficient	Standard Error	t-statistic	Probability
$\log(INV)_t$	0.2972***	0.07	3.99	0.001
$\log(HC)_t$	0.1371**	0.05	2.68	0.015
$\log(POPG)_t$	-0.1216**	0.05	-2.61	0.017
$\log(GC)_t$	0.0771	0.09	0.78	0.445
$\log(RER)_t$	-0.0607	0.15	-0.39	0.698
$\log(INF)_t$	-0.0569**	0.02	-2.29	0.033
$\log(TRD)_t$	0.4278**	0.15	2.79	0.012
$\log(AID)_t$	-0.0867	0.05	-1.69	0.107
C_t	3.5947***	0.78	4.59	0.000
Malawi: Panel 2 – Estimated Short-Run Coefficients (Elasticities) [Dependent Variable: change in log of Real GDP per capita, $\Delta\log(GDPPC)_t$]				
Regressor	Coefficient	Standard Error	t-statistic	Probability
$\Delta\log(INV)_t$	0.0892**	0.04	2.33	0.028
$\Delta\log(INV)_{t-1}$	-0.0479	0.04	-1.26	0.220
$\Delta\log(HC)_t$	-0.0683	0.15	-0.46	0.649
$\Delta\log(HC)_{t-1}$	-0.1511	0.11	-1.43	0.165
$\Delta\log(POPG)_t$	-0.1355*	0.08	-1.79	0.086
$\Delta\log(POPG)_{t-1}$	0.1979***	0.07	2.98	0.006
$\Delta\log(GC)_t$	-0.0045	0.06	-0.08	0.939
$\Delta\log(RER)_t$	0.0268	0.09	0.29	0.771
$\Delta\log(RER)_{t-1}$	0.1149*	0.06	1.91	0.068
$\Delta\log(INF)_t$	-0.0195**	0.01	-2.36	0.026
$\Delta\log(INF)_{t-1}$	0.0123	0.01	1.61	0.120
$\Delta\log(TRD)_t$	0.1432**	0.06	2.42	0.023
$\Delta\log(TRD)_{t-1}$	-0.1113*	0.06	-2.00	0.056
$\Delta\log(AID)_t$	-0.0564	0.04	-1.48	0.152
ECM_{t-1}	-0.6504***	0.15	-4.24	0.000
R-Squared	0.8564	R-Bar Squared	0.6900	
S.E. of Regression	0.0267	F-Stat (15,26)	7.55[0.000]	
Residual Sum of Squares	0.0136	DW-statistic	2.3211	
Akaike Info. Criterion	-86.195	Schwarz-Bayesian Criterion	-66.212	

Note: *** 1% significance level; ** 5% significance level; * 10% significance level. Source: Chirwa and Odhiambo, 2016.

In this study, the impact of eight key macroeconomic determinants on economic growth were investigated during the period 1970-2013 using the recently developed Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration suggested by Pesaran *et al.* (2001). The key macroeconomic determinants investigated in this study include the accumulation of physical capital (investment); human capital development; population growth; real exchange rate depreciation; inflation; foreign aid; and international trade. Panel 1 of table 1 presents the long-run growth elasticity estimates on the responsiveness of a 1% change in key macroeconomic determinants to the responsiveness of the long-run level of real GDP per capita; while panel 2 presents the respective short-run elasticities.

In general, the results show that the key macroeconomic determinants that were positively associated with the growth of real GDP per capita in the short-run include the accumulation of physical capital, population growth, real exchange rate depreciation, and international trade; while inflation had a significant negative impact on real per capita GDP growth. In the long-run, the results revealed a significant positive association between the accumulation of physical capital, human capital development, and international trade; and a significant negative relationship between population growth, inflation, and the long-run level of real GDP per capita. The study results, however, revealed no significant impact between human capital development, government consumption, foreign aid and the growth of real GDP per capita in the short-run; and no significant impact between government consumption, real exchange rate depreciation, foreign aid and the real GDP per capita in the long-run (Chirwa and Odhiambo, 2016).

The parameter estimates, both in the short- and long-run are of particular importance in the measurement of inclusive growth. For instance, holding other things constant, the accumulation of physical capital is positively associated with economic growth both in the short- and long-run. The results show that a 1% increase in the growth of investment leads to a 0.09% increase in the

growth of real GDP per capita in the short-run, and the results are statistically significant at the 5% significance level. This implies that, holding other factors constant, doubling the growth of gross fixed capital formation (100% increase) in the short-run would result in a real GDP growth rate of 9% p.a. Similarly, a 1% increase in the accumulation of physical capital in the long-run leads to a 0.30% increase in the level of real GDP per capita and the results are statistically significant at the 1% significance level. This implies that, *ceteris paribus*, doubling gross fixed capital formation (100% increase) in the long-run would lead to an increase in the level of real GDP per capita by an estimated 30%. Similarly, the impact of human capital development has long-run effects where a 1% increase in human capital development leads to a 0.14% increase in the long-run level of real GDP per capita at the 5% significance level.

Another key determinant that is important for the Malawian economy is international trade that exhibits a high elasticity both in the short- and long- run. In the short-run, the impact of trade affects economic growth in the current and one-period lag, whose results are statistically significant at the 5% and 10% significance levels, respectively. The study results show that a 1% increase in international trade (trade ratio) increases the growth of real GDP per capita in the current period by an estimated 0.14%, and decreases the growth of real GDP per capita by -0.11% in the previous period. Overall, the impact of international trade on the growth of real GDP per capita in the short-run is positive. Similarly, in the long-run, a 1% increase in international trade leads to a 0.43% increase in the long-run level of real GDP per capita. This implies that if Malawi has the ability to double its export base this would increase the long-run level of real GDP per capita by approximately 43%.

Based on these empirical findings, the coefficient estimates, both short- and long-run elasticities, can be used to make projections on poverty headcount ratios assuming inclusive growth and

shared prosperity. The methodology adopted for estimating the annual poverty headcount ratio for Malawi based on US\$1.25 a day is based on the following formulas:

$$\text{Poverty Headcount: } phc_{2010} = f(rexp_{2010} | ppp_{2010} \times 365days, hhs\text{ize}) \quad (1)$$

$$\text{Poverty Headcount Forecast: } phc_t = phc_{2010} \times \sum_{i=1}^{43} \Delta rgdppc_{i,t} \quad (2)$$

In equations (1-2), phc_{2010} represents poverty headcount in the year 2010 as the base year; $rexp_{2010}$ represents the household-level real aggregate expenditure in the year 2010; ppp_{2010} represents the implied annual purchasing power parity conversion factor; $\Delta rgdppc$ represents the actual/projected real GDP per capita growth rate; and $hhs\text{ize}$ represents household size. Annual poverty headcounts are projected using annual real GDP per capita growth rates required to eliminate extreme poverty by 2030. For the purposes of this study, the forecast period is up to the year 2043.

The study uses data obtained from two sources, namely: The International Monetary Fund (IMF, 2015); and the Malawi Third Integrated Household Survey (IHS3) conducted in 2010-2011 (Government of Malawi, 2012). Poverty Headcount Ratios are estimated using STATA 13.1.

3. Poverty Headcount Ratio Forecasts

To illustrate how this methodology works, annual projections are made in STATA based on the estimated growth projections of real GDP per capita obtained from the World Economic Outlook database from the base year 2016 to 2020. The same real income growth projection is assumed to apply for the period 2021-2043. The projected poverty headcount at less than \$1.25 a day for the study period uses the recently published implied PPP conversion factors and formulas described in equation (1) and (2) above. According to the IMF (2015), the growth in implied PPP conversion factors is assumed to grow at a rate of 4% p.a. during the study period.

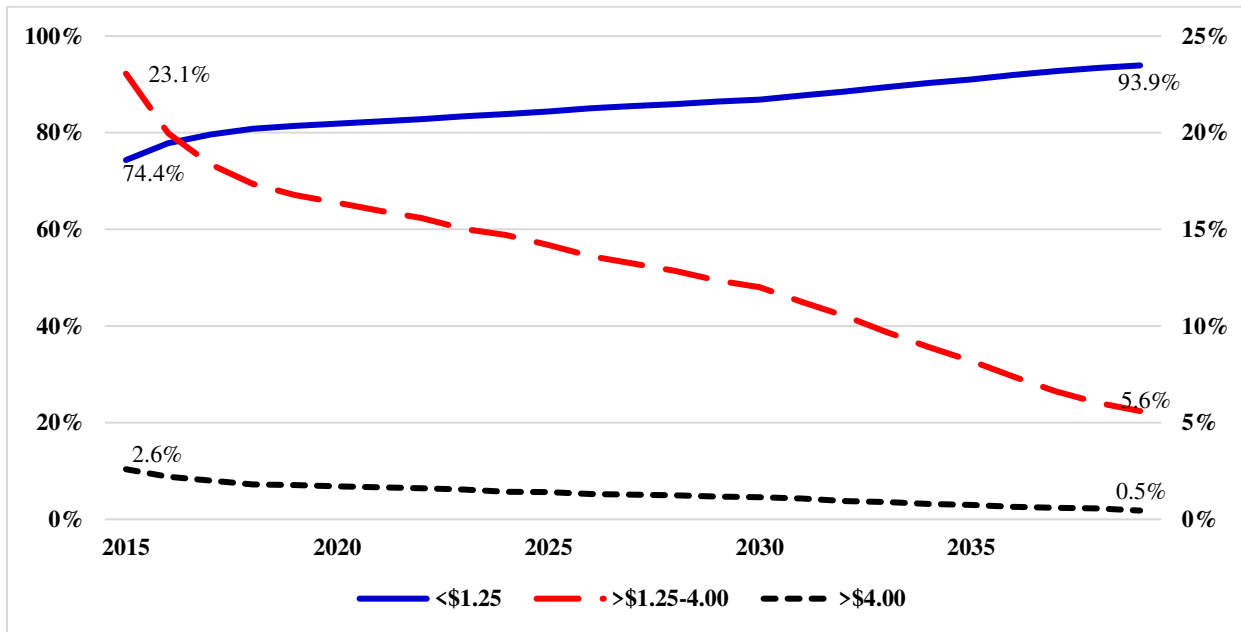
There are six scenarios that are considered. The first is the base case. According to the World Economic Outlook of October 2015, real GDP per capita growth rate is estimated to grow at an average rate of 3% p.a. during the period 2015-2020 (International Monetary Fund, 2015). This growth rate is further assumed to be the same during the period 2021-2043. The second case considered is an assessment on the contribution that one of the big programs Malawi is implementing will have on real GDP per capita. The Millennium Challenge Corporation Compact with Malawi is expected to increase physical capital by an estimated US\$257.1 million through its infrastructure development project, representing an increase of approximately 27% in gross fixed capital formation (Chirwa, 2016). Based on this estimate, and estimated elasticities presented in table 1 above, real GDP per capita growth is expected to increase in the short-run by 2.41%; while in the long-run, real GDP per capita will increase by an estimated 8.03% during its beneficiary period.

The third and fourth cases consider the impact of either doubling or tripling real GDP per capita, respectively. The modelling assumes that these projects are expected to come online within the study period given the nature of any investment requirements. Finally, the fifth and six cases assume increasing real GDP per capita by 20 times (fifth case) and 40 times (sixth case) by 2043. The last two extreme cases are aimed to examine by how much the poverty headcount ratio can be reduced by 2030. Figures 2-7, below presents the modelled results for each scenario. The primary vertical axis on the left represent the percentage change in the poverty headcount ratio for households that spend less than US\$1.25 a day, while the secondary vertical axis on the right represents percentage changes of the poverty headcount ratio for household categories that spend more than US\$1.25 a day.

In figure 2, in the base case scenario, real incomes are projected to grow at a rate of 3.0% p.a. and by 2030 real income is estimated to rise to US\$522 per capita, representing an overall growth rate

of 2.3% during the period 2019-2043. However, based on the same growth rate of real incomes, the poverty headcount ratio for households living on less than US\$1.25 a day is expected to worsen from an estimated 74.4% in 2015 to 87% by 2030.

Figure 2: Projected Poverty Headcount Ratios – Base Case Scenario

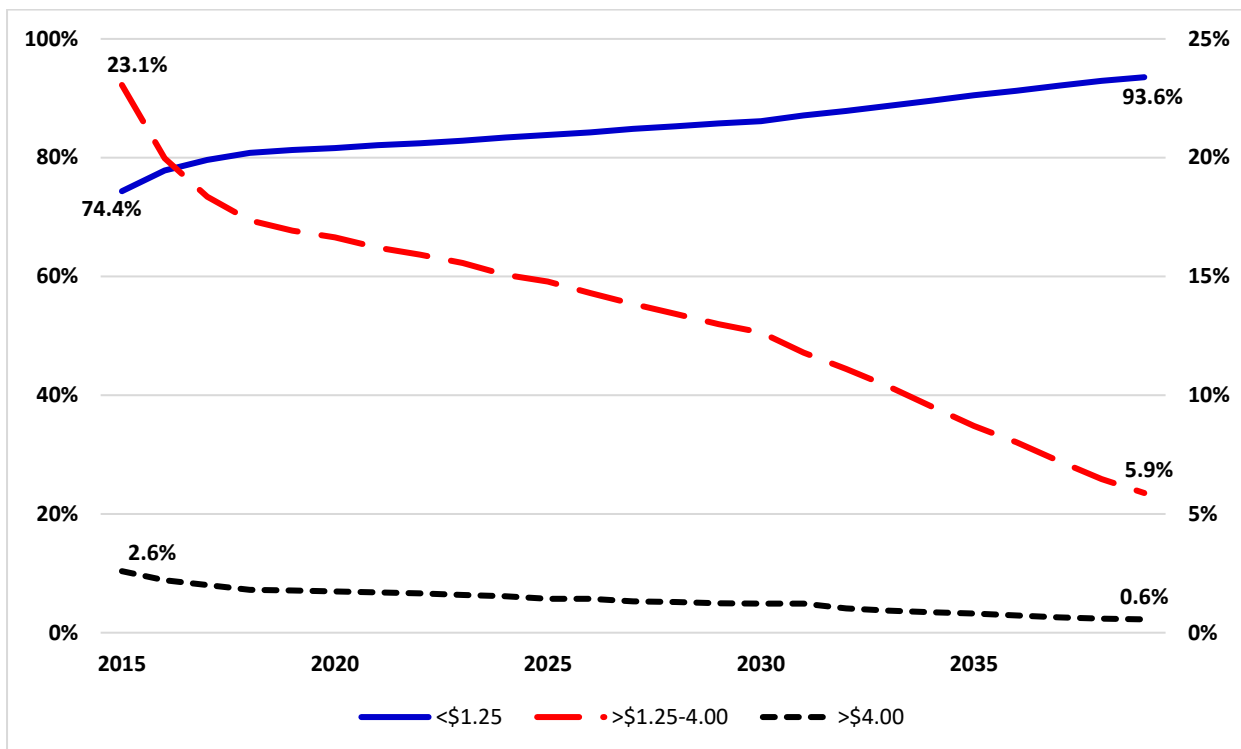


Source: Author Generated in STATA 13.1

For the population within the middle class (US\$1.25-US\$4.00) their population is expected to decline by almost half from an estimated 23.1% in 2015 to 12.0% in the year 2030. Those who are in the category of more than US\$4.00 are also expected to decline from an average of 2.6% in 2015 to only 1.1% of the population by 2030. The analysis reveals that a projected real GDP per capita growth rate of 3.0% p.a. is not adequate for Malawi to effectively reduce extreme poverty by 2030, especially when the implied PPP conversion factor grows at a higher rate of 4% p.a. during the study period.

Scenario 2 considers an increase in investment through the MCC Malawi program that is expected to increase gross fixed capital formation by 27% in 2019. Figure 3 illustrates how the poverty headcount ratio will be affected.

Figure 3: Projected Poverty Headcount Ratios – 27% increase in Investment

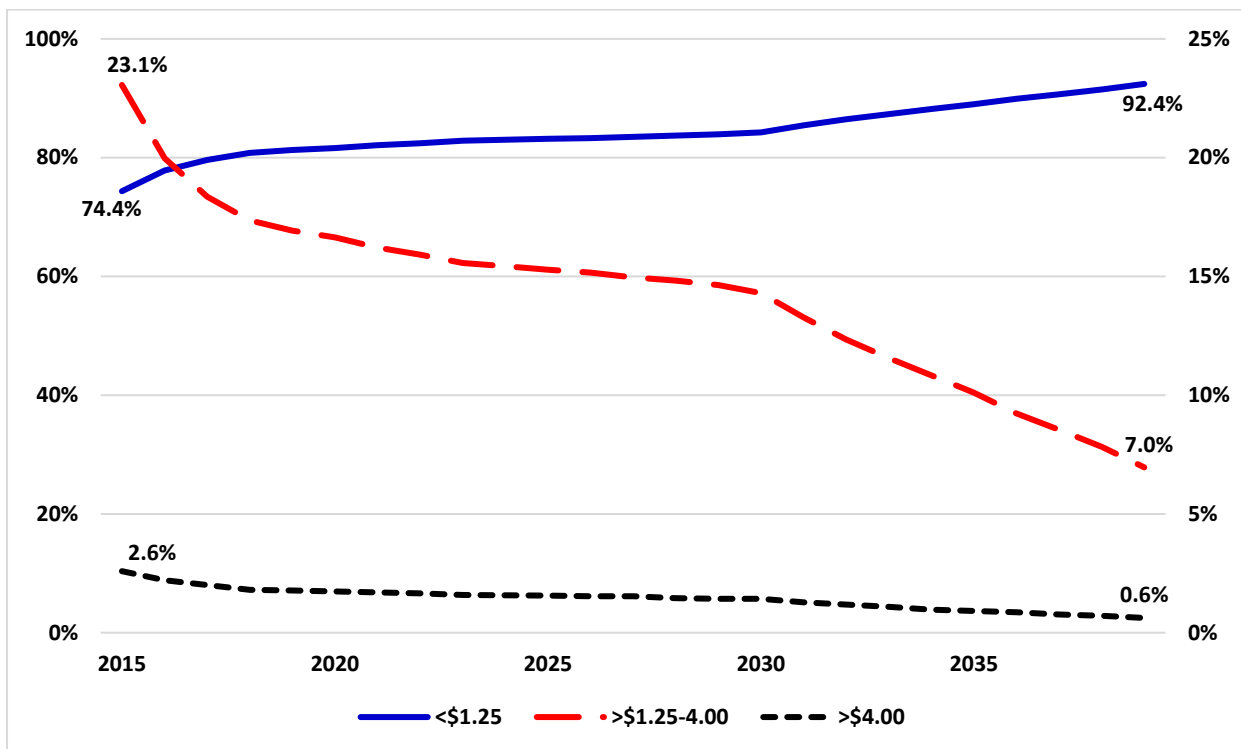


Source: Author Generated in STATA 13.1

Based on the modelled results, the expected increase in gross fixed capital formation in 2019 is expected to increase real GDP per capita by 8.03%, which represents an increase to US\$539 per capita by 2030, holding other things constant. However, this additional growth slightly increases the annual per capita growth rate from 2.3% (base case) to 2.5% during the study period. As illustrated in figure 3, this will result in a slight improvement on the poverty headcount ratio in all categories. The poverty headcount ratio for extreme poverty is expected to reduce by 1% in 2030 to 86% compared to the base case.

Figure 4 illustrates poverty headcount projections based on the premise that real incomes will double by the year 2043. Real incomes per capita are expected to increase from US\$446 per capita in 2023 to US\$892 per capita by 2043, representing an annual growth rate of 3.5% p.a. This implies that by 2030, real incomes are expected to increase to US\$602 per capita.

Figure 4: Projected Poverty Headcount Ratios – Double Real Incomes per Capita by 2043

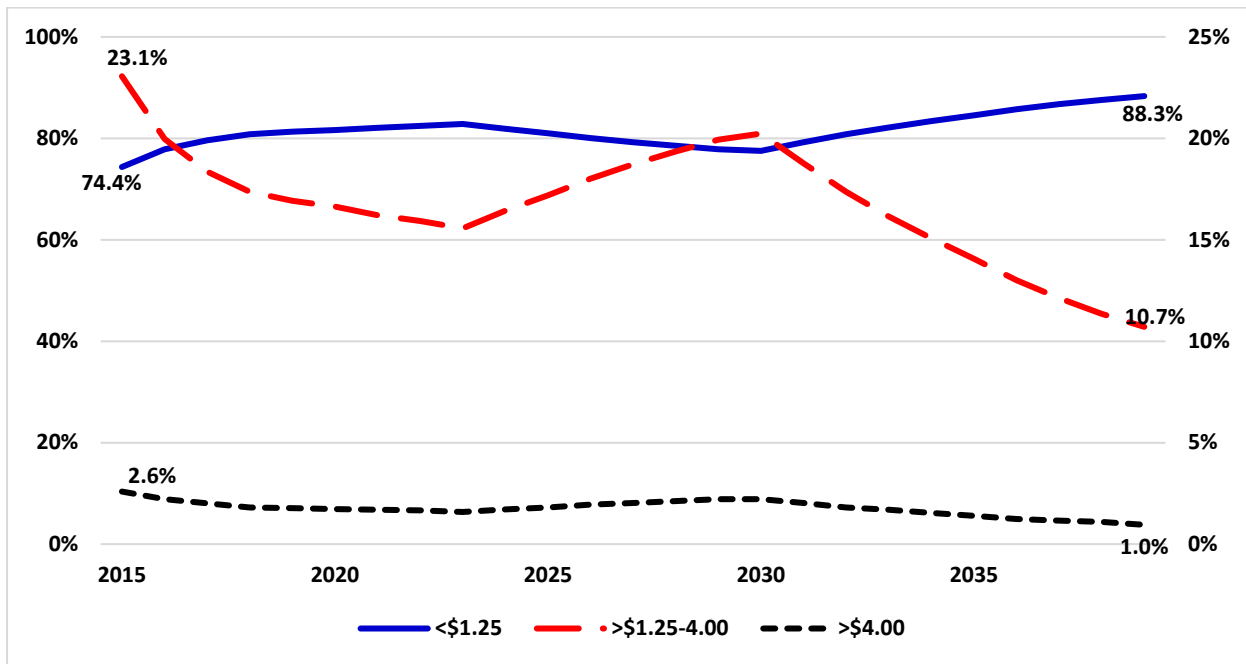


Source: Author Generated in STATA 13.1

As illustrated in figure 4, doubling real incomes by 2043 does not lead to a significant improvement in the poverty headcount ratio though it declines to 84.3% compared to the base case. As such, the assumed increase in real incomes does not address the aspirations of the United Nations post-2015 Sustainable Development Goals of eliminating extreme poverty by 2030.

In the fourth scenario (figure 5), real incomes are assumed to triple from US\$446 in 2023 to US\$1,337 by 2043. In this scenario, the annual increase in real incomes is projected to grow at a rate of 5.3% p.a. At this assumed growth rate, extreme poverty can be reduced further to 77.5% in 2030 compared to the base case and slightly above the projected value of 74.4% in 2015. The figure also illustrates that the middle class benefits more if real incomes would triple during the study period.

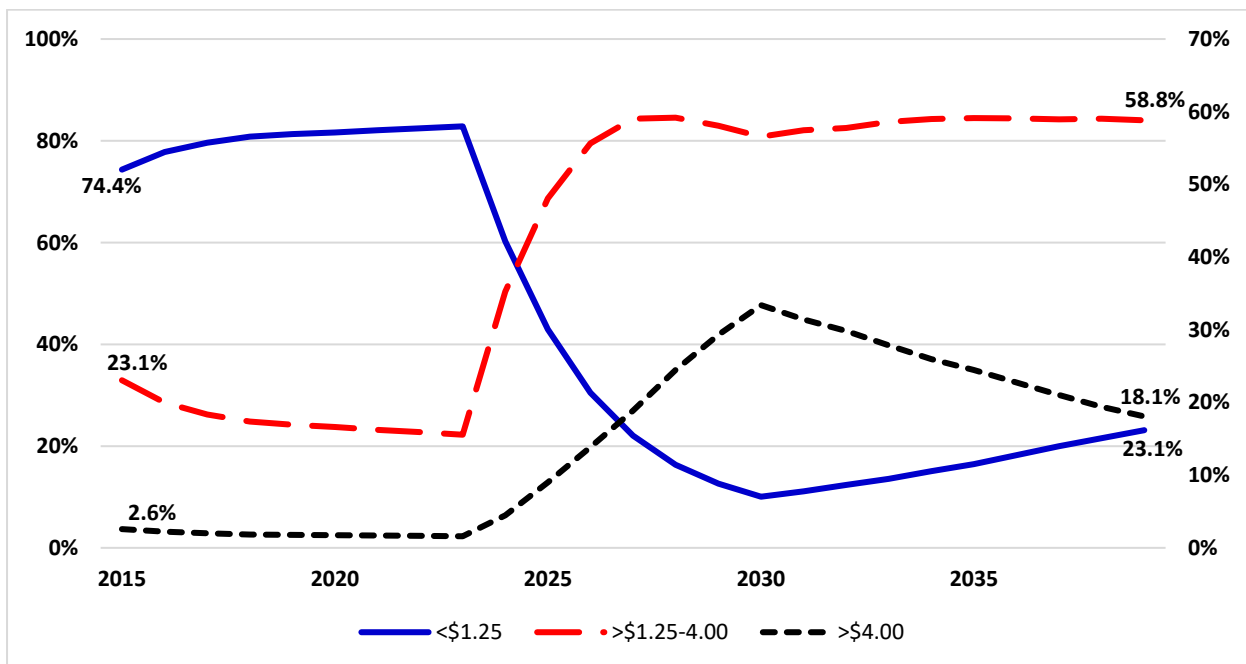
Figure 5: Projected Poverty Headcount Ratios – Triple Real Income per Capita by 2043



Source: Author Generated in STATA 13.1

Figures 6 and 7 below the expected growth projections that would effectively eliminate extreme poverty in Malawi. In figure 6, real incomes are assumed to increase twentyfold from US\$446 in 2023 to US\$9,360 per capita by 2043.

Figure 6: Projected Poverty Headcount Ratios – 20x Real Income per Capita by 2043

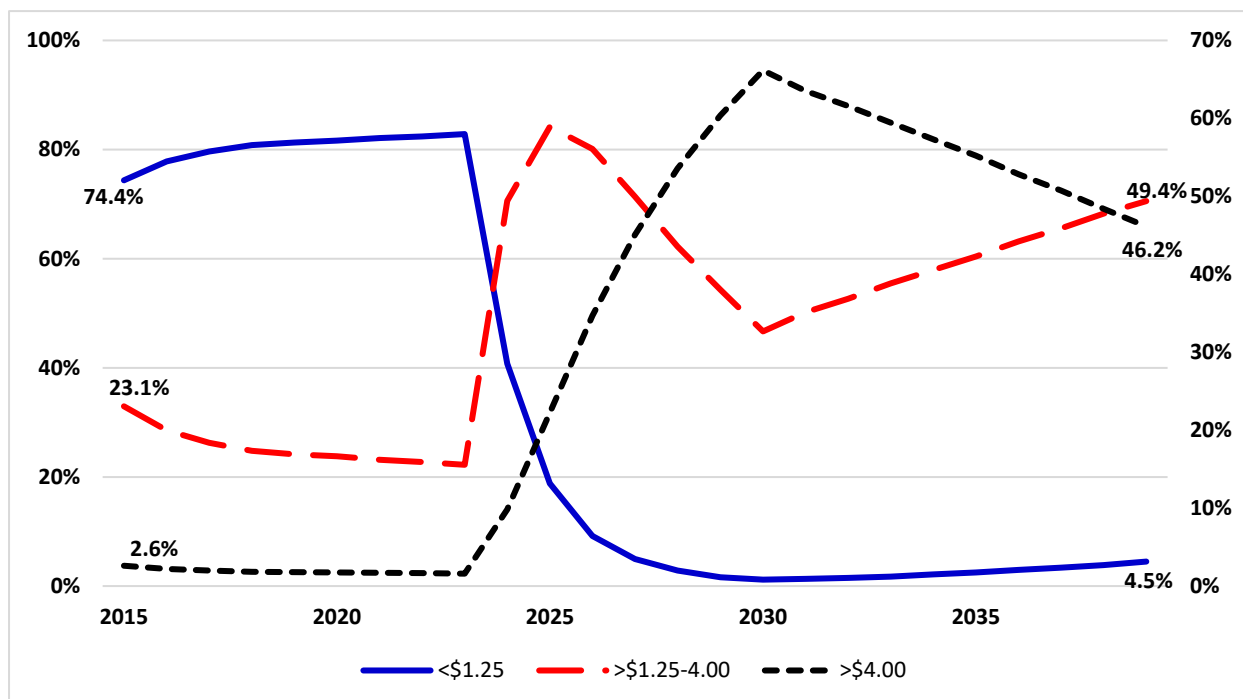


Source: Author Generated in STATA 13.1

As illustrated in figure 6, significant increases in real income per capita are expected to effectively reduce extreme poverty. The results reveal that such an increase in real incomes can reduce extreme poverty to as low as 10.1% by 2030. The results also show that the middle class increases significantly from an estimated 23.1% in 2015 to an estimated 57% in 2030. The population that lives on more than US\$4.00 a day also improves significantly from an estimated 2.6% in 2015 to as high as 33% by 2030.

Finally, figure 7 illustrates by how much real incomes are expected to increase in order to meet the UN SDG goal of eliminating extreme poverty by 2030. The expected increase in real incomes of fortyfold by 2043 assumes an increase in real incomes from an average US\$446 in 2023 to US\$18,275 per capita by the year 2043. This implies an assumed real income growth rate of 21.2% p.a. during the study period.

Figure 7: Projected Poverty Headcount Ratios – 40x Real GDP per Capita by 2043



Source: Author Generated in STATA 13.1

As illustrated in figure 7, extreme poverty reduces to approximately 1% of the population by 2030, meeting the aspirations of the UN SGDs. The projections also show that with a 40 times increase

in real GDP per capita, there will be more middle and high income households by 2030 estimated as 33% and 66%, respectively. The main conclusion from the analysis in this section reveals that Malawi needs to first move swiftly from a low income/developing economy to a high income/developed economy if extreme poverty is to be eliminated effectively. In the next section, the financial implications of such a mammoth task are estimated at the macroeconomic level.

4. Implications for Malawi and the Global Community

The previous section has illustrated that the base and sustainable strategy for Malawi to eliminate extreme poverty is by raising real incomes of Malawians by fortyfold. However, for real incomes to increase sustainably some key drivers that contribute significantly to economic growth have to be promoted during the study period. The empirical growth results presented in table 1 highlight the possible solutions that Malawi can take. In 2013, Malawi recorded a gross fixed capital formation estimated as US\$951.6 million, representing 22% investment share in real GDP per capita at 2005 constant US dollar prices. At the same time, exports of goods and services recorded in 2013 were estimated at US\$2.0 billion, representing 46.3% of real GDP (World Bank, 2015b).

Table 2 highlights the possible estimated financial projections required for Malawi to eliminate extreme poverty. The forecasts for the possible growth scenarios that can be adopted in Malawi uses the estimated elasticities of investment and trade given in table 1. The emphasis is on the key macroeconomic determinants that are positively associated with real GDP per capita and exhibit a high return, which include investment and international trade.

Table 2: Projected Real GDP per capita growth rates

	Investment Contribution (%)	Investment Elasticities	Description	Required Investments in Physical Capital	Trade Contribution (%)	Trade Elasticities	Required Investments in Trade (Exports)	Total Contribution
Scenario 2	27%	0.09 0.30	short-run	2.41		0.03 0.43	-	2.41
			long-run	8.03			-	8.03
			Accumulated increase in Investment Net increase in Investment	\$1,208,706,889 \$257,100,000	Accumulated increase in Exports Net Increase in Exports		\$2,003,373,224 -	<u>\$257,100,000</u>
Scenario 3	189%	0.09 0.30	short-run	16.87	103%	0.03 0.43	3.29	20.16
			long-run	56.21			44.08	100.28
			Accumulated increase in Investment Net increase in Investment	\$2,751,306,889 \$1,799,700,000	Accumulated increase in Exports Net Increase in Exports		\$3,597,393,224 \$1,594,020,000	<u>\$3,393,720,000</u>
Scenario 4	405%	0.09 0.30	short-run	36.15	186%	0.03 0.43	5.94	42.09
			long-run	120.44			79.62	200.06
			Accumulated increase in Investment Net increase in Investment	\$4,808,106,889 \$3,856,500,000	Accumulated increase in Exports Net Increase in Exports		\$4,882,893,224 \$2,879,520,000	<u>\$6,736,020,000</u>
Scenario 5	3570%	0.09 0.30	short-run	318.48	2195%	0.03 0.43	70.03	388.50
			long-run	1,061.11			939.09	2,000.20
			Accumulated increase in Investment Net increase in Investment	\$34,927,371,889 \$33,975,765,000	Accumulated increase in Exports Net Increase in Exports		\$35,966,283,224 \$33,962,910,000	<u>\$67,938,675,000</u>
Scenario 6	7146%	0.09 0.30	short-run	637.43	4387%	0.03 0.43	139.95	777.38
			long-run	2,123.83			1,876.76	4,000.59
			Accumulated increase in Investment Net increase in Investment	\$68,954,556,889 \$68,002,950,000	Accumulated increase in Exports Net Increase in Exports		\$69,877,773,224 \$67,874,400,000	<u>\$135,877,350,000</u>

Source: Author calculations based on investment and trade elasticities from table 1.

As illustrated in table 2, scenario 2 reveals the impact of the Millennium Challenge Compact with Malawi that aims to add US\$257.1 million of gross fixed capital in 2019. This is estimated to add to gross fixed capital investment approximately 27%. From table 1, given that a 1% increase in investment is expected to raise real GDP growth in the short-run by an estimated 0.09%, the overall contribution of a 27% increase in gross fixed capital formation is expected to increase real GDP per capita growth in the short-run by an estimated 2.41%. Similarly, in the long-run, a 1% increase in investment will increase real GDP per capita by an estimated 0.30%. Thus, a 27% increase in investment through the implementation of the MCC program with Malawi is expected to increase real GDP per capita by 8.03%. As illustrated in figure 3 above, such an investment alone is expected to have a minimal impact on reducing the poverty headcount ratio, unless more programs of this magnitude are implemented. Given the simulation in figure 2, a 27% increase in gross fixed capital formation will only reduce extreme poverty from 87% (base case) to 86% by 2030.

Scenarios 3 to 6 provide financial projections for cases discussed in figures 4-7. Since these are programs that are simulated, for Malawi to meet the 2030 UN Sustainable Development Goals, these programs should be implemented at the earliest by 2024. As illustrated in table 2, for Malawi to double real GDP per capita from US\$446 to US\$892 by 2043, Malawi needs to invest a total of US\$3.4 billion by 2024. This includes increasing gross fixed capital formation by an estimated 189% of real GDP and approximately 103% increase in exports. As illustrated in figure 4, doubling real GDP per capita will reduce extreme poverty from 87% (base case) to 84.3% by 2030. This implies an annual growth in real GDP per capita of 3.6% p.a. during the period 2019-2043. However, this is short of the assumed growth rate in implied PPP conversion factor of 4% p.a., implying that even if real incomes were to double, extreme poverty in Malawi will still increase from an average of 74.4% in 2015 to 84.3% by 2030.

On the other hand, for real GDP per capita to be tripled from an estimated US\$446 in 2023 to US\$1,337 by 2043, representing an annual real GDP growth rate of 5.3% p.a., Malawi needs to invest approximately US\$6.74 billion by 2024. If Malawi can invest approximately US\$3.9 billion in increasing gross fixed capital formation and increase exports by an estimated US\$2.9 billion, extreme poverty can be reduced from 87% (base case) to 77.5% by 2030. This implies that Malawi should increase its gross fixed capital formation by an estimated 405% of the estimated share in 2013 and approximately 186% increase in exports by 2024. What is also important to note at this level is that given an assumed implied PPP conversion factor growth rate of 4% p.a., meaningful increases in real incomes per annum should not be less than 5.5% p.a. to effectively reduce extreme poverty.

The previous analysis clearly indicates that significant financial resources are required for Malawi to eliminate extreme poverty by 2030. In scenarios 5 and 6, financial projections are made for cases where Malawi is expected to eliminate extreme poverty by 2030. In scenario 5, a case is assumed where real GDP per capita increases twentyfold moving from US\$446 in 2023 to US\$9,360 by 2043. This represents an annual real GDP growth rate of 15.5% p.a. during the study period. As illustrated in figure 6 above, such a development is expected to reduce extreme poverty from an estimated 87% to 10.1% in 2030. However, this implies that Malawi needs to invest approximately US\$67.94 billion during the study period, which may include increasing gross fixed capital formation by an estimated 3570% and approximately 2195% increase in exports during the study period.

Finally, if Malawi is to eliminate extreme poverty by 2030, scenario 6 shows that this is only possible if real GDP per capita increases fortyfold from US\$446 in 2023 to US\$18,275 by 2043. This represents an annual increase in real GDP per capita at a rate of 21.2% p.a. during the study period. As illustrated in figure 7, the estimated extreme poverty in 2030 reduces to 1% of the total

population. The implications of such as drastic reduction in extreme poverty entails that Malawi needs to invest an estimated US\$135.9 billion by 2024. This entails increasing gross fixed capital formation by 7146% and an increase in exports by 4387% during the study period.

5. Challenges Facing Malawi

It is apparent from the previous discussion that Malawi cannot eliminate extreme poverty by 2030, unless significant investments are made to increase real GDP per capita in the long-run. The analysis also reveals that the threshold for the growth of real GDP per capita in Malawi is expected to be not less than 6.0% p.a. if meaningful reduction in extreme poverty is to be achieved. In fact, the results reveal that for Malawi to eliminate extreme poverty by 2030, real GDP per capita in the long-run is expected to grow at an annual average rate of 21.2% p.a. during the study period. We identify three challenges that need to be address for Malawi to achieve the post-2015 SDGs of eliminating extreme poverty.

The first challenge that Malawi is expected to face is how and where to find significant resources for investing in gross fixed capital formation and export promotion. As illustrated in this paper, Malawi will need to increase significantly its gross fixed capital formation and export base if extreme poverty is to be eliminated during the study period and especially by 2030. However, Malawi cannot on its own meet these requirements and the likelihood of achieving this during the post-2015 SDG period is highly unlikely; unless the assistance of the global community comes in strongly especially bilateral relations with developed countries and multilateral institutions such as the World Bank and the International Monetary Fund are made in order to inject a considerable amount of the financial resources required.

Second, while the accumulation of gross fixed capital formation and export base is critical to achieve the desired objective of eliminating extreme poverty by 2030, factors that affect the efficiency of investment should also be considered by policymakers in Malawi at the

macroeconomic level. The evidence from Chirwa and Odhiambo (2016) suggest the need for policymakers to ensure macroeconomic stability (low inflation), checking population growth, and ensuring quality-based human capital development. These factors were found to have a negative impact on real GDP per capita growth during the period, 1970-2013 in Malawi.

The third challenge that we envisage is for policymakers in Malawi to ensure inclusive growth and shared prosperity. The simulations used to make projections on the poverty headcount assumed these properties. The results show that if growth can be inclusive, the likelihood of moving the population out of extreme poverty from low- to middle- or high-income levels is possible. Furthermore, inclusive growth requires that a strong focus on investing in productive investment and labour-intensive technologies should be at the centre of the Malawi government's economic strategy and the accumulation of labour-intensive gross fixed capital formation is crucial for poor countries like Malawi. However, the means of implementation promulgated in the 2030 agenda for SDGs does not provide concrete strategies on how this can be achieved by poor economies that fail to attract the needed capital for their economies to grow during the post-2015 Sustainable Development Goals (SDGs) period. It is, therefore, recommended that this should be reviewed and discussed how this can be achieved.

6. Conclusion

In this paper, we have examined the financial implications for Malawi if extreme poverty is to be eradicated by 2030 as stipulated by the post-2015 Sustainable Development Goals agenda. The study employed a two-pronged approach where first, the key macroeconomic determinants that are positively and significantly associated with economic growth are identified; and then their coefficient estimates used to forecast financial projections required to reduce extreme poverty by 2030 using household-level data.

The results show that in order for Malawi to eliminate extreme poverty levels of less than \$1.25 a day by 2030, real GDP per capita is expected to grow at an annual rate of at least 21.2% p.a. within the SDG period. Based on the key determinants of growth, this will require Malawi to significantly increase financial investments in accumulating physical capital and increasing exports during the post-2015 SDGs period. These resources cannot be generated internally and Malawi will need to create economic incentives that attract significant financial support from the global community. This might mean significantly changing its development agenda towards more of private sector development as the only key source that can generate meaningful employment to get most of its citizens out of poverty.

References

- Chirwa, T. G., and N. M. Odhiambo. 2016. "The Drivers of Real Sector Growth in Malawi: An empirical investigation." *Journal of Applied Economic Sciences*, Vol. 11, No. 6(44), pp. 1157-1169.
- Chirwa, T. G. 2016. "Electricity Revenue and Tariff Growth in Malawi." *International Journal of Energy Economics and Policy*, Vol. 6, No. 2, pp. 183-194, April
- Government of Malawi. 2012. *Integrated Household Survey 2010-2011: Household socio-economic characteristics report*. National Statistics Office: Zomba, September.
- International Monetary Fund. 2015. World Economic Outlook Database, Retrieved from www.imf.org on January 1, 2016
- Pesaran, M. H., Y. Shin and R. J. Smith. 2001. "Bounds Testing Approaches to the Analysis of Level Relationships". *Journal of Applied Econometrics*, Vol. 16, No. 3, pp. 289-326.

The President of the General Assembly. 2015. Transforming our World: The 2030 agenda for sustainable development. Retrieved from www.un.org on January 1, 2016.

World Bank. 2015a. *Poverty and Equity Database 2015*. Retrieved from www.worldbank.org on January 1, 2016.

World Bank. 2015b. *World Development Indicators 2015*. Retrieved from www.worldbank.org on May 5, 2015.

Annex 1: Country Statistics – Per Capita Income and Poverty Headcount

Country	Code	Real GDP per capita (2014)	Poverty Headcount Ratio - % (US\$1.90)
Madagascar	MDG	\$271	82
Malawi	MWI	\$274	71
Niger	NER	\$293	50
Ethiopia	ETH	\$315	34
Uganda	UGA	\$434	13
Mozambique	MOZ	\$439	69
Rwanda	RWA	\$446	60
Burkina Faso	BFA	\$526	55
Tanzania	TZA	\$601	47
Kenya	KEN	\$659	34
Bangladesh	BGD	\$748	44
Ghana	GHA	\$765	25
Lesotho	LSO	\$974	60
Zambia	ZMB	\$1,033	64
Nigeria	NGA	\$1,098	53
India	IND	\$1,235	21
Georgia	GEO	\$2,254	11
Swaziland	SWZ	\$2,519	42
Angola	AGO	\$2,521	30
Thailand	THA	\$3,426	0
China	CHN	\$3,866	11
Namibia	NAM	\$4,571	23
Brazil	BRA	\$5,853	5
South Africa	ZAF	\$6,086	17
Romania	ROM	\$6,196	-
Botswana	BWA	\$7,096	18
Mauritius	MUS	\$7,117	1
Malaysia	MYS	\$7,374	0
Argentina	ARG	\$7,738	2
Mexico	MEX	\$8,517	3
Turkey	TUR	\$8,861	1
Chile	CHL	\$9,854	1
Croatia	HRV	\$10,561	1
Poland	POL	\$11,305	0
Seychelles	SYC	\$15,592	0
Saudi Arabia	SAU	\$16,944	-
Portugal	PRT	\$18,300	-
Greece	GRC	\$18,377	-
Brunei Darussalam	BRN	\$25,490	-
France	FRA	\$35,667	-
Japan	JPN	\$37,595	-

Country	Code	Real GDP per capita (2014)	Poverty Headcount Ratio - % (US\$1.90)
Australia	AUS	\$37,828	-
Belgium	BEL	\$37,857	-
Singapore	SGP	\$38,088	-
Canada	CAN	\$38,293	-
Finland	FIN	\$38,837	-
Germany	DEU	\$39,718	-
United Kingdom	GBR	\$40,968	-
Austria	AUT	\$41,077	-
Netherlands	NLD	\$43,141	-
Sweden	SWE	\$46,061	-
United States	USA	\$46,405	-
Denmark	DNK	\$47,547	-
Switzerland	CHE	\$58,997	-
Iceland	ISL	\$59,693	-
Norway	NOR	\$67,246	-
Luxembourg	LUX	\$79,511	-

Source: World Bank, 2015a, 2015b