FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY (SADC): THE ROLE OF HUMAN CAPITAL

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ABSTRACT

The relationship between foreign direct investment (FDI) and economic growth has received considerable empirical attention in the Southern African Development Community (SADC) but the role that human capital plays in this nexus is not well-understood. This is despite economic theory firmly suggesting that human capital plays a pivotal role in fostering the adoption of superior foreign technologies and enhancing the spillover benefits (learning-by-doing) that emanate from inward FDI in host countries. Against this background, therefore, the paper utilizes the Mankiw-Romer-Weil growth model in examining linkages between human capital (in form of education), FDI and economic growth in 15 SADC countries. After running cross-country regressions on data covering the period 1990-2015, human capital is found to positively influence the size and significance of the FDI-effect on economic growth in SADC. This suggests that SADC countries should continue upgrading the quality and quantity of their education in order to maximize FDI-induced development.

Keywords: Foreign Direct Investment, Economic Growth, Human Capital, Mankiw-Romer-Weil growth model, SADC

JEL Classification Numbers: F21, O4, I25

INTRODUCTION

Since the 1980s, international capital inflows in form of foreign direct investment (FDI) have increased enormously in developing countries. Even the 2009 global financial crisis with its attendant aggregate demand declines could not manage to halt the surge in FDI as the developing world still managed to account for more than 50 percent of total foreign investment inflows in the world (Alfaro, 2014). A similar episode has been recorded in African regions such as the Southern African Development Community (SADC) which have seen a meteoric rise in international capital inflows. Data from the United Nations Conference on Trade and Development (UNCTAD) reveals that from a meagre US$372 million registered in 1980, FDI inflows into SADC countries have grown significantly to reach a record US$15.96 billion in 2014 (UNCTAD, 2016).This rising trend has not only coincided with but also justified concerted efforts employed by host-governments in the SADC region aimed at attracting foreign investment.

As a matter of fact, the aggressive tactics that developing regions such as SADC have employed to attract FDI emanate from the belief that foreign investment confers economic benefits on the host economy such as transfers of superior foreign technology, increased productivity, superior managerial skills and know-how, access to international markets and production networks, and employee training. Indeed, through learning-by doing and/or learning by observing domestic firms may increase not only their productivity but also boost overall economic growth in the host country (Alfaro et al., 2004). Furthermore, the introduction of foreign technology by foreign enterprises may spillover to domestic firms resulting in the diffusion of new production processes and new products to the domestic market. Blomström and Kokko (1998 and 2003) argue that domestic firms may capture the above spillover benefits by simply observing the operations of foreign firms. On the other hand, movement of workers from foreign to domestic firms may, overtime, also lead to diffusion of technology and other managerial expertise. In addition to its stability and the direct capital financing it provides; there are reasonable grounds to believe that FDI has the potential to be a driving force for accelerated economic growth and economic modernization in developing countries.

There is some consensus in the literature that the ability of the above FDI-induced benefits to contribute to economic growth and development is largely contingent on a host country's absorptive capacity. Even though 'absorptive capacity' is a somewhat blanket term but in essence it includes host-country conditions such as human capital, macroeconomic policy environment, local financial markets, sector characteristics, and market structure (Olofsdotter, 1998; Alfaro, 2014). Among the myriad of the aforementioned local conditions/characteristics, the pivotal role that human capital plays in enhancing the host country's capacity to take advantage (absorb) FDI externalities is well established in the literature. Actually, pioneering work by Borenzstein et al., (1998), Xu (2000), and Noorbakhsh et al., (2001) strongly posits that the level of human capital development is an important condition for fostering the adoption of superior foreign technologies, learning-by-doing and learning-by-observing in host countries. As a matter of fact, a minimum level human capital development (in form of education attainment) is necessary for any host country to not only attract meaningful FDI inflows but also to maximize spillovers from foreign firms. On the same, the Organization of Economic Cooperation and Development (OECD) observes that, in theory, human capital contributes to bridging the knowledge gap between foreign firms and the rest of the host economy and thereby enabling significant spillovers and economic development to occur (OECD, 2002).However, there is a severe dearth in empirical literature aimed at testing the above theses more especially in developing host-regions of the world.

Against this back ground, therefore, this paper uses the Mankiw-Romer-Weil (MRW) growth model in order to develop a mechanism through which the positive effects of FDI on a host economy are dependent on the development of its human capital. With the MRW framework, the paper intends to theoretically and empirically illustrate that human capital is a vital channel through which FDI accelerates the pace of economic growth. More specifically, the study's empirical focus is on the SADC region. SADC is an important economic bloc in Africa and receives a significant proportion of all the FDI flowing into the whole African continent. But as far it can be ascertained, no known study has so far been conducted with an aim of investigating the role of human capital in the FDI-economic growth nexus in the aforementioned region. Therefore the paper aims to be the first to undertake such an endeavor.

The paper is structured along the following lines: Section One presents a short and concise introduction to the FDI, human capital and economic growth topic under consideration. In Section Two the Mankiw-Romer-Weil (MRW) growth model is briefly explored before an adapted empirical model containing FDI, is extracted from it. Section Three deals with empirical issues such as econometric analysis and interpretation of the study results. Finally, concluding remarks and some policy suggestions are given in Section Four.

ANALYTICAL FRAMEWORK: THE MANKIW-ROMER-WEIL (MRW) GROWTH MODEL

The Mankiw-Romer-Weil (MRW) model (1992) represents a seminal contribution to the human capital (education)-economic growth nexus. It basically is an extension of the Solow (1956) growth theory and it considers human capital as one of the input factors in an aggregate Cobb-Douglas production function. In this framework, human capital input is combined with physical capital as well as labor-augmenting technology to produce increases in national output over time (Jones, 1995). The typical MRW model takes the following form:

$$Y_t = K_t^{\alpha} H_t^{\beta} (A_t L_t)^{1-\alpha-\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(1)$$

Where Y is national output, A is total factor productivity/level of technology, K is physical capital, L is untrained or raw labor force and H is the stock of human capital. Furthermore, α, β and $1-\alpha-\beta$ are measures of elasticity of output to physical capital, human capital and labor respectively. It must also be stated in passing that the MRW model assumes constant returns-to-scale but diminishing returns to the reproducible input factors i.e. $\alpha + \beta < 1$. On the same, population *(n)* and level of technology *(g)* expand at an exogenous rate while physical capital depreciates at a rate given as, δ.

The above growth model also makes some important assumptions. Firstly, Mankiw, Romer and Weil (1992) argue that individuals invest in human capital in the same way they do invest in physical capital by simply foregoing consumption and allocating a fraction of their income (S_h) in order to accumulate human capital. This is the same way the fraction (S_k) is invested in the accumulation of physical capital. Secondly, the stock of both physical and human capital; depreciates at a constant rate δ. The MRW further argues that since output is a homogenous good generated in an economy it can therefore be used for either consumption or investment purposes.

By taking time differentials of *(i)* some fundamental equations of the MRW and its steady-state properties can be generated in order to make empirical predictions with respect to the model. Traditionally, this is simply accomplished by rewriting *(i)* into an intensive functional formulation (i.e. in terms of labor units) and this yields the following equation:

$y_t = k_t^{\alpha} h_t^{\beta}$ ……………………………….*(2)*

In the above equation the following holds: $y = Y / AL$, $k = K / AL$ and $h = H / AL$. With the aforementioned assumptions, therefore, the stock of physical and human capital per given worker exhibits behavior described by the following formulations:

$\dot{k}(t) = S_k y(t) - (n + g + \delta)k(t)$…………………………*(3)*
$\dot{h}(t) = S_h y(t) - (n + g + \delta)h(t)$……………………......*(4)*
The MRW framework demonstrates that by maximizing *(iii)* and *(iv)* i.e. setting $\dot{k}(t)$ and $\dot{h}(t)$ equal to 0 generates steady-state values for k^* and h^* as follows:

$$k^* = \left(\frac{s_k^{1-\beta} s_h^{\alpha}}{n + g + \delta}\right)^{\frac{1}{(1-\alpha-\beta)}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(5)$$

$$h^* = \left(\frac{s_k^{\alpha} s_h^{1-\alpha}}{n + g + \delta}\right)^{\frac{1}{(1-\alpha-\beta)}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(6)$$

With diminishing returns-to-scale, both human capital and physical capital are measured in terms of effective labor units and all quantities are constant in steady-state. This implies that *Y/L, K/L* and *H/L* grow at exogenous rate equal to technological progress *g*. By extension this indicates that growth in the rate of investment in human capital stock S_h does not have discernible long-run economic growth effects. This generates level effects but no rate effects. From the steady-state equations, it can be seen that there exists a positive relationship between income growth and investment rates in both physical and human capital stock. However, steady-state income growth is negatively correlated with population growth rate. What this entails is that a permanent expansion in the fraction of income set aside for accumulation of human capital stock also leads to a surge in steady-state income thus setting the economy on a transitional growth trajectory (Weil, 2013).

The MRW model has a number of implications on the economy. To begin with, the income elasticity of both physical and human capital stocks is equal thus implying that an investment in physical capital earns a social return. Additionally, physical capital accumulation has a significant positive effect on per capita steady-state incomes even in the absence of externalities. This means that higher national saving levels lead to increases in human capital accumulation. Likewise, population growth leads to a decline in income growth over time as total factor productivity diminishes. The MRW model also has important repercussions on the general macro economy even when economies are not in their steady-state. In particular, it posits that countries with similar levels of accumulation, technology and population growth should experience a per capita income convergence. All in all, the above model views differences in savings, population growth and education as the main determinants of cross-country per capita income differences (Mankiw, Romer and Weil, 1992).

In line with Mankiw, Romer and Weil (1992), per capita income growth is estimated using the following fundamental equation:

$$ln\left[\frac{Y(t)}{L(t)}\right] = lnA(0) + gt + \frac{\alpha}{1-\alpha-\beta} ln(s_k) - \frac{\alpha+\beta}{1-\alpha-\beta} ln(n+g+\delta) + \frac{\beta}{1-\alpha-\beta} l\, n(h^*) \ldots\ldots.(7)$$

In order to incorporate FDI into the MRW framework, the study splits the share of physical capital s_k into physical capital stock of domestic origin s_d and physical capital stock of foreign origin s_f.Replacing the two forms of physical capital in the above equation generates the following model:

$$ln\left[\frac{Y(t)}{L(t)}\right] = lnA(0) + gt + \omega_1\, ln(s_d) + \omega_2\, ln(s_f) - \omega_3\, ln(n+g+\delta) + \omega_4 l\, n(h^*) \ldots\ldots\ldots\ldots\ldots(8)$$

By substituting proxies for human capital, physical capital-stock of foreign origin, physical capital-stock of domestic origin, and population growth rates in the above equation the following cross-country econometric model is generated that will be empirically estimated using conventional least squares regression methods:

$$\boldsymbol{lngPCI = \omega_0 + \omega_1\, ln\left(\frac{gns}{gdp}\right) + \omega_2\, ln\left(\frac{fdi}{gdp}\right) - \omega_3\, ln(n+g+\delta) + \omega_4\, ln(humcap) + \varepsilon_t \ldots\ldots(9)}$$

Where *gPCI* is growth rate in per capital income, $\frac{gns}{gdp}$ is gross national savings to GDP ratio representing growth in physical capital stock of domestic origin, $\frac{fdi}{gdp}$ is foreign investment to GDP ratio representing physical-capital stock of foreign origin, *humcap* is growth in human capital over time, $(n+g+\delta)$ is population growth rate plus depreciation, ε_t is the random disturbance term and $\omega_1, \omega_2, \omega_3$ and ω_4 are regression coefficients or economic growth elasticities of domestic physical capital, FDI, population and human capital respectively

In theory, it is expected that $\omega_1 > 0, \omega_2 > 0, \omega_4 > 0, and\ \omega_3 < 0$.However, the principal interest of this study is on $\boldsymbol{\omega_2}$

EMPIRICAL METHODOLOGY: DATA, ECONOMETRIC ISSUES AND DISCUSSION OF RESULTS

In order to examine the interaction between FDI, human capital and economic growth in SADC, the study performs cross-country regressions on panel data from 1990 to 2015 covering 15 member states. These SADC member states are: Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The panel data enables the study to adequately handle all the heterogeneity issues in the sample and also to thoroughly investigate growth dynamics within individual SADC member countries. Furthermore, econometric diagnostic tests such as Hausman test, unit root, heteroscedasticity and serial correlation tests are also applied in order to ensure robustness of the results. It must also be clearly spelled out that the study's empirical estimation will be strictly restricted to the variables suggested by the modified MRW growth model generated in section 2.

What is more, the study utilizes Word Bank data (World Development Indicators 2015) (https://datacatalog.worldbank.org/dataset/world-development-indicators) for most of the variables except for an alternative human capital proxy whose time series is obtained from Penn World Tables 9.0.The study's sampling is largely guided by the availability of the data and also the fact that SADC began to effectively function as an economic bloc in the early 1990s.In the analysis, annual per capita GDP growth (in national income at constant prices) is used as a proxy for economic growth while inward FDI to GDP ratio is a proxy for physical capital stock of foreign origin. Likewise, domestic savings to GDP ratio is utilized to approximate physical capital of domestic origin. For human capital approximation, enrollment rates for secondary school education and a human capital proxy developed by Feenstra et al., (2015) which is presented in Penn World Tables 9.0, (https://www.rug.nl/ggdc/productivity/pwt/) are employed as alternate proxies. For population growth, the study uses working-age population (15-64 years) growth rate in order to capture the active labor force. Additionally, following the footsteps of Mankiw-Romer and Weil (1992), we assume that $g + \delta = 0.05$.

But it must be pointed out that human capital in form of education is difficult to measure economically owing to a number of factors. Firstly, a significant proportion of educational investment is in the form of foregone employment earnings on the part of students. Such a scenario makes measurement problematic since the foregone employment earnings vary with the amount of investment in human capital formation In addition; explicit spending on education is undertaken at every level of government as well as among individual households thus making it difficult to accurately measure (Weil, 2013). But this notwithstanding, the two alternative measures used in the study provide the most realistic and feasible proxies available.

Panel Diagnostic Tests

Before cross-country regressions can be run on the panel data it is important to perform some standard diagnostic tests in order to ensure robustness of the panel regression results. These diagnostic tests are given in the sub-sections that follow below.

Hausman test. Basically, the Hausman (1978) test assesses the presence of endogenous or predictor values in panel regression models. These endogenous variables are those whose values are determined by other independent variables in the regression. The presence of the above variables violates the fundamental assumption of classical regression that the predictor variables and the error term are not serially correlated. The Hausman test therefore detects whether the model's predictor variables exhibit endogeneity and thus determining if the regression model is correctly specified or not. In essence this model misspecification test simply helps in choosing between fixed-effects models or random-effects models by checking the presence of autocorrelation between error terms and the regressors of the model (Greene, 2003). With Stata software the test is simply done by comparing the Prob>chi2 value against the p-value (i.e. 0.005). If the later values are less than the former then the fixed-effects approach is a better option than the random-effects and vice versa. In the Tables 1, 2, and 3, presented in the sections that follow below, since all the Prob>chi2 values are less than 0.05 (i.e. significant) in all the three empirical models therefore the fixed-effect regression approach is chosen.

Wooldridge test for autocorrelation. Given that autocorrelation or serial correlation in panel data models biases standard errors and causes inefficiencies in the estimated regression results, it is important to detect serial correlation in the error term and remedy it if possible (Drukker, 2003). A standard procedure for testing for panel data autocorrelation is the Wooldridge (2002) test which is applicable under general regression conditions and is easy to perform. In Stata this test is computed by simply comparing the computed F-value against the p-value (0.05).If the former value is greater than the later the null hypothesis of no autocorrelation is accepted and vice versa. Wooldridge test results for the three panel models are presented in Tables 1, 2, and 3 located in the sections that follow below.

Discussion Of Cross-Country Regression Results

After successful performance of panel diagnostic tests the paper proceeds to estimate cross-country regressions. In particular, three regression models are run on the SADC country data in order illustrate the FDI-economic growth nexus in conditions where there is no human capital formation and where human capital is present in the economy. Also, the impact of two alternative measures of human capital (i.e. secondary school enrolment rate and a human capital proxy developed by Feenstra et al., (2015) on economic growth in SADC is empirically assessed. Table 1 presents empirical estimates the effect of FDI on per capita economic growth when no human capital is available in the economy.

Table 1: Estimating the FDI- per capita GDP growth relationship in SADC region when no human capital is available

$Dependent\ variable$	$ln\ gPCI$ (1)	$Dependent\ variable$	$\Delta lngPCI$ (2)
$constant$	1.097^{***}	$constant$	$-$
	(0.101)		$-$
$ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.610^{***}	$\Delta ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.584^{**}
	(0.068)		(0.044)
$Standardised\ coefficient\ for\ ln\left(\frac{GNS}{GDP}\right)$	0.634	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{GNS}{GDP}\right)$	0.409
$ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.401^{*}	$\Delta ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.397^{*}
	(0.149)		(0.236)
$Standardised\ coefficient\ for\ ln\left(\frac{FDI}{GDP}\right)$	0.391	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{FDI}{GDP}\right)$	0.314
$ln(n+d+\delta)$ $growth\ in\ working\ age\ population$	-0.571^{***}	$\Delta ln(n+d+\delta)$ $growth\ in\ working\ age\ population$	-0.326^{***}
	(0.040)		(0.091)
$Standardised\ coeffient\ of\ ln(n+g+\delta)$	0.409	$Standardised\ coeffient\ of\ \Delta ln(n+g+\delta)$	0.603
R^2	0.519	R^2	0.501
$F-value$	6.499	$F-value$	6.272
$Breusch-Pagan\ Chi^2$	1.822		
$(P > Chi^2)$	(0.4017)		
$Ramsey\ RESET\ F$	1.017		
$(P > F)$	(0.0608)		
$Wooldridge\ F$	1.218		
$(P > F)$	(0.2114)		
$Hausman\ Chi^2$	5.26		
$(P > Chi^2)$	(0.2369)		
$Total\ number\ of\ sampled\ countries$	15		

Source: Author's secondary analysis using panel data from various international sources

NB: The dependent variable in column (1) is the growth rate of per capita income in SADC. The dependent variable in column (2) is the first differences (Δ). The panel data is unbalanced and covers the time period 1990-2015. The estimation method in column (1) is fixed-effect regression while that in column (2) is AR1. The parentheses below the coefficients report auto-correlation-consistent standard errors.

***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level

From the above table it is clear that all the dependent variables have the expected signs which are in line with the propositions of neoclassical growth theory. Furthermore, both Models 1 and 2 have a reasonable R^2 value (above 50 percent) indicating that the changes in the dependent variables have a high explanatory power on resultant changes in in per capita income growth. But more importantly; Table 1 reveals that inward FDI has a positive, albeit weak statistical effect, on per capita GDP growth in the SADC region at 5 percent level of significance i.e. the result is only significant at 10 percent significant level. Indeed, when no human capital is present in the economy Model 1 shows a 1 percent increase in inward FDI causes a 0.401 percentage increase in per capita GDP growth.

Likewise, Model 2 under the auto-regressive process (AR1) suggests that a 1 percentage surge in inward FDI triggers a corresponding increase of 0.397 percentage points in per capita GDP growth. In a similar vein, standardized values for Model 1 and Model 2 appear to render further credence to the positive role that FDI plays in the economic growth process in the SADC region.

We now consider a scenario where human capital, as approximated by secondary school enrolment ratio, is available in the economy. Empirical results of this model are given in Table 2 presented below. But it must be stated at the onset that all the regressors or independent variables seem to carry the expected signs in line with standard neoclassical growth theory and the model has a fairly reasonable explanatory power as indicated by R^2 values of above 50 percent.

Table 2: Estimating the FDI- per capita GDP growth relationship in SADC region when human capital is available

$Dependent\ variable$	$ln\ gPCI$ (1)	$Dependent\ variable$	$\Delta lngPCI$ (2)
$constant$	1.407^{**}	$constant$	–
	(0.821)		–
$\ln(Secoenrol)$ $secondary\ school\ enrollment\ ratio$	0.276^{*}	$\Delta ln(Secoenrol)$ $secondary\ school\ enrollment\ ratio$	0.204^{*}
	(0.101)		(0.198)
$Standardised\ coefficient\ for\ ln(Secoenrol)$	0.076	$Standardised\ coefficient\ for\ \Delta ln\ (Secoenrol)$	0.129
$ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.860^{***}	$\Delta ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.814^{**}
	(0.088)		(0.032)
$Standardised\ coefficient\ for\ ln\left(\frac{GNS}{GDP}\right)$	0.701	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{GNS}{GDP}\right)$	0.611
$ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.639^{**}	$\Delta ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.427^{**}
	(0.079)		(0.086)
$Standardised\ coefficient\ for\ ln\left(\frac{FDI}{GDP}\right)$	0.576	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{FDI}{GDP}\right)$	0.462
$ln(n+g+\delta)$ $growth\ in\ working\ age\ population$	-0.301^{***}	$\Delta ln(n+g+\delta)$ $growth\ in\ working\ age\ population$	-0.326^{***}
	(0.040)		(0.091)
$Standardised\ coeffient\ of\ ln(n+g+\delta)$	0.359	$Standardised\ coeffient\ of\ \Delta ln(n+g+\delta)$	0.913
R^2	0.553	R^2	0.510
$F-value$	6.520	$F-value$	6.333
$Breusch-Pagan\ Chi^2$	1.979		
$(P > Chi^2)$	(0.3717)		
$Ramsey\ RESET\ F$	1.031		
$(P > F)$	(0.0903)		
$Hausman\ Chi^2$	1.109		
$(P > Chi^2)$	(0.3272)		
$Wooldridge\ \ F$	3.68		
$(P > F)$	(0.5978)		
$Total\ number\ of\ sampled\ countries$	15		

Source: Author's secondary analysis using panel data from various international sources

NB: The dependent variable in column (1) is the growth rate of per capita income in SADC. The dependent variable in column (2) is the first differences (Δ). The panel data is unbalanced and covers the time period 1990-2015. The estimation method in column (1) is fixed-effect regression while that in column (2) is AR1. The parentheses below the coefficients report standard errors.

***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level

Results of the above table suggest that human capital in form of secondary school enrollment rate has a positive albeit a weak statistical effect on per capita income growth in the SADC countries at 5 percent level of significance as indicated by both Model 1 and 2 since it is only significant at 10 percent level of significance.

But more importantly, inward FDI appears to exert a positive and statistically significant effect on per capita GDP growth in the SADC region at 5 percent level of significance. When the standardized coefficients of inward FDI in Table 1 and Table 2 are compared, it is clear that inward FDI has large standardized values and higher statistical significance in both Model 1 and Model 2 of Table 2 (i.e. 0.576 and 0.462 respectively) at 5 percent level of significance compared to Table 1 (0.391 and 0.314) respectively. With this therefore, it can argued that human capital in form of secondary school enrollment appears to boost the positive impact of inward FDI on per capita growth in the SADC region.

By the same token, empirical results in the above table also indicate that capital of domestic origin has a higher positive and statistically significant effect on per capita income growth relative to inward FDI (i.e. capital of foreign origin) in the aforementioned region. This is clearly depicted by comparing the standardized coefficient values of inward FDI and domestic capital in both Table 1 and Table 2. This finding seems to go against conventional wisdom which suggests that FDI has a higher positive growth effect relative to domestic capital because of knowledge spillovers resulting from additional capital, superior technology and knowhow which foreign investment embodies.

Additionally, we also applied some regression diagnostic tests such as Ramsey Regression Error Specification Test (RESET) and Breusch-Pagan/Cook-Weisberg heteroscedasticity tests to ensure statistical robustness of our results. Results of these tests suggest that our empirical results do not show any evidence of heteroscedasticity, omitted variables or model misspecification.

But owing to the difficulties in measuring human capital, we also employ an alternative human capital proxy suggested by Feenstra et al., (2015) in order to ensure robustness of our empirical results. This proxy is basically generated based on the average years of schooling adapted from Barro and Lee (2013) and also a rate of return estimates across the globe which was originally developed by Psacharopoulos (1994).Empirical results of the analysis are presented below.

Table 3: Estimating the FDI-per capita GDP growth relationship in SADC region using an alternative human capital proxy

$Dependent\ variable$	$ln\ gPCI$ (1)	$Dependent\ variable$	$\Delta lngPCI$ (2)
$constant$	2.081^{***} (0.028)	$constant$	$-$ $-$
$ln(Humcap)$ $Human\ capital\ proxy$	0.323^{*} (0.121)	$\Delta ln(Humancap)$ $Human\ capital\ proxy$	0.308^{*} (0.198)
$Standardised\ coefficient\ for\ ln(Humancap)$	0.226	$Standardised\ coefficient\ for\ \Delta ln\ (Humancap)$	0.141
$ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.660^{***} (0.018)	$\Delta ln\left(\frac{GNS}{GDP}\right)$ $share\ of\ domestic\ capital\ stock\ in\ the\ GDP$	0.614^{***} (0.032)
$Standardised\ coefficient\ for\ ln\left(\frac{GNS}{GDP}\right)$	0.580	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{GNS}{GDP}\right)$	0.512
$ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.601^{**} (0.079)	$\Delta ln\left(\frac{FDI}{GDP}\right)$ $share\ of\ foreign\ capital\ stock\ in\ the\ GDP$	0.503^{**} (0.046)
$Standardised\ coefficient\ for\ ln\left(\frac{FDI}{GDP}\right)$	0.411	$Standardised\ coefficient\ for\ \Delta ln\left(\frac{FDI}{GDP}\right)$	0.402
$ln(n+g+\delta)$ $growth\ in\ working\ age\ population$	-0.573^{**} (0.071)	$\Delta ln(n+g+\delta)$ $growth\ in\ working\ age\ population$	-0.526^{**} (0.099)
$Standardised\ coeffient\ of\ ln(n+g+\delta)$	0.239	$Standardised\ coeffient\ of\ \Delta ln(n+g+\delta)$	0.413
R^2	0.621	R^2	0.610
$F-value$	8.320	$F-value$	8.677
$Breusch-Pagan\ Chi^2$	1.098		
$(P > Chi^2)$	(0.0912)		
$Ramsey\ RESET\ F$	1.014		
$(P > F)$	(0.2754)		
$Wooldridge\ F$	2.143		
$(P > F)$	(0.1711)		
$Hausman\ Chi^2$	5.11		
$(P > Chi^2)$	(0.1785)		
$Total\ number\ of\ sampled\ countries$	15		

Source: Author’s secondary analysis using panel data from various international sources

NB: The dependent variable in column (1) is the growth rate of per capita income in SADC. The dependent variable in column (2) is the first differences (Δ). The panel data is unbalanced and covers the time period 1990-2015. The estimation method in column (1) is fixed-effect regression while that in column (2) is AR1. The parentheses below the coefficients report standard errors.

***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level

Results from Table 3 indicate that the regression models have high explanatory power as evidenced by R^2 values of above 60 percent. Also, the regression results from the fixed-effects model (Model 1) and the autoregressive (AR1) process (Model 2) suggests that all the regressors exhibit the expected values in support of the predictions of standard economic growth theory.

From the above table it is clear that human capital has a positive but statistically weak effect on per capita GDP growth in the SADC region. This is so because the human capital coefficients in both Model 1 and Model 2 are only statistically significant at 10 percent but not 5 percent level of significance. When the two human capital measures in Table 2 and Table 3 are compared one can also decipher from their standardized coefficients that secondary school enrollment rate exhibits a lower positive effect on per capita GDP growth relative to the human capital proxy even though both measures are only significant at 10 percent significance level. This may be a reflection of the broadness of the human capital proxy which unlike school enrolment rate captures not only educational attainment but also earnings associated with education and these variables have different growth effects.

On its part, inward FDI exerts positive and statistically significant effect on per capita GDP growth at 5 percent level of significance in the SADC region. When a comparison is made with results in Table 1 (an economy with no human capital), it is clear that the incorporation human capital appears to boost not only the positive growth-effect of inward FDI but also the statistical significance in both Model 1 and Model 2.

Furthermore, capital of domestic origin appears to exhibit a higher growth-generating effect relative to inward FDI in the SADC region under both fixed-effect and auto-regressive (AR1) estimation. This fact is clearly evident when the standardized coefficients of inward FDI and domestic capital are compared from the above table.

Post-estimation regression tests (Breusch-Pagan/Cook-Weisberg test and Ramsey RESET test) suggest that our empirical results are robust since no evidence of heteroscedasticity, model misspecification and measurement bias has been detected in the model.

CONCLUDING REMARKS AND SOME POLICY SUGGESTIONS

The study set out to examine the role that human capital plays in the enhancing the FDI-economic growth nexus in the SADC region using the MRW growth framework. Human capital was approximated using two alternative proxies: secondary school enrollment rate and a human capital proxy developed by Feenstra et al. (2015). In this undertaking, cross country regressions were employed on panel data for 15 SADC member countries covering the period 1990-2015. In a nutshell, the paper finds that human capital (in form of both secondary enrolments rates and human capital proxy) boosts inward FDI’s positive effect on per capita GDP growth in the aforementioned region. However, on its part human capital appears to exert a positive but relatively weak statistical effect on per capita GDP growth. Contrary to the commonly accepted wisdom in the FDI literature, the study finds that domestic capital seems to have a larger economic growth generating-effect relative to inward FDI in the SADC region. Additionally, capital of domestic origin and population have a positive and negative effect respectively on the level of economic growth in SADC at 5 percent significance level.

The above findings and their important policy implications on the SADC member countries can be summarized as follows:

- Firstly, since human capital boosts the positive effect of FDI on growth, SADC countries should continue upscaling the provision of education to their citizens.
- But the relatively weaker positive-effect of human capital on economic growth suggests that SADC should put concerted efforts on improving the quality of education provided.
- Furthermore, since domestic capital also has a positive and significant effect on economic growth, SADC should enhance linkages between domestic firms and foreign investors.
- Human capital is pivotal in the formation of the above backward and forward linkages between domestic capital and inward FDI in the SADC region.
- Finally, we argue that the above human capital-driven linkages have the potential to reduce the likelihood of FDI-induced 'enclave development' in the aforementioned region.

Indeed, from the above discussion, human capital appears to boost the positive effect of inward FDI on per capita income growth which may suggest SADC member countries are justified in continuing with their policies aimed at providing educational and training services to their citizens. This has potential to boost FDI-induced economic development in the SADC region.

However, the positive albeit weak effect that human capital appears to exhibit on per capita GDP growth gives food for thought for policy makers in the SADC member countries. Indeed, it may be prudent for SADC countries to strike a delicate balance between quantity of education provided (e.g. increasing school enrolment) and quality of the education offered (e.g. improving learning conditions for students and workers).If appropriate and adequate education is provided to its citizens SADC countries will boost the quality of their labor force thereby not only enhancing their attractiveness as foreign investment destinations but will also enhance their absorptive capacity for adopting and adapting foreign technology and knowhow. In the end this will increase the likelihood of FDI-induced spillovers which are crucial for catalyzing FDI-driven economic development.

In addition to this, given that domestic capital appears to generate larger positive effects on per capita economic growth relative inward FDI in the region, it may be prudent for SADC countries to increase their efforts aimed at boosting complementarities between domestic and foreign investment in their economies. These complementarities would assist in effectively dealing with the 'enclave character' of inward FDI which largely flows into primary sectors of most SADC member countries. Such 'enclave character' greatly reduces economic growth-generating effects of FDI inflows in host countries by reducing the formation of any meaningful backward and forward linkages with the host economy. Human capital in form of education can play a crucial role in formation of these meaningful linkages between domestic firms and foreign investors, given that the adoption and adaption of foreign technology and know-how through learning-by-doing or learning-by-observing requires that the local investors and local workers should have attained a certain threshold of basic education.

But all in all, it is worth noting that the above recommendations on the role of human capital in catalyzing the FDI-economic growth nexus provided in this discussion are only suggestive. It may be worthwhile for researchers and policy makers to conduct further research on the topic in question. Given that education is just one component of human capital, there is need to also examine the other side of the coin, which is health. By investigating the role that health plays in the human capital, FDI and economic growth relationship, therefore, this will provide not only a more comprehensive picture but also deeper insights into the aforementioned nexus in the SADC region.

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