Mining Sector and Economic Growth in Southern African Economies: A Panel Data Analysis

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ABSTRACT

This paper investigates the relationship between mineral resource endowment and economic growth in the Southern African economies, using a panel dataset of 14 countries in the Southern African Development Community (SADC) from 1990 to 2014. The empirical methodology involved the use of Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM) as the estimation techniques. Based on a modified framework from Mahonye and Mandishara (2015), the economic growth model was analysed using real growth of mining, share of mineral exports to total exports, real growth of agriculture, real growth of manufacturing, human capital development, population growth, mineral resource endowments, infrastructural development, real growth in services, trade openness and growth in foreign direct investment. Findings showed that real growth in services, real growth of manufacturing, real growth of agriculture, real growth of mining, human capital development, infrastructural development, trade openness, and growth in foreign direct investment are important determinants of economic growth in Southern African economies during the study period. Hence, this study validates the FDI fitness theory. Consequently, to improve economic growth, Southern African countries must improve their macroeconomic policies, institutions and regulatory framework to be able to attract the much desired strategic investments in the mining sector. Therefore, Southern African countries with natural resources should encourage their development and not be concerned about the threat of "resource curse".

KEY WORDS: Mining sector, mineral resource endowment, economic growth, OLS, GMM, Southern African Development Community; SADC.

1.0 Introduction

In the past few decades, Southern Africa's mining sector has played a key role in attracting foreign investments into the region (Butler, 2013; Kahn, 2013; El-Wassal, 2012). Accordingly, investments in mineral resources have evolved into a major source of development finance, contributing to the economic growth of many Southern African economies (UNCTAD, 2015; Kostad and Soreide, 2009).The Southern African Development Community (SADC) was established in 1980 as a development coordinating conference (SADCC) and transformed into a development community in 1992 (Mahonye and Mandishara, 2015; UNDP, 2014). With a total membership of fifteen countries (Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe); SADC as a whole, constitutes about 37 percent of Africa's total Gross Domestic Product (GDP) in 2003–2012 (UNCTAD, 2015). It is an organisation that strives for regional integration to promote economic growth, security and peace in the southern African region (Anyanwu & Yameogo, 2015; Pelinescu, 2015). Since its inception, SADC has formulated policies and strategies for regional Integration in support of sustained economic growth and development in the region, with the expected economic benefits of increased market size, improved intra-regional trade and investment flows (World Bank, 2015; WEF, 2014). It is also important to note that the economies of member countries are at different stages of development; ranging from countries like Malawi, which figures among the poorest

countries of the world, to countries such as Mauritius, a stable and prospering middle-income country (World Bank,2015; Anyanwu and Yameogo, 2015).

Southern Africa is a region highly endowed with a diverse minerals and metals, ranging from vast amounts of diamonds, platinum, coal, gold, asbestos, iron, nickel, chrome and other varied kinds of minerals (UNCTAD, 2015; Cawood and Oshokoya, 2013b; Kostad and Soreide, 2009). Despite the abundance mineral resources, the mining industry in Southern Africa has undergone major turmoil in the past two decades, ranging from the global financial crisis, increasingly vocal calls for the nationalization of mines, falling commodity prices, labour unrest, and police brutality (Butler, 2013; Cawood and Oshokoya, 2013a). Most of these crises, in conjunction with the high rate of poverty, corruption, and HIV/AIDS are some of the biggest factors impeding economic growth in the region (UNCTAD, 2015). Consequently, the abundance minerals and metals in the region present immense potential for sustainable economic growth, an avenue for massive reduction in poverty and employment generation through forward and backward integrations across the productive sectors of the region (Mahonye and Mandishara, 2015).

Furthermore, one of the cornerstones upon which globalisation has grown in the past few decades is foreign direct investment (FDI) in the mining sector; flowing predominantly from high income western nations (Mahonye and Mandishara, 2015; Butler, 2013; Cawood and Oshokoya, 2013a). Accordingly, investments in mineral resources have evolved into a major source of development finance, contributing to the economic growth of many African economies (Al-Sadig, 2009; UNCTAD, 2015, 2013). Specifically, FDI as a form of capital obtained through foreign sources, has preferred multifaceted characteristics compared to other sources of capital (Mahonye and Mandishara, 2015; Papyrakis and Gerlagh, 2004; Anyanwu & Yameogo, 2015). However, despite the influence of mining on economic growth and poverty reduction (Mahonye and Mandishara, 2015; Butler, 2013; Kahn, 2013) in Southern Africa, evidence relating to the interplay between mining and economic growth has been mixed (Cawood and Oshokoya, 2013a; Ding and Field, 2005; Papyrakis and Gerlagh, 2004). In short, there is no simple way of describing government policies in the mining sector over the last three decades (Cawood and Oshokoya, 2013b; Kostad and Soreide, 2009). Interestingly, studies have been conducted on the relationships between natural resources endowments and economic growth; however, there seem to be few studies on a panel analysis of Southern African countries (Mahonye and Mandishara, 2015). Given the comparative advantages enjoyed by many Southern African economies in mineral resources exploitation, thus, a study of the dynamic relationship between mineral resource endowment and economic growth will be beneficial to many policy-makers in terms of formulating their growth, trade, and investments policies (Kahn, 2013; Kostad and Soreide, 2009; Steers & Nardon, 2006). Consequently, this study seeks to investigate the relationship between mineral resource endowments and economic growth in the Southern African economies using a panel dataset from 1990 to 2014. This objective was motivated based on the argument that, with better education systems, investments, institutional and sensible regulatory reforms in the mining sector, Southern African region could completely break the spell that has held it back so often in the past (Butler, 2013; Cawood and Oshokoya, 2013b). This study was also motivated by the presumption that mineral resource endowment might encourage rent-seeking behaviour and the attendance negative result on the economy (Anyanwu and Yameogo, 2015). The study was also designed to validate the conceptual and theoretical frameworks toward determining the influence of mining sector development on economic growth of Southern African economies.

Based on the objective of this study, the basic questions to ask are: after years of exploitations of mineral resources in the Southern African region, do mineral resources contribute negatively to economic growth? And secondly, do government institutions improve the contribution of mining sector to economic growth? Consequently, the study tests two important hypotheses: 1. mineral resources endowment contributes negatively to economic growth in

Southern African economies; 2. Government institutions improve the influences of minerals resources endowment and economic growth in Southern African economies. The remaining part of this paper is structured as follows: Section two reviews the related literature and section three treats the adopted methodology. Section four presents the results and discussion of the findings. The last section, section five, presents the conclusion, implications and policy recommendations.

2.0 Review of Related Literature

2.1 Theoretical Framework

The theoretical framework of this study is based on the strategic tripod of the dependency schools, the modernization schools, and the integrative schools. This strategic tripod integrates the two traditional schools of development thinking, namely, the dependency and modernization schools into the integrative schools (Adelakun, 2011; Pelinescu, 2015). However, this study is rooted in the integrative school, as develop further through the FDI Fitness theory. Most dependency theories see the cause of underdevelopment in Africa mining sector primarily in exploitation by the industrialized nations, whether through international trade or multinational corporations (Kahn, 2013; Wilhelms, 1998). According to Aregbesola (2014), the major contribution of this school is its focus on the consequences of FDI and the critical analysis of Western development paradigms in many developing countries (Pelinescu, 2015; Wilhelms, 1998). Despite its critics about the inability of most developing nations to maximally benefits from their mineral endowments and the complex regulations, rent-seeking, and lagging implementation of reforms by many African countries; the solution for underdevelopment offered by the dependency theorists contradicts the present quest for improved economic growth through strategic investments in the mining sector (Adelakun, 2011).

Most modernization school theories, like the perfect market theories, stem from the free trade and perfect competition assumptions by viewing FDI and portfolio investments as prerequisites for sustainable economic growth (Aregbesola, 2014; UNCTAD, 2015). Furthermore, theories like linkage theory, export instability theories and the booming sector and Dutch disease theory also lends credence to the debate on the influence of resource endowments and economic growth (Pelinescu, 2015). While the linkage theory uses interrelations and interactions amongst the economic variables like production and consumption; the Dutch disease theory posits an initial benefits to a resource endowed country at the expense of reallocation of production and a fall in manufacturing output (an offshoot of deindustrialization) in the long run (Mahonye and Mandishara, 2015). That notwithstanding, both the perfect and imperfect markets still does not explain the influence of mineral resource endowment on economic growth (Cawood and Oshokoya, 2013b; Ding and Field, 2005; Wilhelms, 1998).

Consequently, institutional FDI Fitness theory posits that investments in the mining sector are determined more by institutional variables; consequently, the fitness must be based on a country's ability to recognize and utilize available opportunities, to improve economic growth (Aregbesola, 2014). This is also based on their quest to attract more inflows of investments in the mining sector (Butler, 2013; Cawood and Oshokoya, 2013a). The presupposition is that policies in the mining sector must be implemented within an institutional framework for the desired improvements in economic growth (Wilhelms, 1998). In other words, national institutions, like markets (macroeconomics), education, government and socio-cultural systems, must be effective and efficient in transmitting policies to sustainable growth and development (Mahonye and Mandishara, 2015; Atkinson and Hamilton, 2003; Anyanwu and Yameogo, 2015; Wilhelms, 1998). Based on previous studies, the four institutions adding to FDI Fitness are policy related issues on education (human capital development), government (service institutions), socio-culture, and markets- macroeconomics (El-Wassal, 2012; Wilhelms, 1998). Hence, increasing

institutional capacity is now the objective of many countries or organizations desirous of attracting investments in the Southern African mining sector (Mitchell, 2013; Papyrakis and Gerlagh, 2004).

2.2 Mining and Economic growth

Mining is a strategic sector in Southern Africa, with roughly half of the world's platinum, vanadium, and diamonds originate in the region, in addition to about 36% of gold and 20% of cobalt (World Bank, 2015; WEF, 2014). These minerals contribute immensely to the gross domestic product (GDP), employment and poverty reduction in many Southern African Development Community (SADC) member countries, while many of them depend on mineral exports for their foreign exchange earnings (Anyanwu and Yameogo, 2015). Despite an average of 3% increase in GDP per capita in SADC over the last decade, it is however important to note that economic growth in SADC differs greatly from country to country (Mitchell, 2013). While a country like Angola enjoyed a GDP growth per capita of around 7% annually in the last decade, the GDP per capital of a country such as Zimbabwe decreased by about 2.8% annually over the same period (UNCTAD, 2015). In some instances, economic growth is propelled by a booming resource industry (Angola and Mozambique), while in others, especially small SADC countries, it is the services sector (World Bank, 2015). According to Mitchell (2013), these disparities also show the potential for increased growth in SADC.

Studies have been conducted to understand the determinants of economic growth in developing economies (Mahonye and Mandishara, 2015; El-Wassal, 2012; Adelakun, 2011; Butler, 2013; Kahn, 2013). However, little efforts are placed on the various determinants of economic growth in many resource endowed economies in Africa (Aregbesola, 2014; Butler, 2013). Studies, like Onyeukwu (2006), observed a 'resource curse' in Nigeria. This was corroborated in similar study by Weeks (2011), which also showed that Zambia was under a 'resource curse trap'. These studies however validates the existence of a paradox, in which resource endowed nations underperformed when compared with non or less resource endowed nations in terms of economic growth and development (Mahonye and Mandishara, 2015). When compared to agriculture products, the impact of natural resources are usually homogeneous and are more likely to attract appropriation and rent seeking, with the attendance higher risk of conflicts (Butler, 2013). From the policies and non policies perspectives, agglomeration effects may exist given that local and foreign investors may be attracted to countries with more existing foreign investment in the mining sector (Nnadozie & Osili, 2004). This is on the premise that, investors may view the investment decisions by others as being a good signal of favourable conditions, and may decide to invest too (Anyanwu, 2012). According to previous studies (Mahonye and Mandishara, 2015; Aregbesola, 2014; El-Wassal, 2012; Adelakun, 2011), variables like real growth of mining, share of mineral exports to total exports, population growth, real growth of agriculture and manufacturing, economic openness, human capital development, natural resources, infrastructural development, FDI were found to be major determinants of economic growth in many mineral producing nations in Africa. In addition, other studies also observed significant relationships between economic growth and natural resources (Aseidu, 2006; Mohamed & Sidiropoulos, 2010); good infrastructure, macroeconomic stability, an efficient legal system, less corruption and political stability (Hailu, 2010) and human resource development (Rodríguez & Pallas, 2008; Anyanwu, 2012).

Past studies have used macroeconomic and institutional factors to analyse the relationships between mining and economic growth in many developing economies (Mahonye and Mandishara, 2015; Butler, 2013; Kahn, 2013). According to these studies, macroeconomic theory attempts to explain economic growth in relation to macroeconomic variables like real growth of mining, mining export to GDP, institutional variables, and FDI (Butler, 2013; Aregbesola, 2014). In addition, interactions among government policies and institutions,

organisations, and macro economic variables also influence the degree of beneficiation, foreign exchange, balance of payment, and environmental factors in many developing economies (Aregbesola, 2014). Consequently, most multinational corporations (MNCs) often consider wider influences from sources such as government policies, institutions, macroeconomic and environmental factors in terms of their decision to invest in other countries (Butler, 2013; Kahn, 2013). Specifically, the efficiency of the political institutions in developing economies to formulate the desired investment-related fiscal and monetary policies influences the growth benefits from mineral exploitations in many African economies (Asheghian, 2004). Consequently, many Southern African economies that compete for a larger share of global FDI flows in the mining sector have started liberalising their institutional environments (through various reforms), to create favourable investment opportunities for MNEs (Butler, 2013). This is on the premise that institutional quality, sound macroeconomics, educational levels (human capital), and natural resources are the major determinants of foreign investments inflows into the mining sector of many African economies (Asiedu & Lien, 2004). However, the inadequate functioning of institutions in Africa has been identified as creating high political risk, corruption, poor governance, bureaucracy, and rule-of law failures (Anyanwu, 2012). In addition, most African countries are characterised by less structural interaction between political and economic institutions, which inhibits the growth potentials of mineral exploitations in the region (Aregbesola, 2014; Wyk and Lal, 2008).

3.0 Methodology

This study employed a panel dataset of 14, out of the 15 countries in the Southern African Development Community (SADC) from 1990 to 2014. The countries are: Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. Angola was excluded because of insufficient data, especially data on GDP (proxy for economic growth). The data used in this analysis was generated from World development indicators online, World Trade Organisation (WTO) database, the World Bank, African Development Indicators (ADI), United Nations Commodity Trade Statistics (UNCTS) Database, and United Nations Statistics Database (UNdata).

3.1 Econometric Model

Similar to previous studies in literature (Sachs and Warner, 1995; Mahonye and Mandishara, 2015), this study builds on the traditional neoclassical growth models for estimating economic growth, while the core determinants of growth are basically the same. Consequently, based on a modified framework from Mahonye and Mandishara (2015), the economic growth model was analysed using real growth of mining, share of mineral exports to total exports, real growth of agriculture, real growth in services, real growth of manufacturing, human capital development, population growth, natural resource endowments, infrastructural development, trade openness and growth of foreign direct investment. The economic growth model was estimated using Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM). GMM approach was adopted based on differencing regressions to control unobserved effects, the utilisation of previous explanatory and lagged-dependent variables, and to address any potential endogeneity (El-Wassal, 2012).

Therefore, considering the following regression specification:

$$Y_{it} = \beta_0 + \lambda\varepsilon_{i,t-1} + \beta_1 X_{it} + \mu_i + \varepsilon_{it} \quad \text{.....equation 1}$$

Where Y_{it} is the logarithm of GDP, while X_{it} represents the set of relevant explanatory variables, μ_i is the time-invariant country-specific effects, and $\varepsilon_{i,t}$ is the error term (Blundell and Bond, 1998). By relaxing the assumption of strict exogeneity, equation 1 was mathematically translated to equation 2 to eliminate the county-specific effect. (El-Wassal, 2012)

$Y_{it} - Y_{it-1} = \eta(Y_{it-1} - Y_{it-2}) + \beta(X_{it} + X_{it-1}) + (\varepsilon_{it} + \varepsilon_{it-1})$……equation 2

This was to controls for the correlation between the new error term, $\varepsilon_{it} - \varepsilon_{it-1}$, and the lagged dependent variable, $Y_{it-1} - Y_{it-2}$. Consequently, based on the assumptions of the GMM dynamic estimator (El-Wassal, 2012), equation 2 was subsequently translated and expanded to the multiple regression equation 3 as follows:

$GDP_{i,t} = \alpha_0 + \alpha_1 RGM_{it} + \alpha_2 SMEE_{it} + \alpha_3 RGA_{it} + \alpha_4 RGMAN_{it} + \alpha_5 HCD_{it} + \alpha_6 PG_{it} + \alpha_7 NRE_{it} + \alpha_8 IDEV_{it} + \alpha_9 RGS_{it} + \alpha_{10} TOP_{it} + \alpha_{11} FDI_{it} + \varepsilon_{it}$.....equation 5

Where:
GDP = real per capita GDP (GDP_PPP),
RGM = Real growth of mining
SMEE = share of mineral exports to total exports
RGA = Real growth of agriculture
RGMAN = Real growth of manufacturing
HCD = Human Capital Development, measured by the ratio of secondary and tertiary institution enrolment in the population
PG = Population growth
NRE = Natural resources endowment
IDEV = Infrastructure development
RGS = Real growth in services
TOP= Trade Openness expressed as a ratio of merchandise trade to GDP (percentage)
FDI= Growth in foreign direct investment
$_i$ = represents the country
$_t$ = represents time in year

$\alpha 0$= is an intercept, and

ε_{it}= is the error term.

Table 1: The measure of Constructs (Dependent and Explanatory variable)

Variable	Measure	Author
GDP	Real level of GDP per capita (GDP_PPP)	Aregbesola, 2014; Pelinescu, 2015
RGM	Real growth of mining	Sachs and Warner, 2001; Mahonye and Mandishara, 2015
SMEE	Share of mineral exports to total exports	Dupasquier and Osakwe, 2006; Nnadozie and Osili, 2004
RGA	Real growth of agriculture	Sachs and Warner, 2001
RGMAN	Real growth of manufacturing	Sachs and Warner, 2001; Mahonye and Mandishara, 2015
HCD	Human Capital Development, measured by the ratio of secondary and tertiary institution enrolment in the population	Anyanwu, 2012; Aregbesola, 2014; El-Wassal, 2012; Adelakun, 2011
PG	Population growth	Anyanwu, 2011, 2012; Kyereboah-Coleman and Agyire-Tettey, 2008

MRE	Mineral resources endowment	Aregbesola, 2014; El-Wassal, 2012; Adelakun, 2011; Sachs and Warner, 2001
IDEV	Infrastructure development	Dupasquier and Osakwe, 2006; Nnadozie and Osili, 2004
RGS	Real growth in services	Aregbesola, 2014; El-Wassal, 2012; Adelakun, 2011
TOP	Trade Openess: Ratio of merchandise trade to GDP (in Percentage).	Wheeler and Mody, 1992; Ponce, 2006; Asiedu, 2002; Anyanwu, 2012
GFDI	Growth of foreign direct investment	Aregbesola, 2014; Nnadozie and Osili, 2004.

4.0 Results and Discussion of Findings

4.1.1 Descriptive Statistics

The GMM estimators used in this study were based on differencing regressions to control for unobserved effects and the utilisation of previous explanatory and lagged-dependent variables as instruments (El-Wassal, 2012). However, before the application of these techniques, a series of diagnostic tests were undertaken to cater for sensitivity and reliability (Hailu, 2010; Kimura & Todo, 2010). Firstly, to correct for possible autocorrelation between the regressor variables and the error terms, the Hausman test was conducted (Dupasquier & Osakwe, 2006; Aseidu, 2002). In addition, to cater for the standard errors, the redundancy variable test was conducted using the White diagonal standard errors and covariance technique (Aregbesola, 2014). The results were robust and showed the absence of arbitrary serial correlation and time varying variances in the disturbances.

Table 1: Mean, standard deviations (SD), and correlations of the main regression variables (excluding dummies) – average from 19980-2013

Constructs	Obs.	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
GDP	372	5.21	6.44	1.00											
RGM	338	6.33	7.33	0.39***	1.00										
SMEE	370	3.24	3.31	0.12	0.14	1.00									
RGA	334	7.32	2.43	0.35*	0.31**	0.26*	1.00								
RGMAN	367	4.59	6.51	0.43***	0.22*	0.31**	0.23*	1.00							
HCD	344	6.13	11.19	0.29*	0.22*	0.24**	-0.12	0.35**	1.00						
PG	302	3.11	4.33	-0.06	-0.10	0.10	0.27*	0.25*	0.24*	1.00					
MRE	342	6.31	12.33	0.03	0.11	0.09	0.12	0.07	0.13	0.13	1.00				
IDEV	386	8.35	8.21	0.28***	0.27**	0.31**	0.34**	0.31**	0.27**	0.13	0.33**	1.00			
RGS	338	7.12	6.23	0.40*	0.38*	0.10	0.31**	0.32**	0.21**	0.11	0.23**	0.22**	1.00		
TOP	384	11.33	12.33	0.28*	0.24**	0.31**	0.26*	0.21*	0.16	0.21*	0.27*	0.25*	0.03	1.00	
GFDI	336	7.13	5.98	0.10	0.22*	0.29*	0.12	0.31*	0.31**	0.06	0.24**	0.31**	0.09	0.34**	1.00

Note: *p≤0.1, **p≤0.05, ***p≤0.001

Table 1 (above) shows the descriptive statistics and correlation matrix for the economic growth model function. The matrix shows a generally positive correlation between most of the variables, except for population growth which exhibits negative correlation with some variables, especially, GDP. It is also important to note that none of the explanatory variables were strongly correlated; an indication of lack of multicolinearity (Ozturk, 2007). Consequently, all the variables were used in the test for stationarity.

Second, in order to determine the order of integration, a unit root test was conducted. This was an attempt to identify non-stationarity (unit roots). A standard augmented Dickey-Fuller (ADF) test was conducted to eliminate autocorrelation and whiten noise (Anyanwu, 2012), while a Phillips Perron (PP) test was also conducted, given the imperative of uncorrelated error terms. The two tests were conducted at the level, first difference and second difference series (Hair et al., 1998; Ozturk, 2007). The results of the unit root tests are presented in Table 2.

Table 2: Summary of Unit Root Test Results

Variables	**ADF Test:**		**PP Test:**		**Order of Integration**
	First Difference: Constant with Trend	**2nd Diff. Statistics**	**First Difference: Constant with Trend**	**2nd Diff. Statistics**	
Southern. African Panel					
LnRGM	-5.340880*	-3.453266	-6.057306**	-5.546737	1(2)
LnSMEE	-5.325263*	-3.865437	-3.07412**	-5.665435	1(2)
LnRGA	-4.096229*	-4.445328	-3.096805*	-5.654355	1(2)
LnRGMAN	-4.174591*	-3.265787	-3.174591*	-4.876456	1(2)
LnHCD	-2.963164*	-4.834577	-4.860987*	-4.345675	1(2)
LnPG	-6.428332*	-5.136538	-4.407357*	-5.546789	1(2)
LnMRE	-6.709925*	-7.728656	-7.801947*	-5.653546	1(2)
LnIDEV	-3.965081**	-3.123567	-4.489557*	-5.987534	1(2)
LnRGS	-5.552479*	-5.735634	-3.737240*	-4.154346	1(2)
LnTOP	-2.907973**	-4.456776	-4.891656**	-3.234589	1(2)
LnGFDI	-5.234571**	-5.65376	-4.453567*	-4.276547	1(2)

Note: Critical Values: (ADF): 1% -2.8675; 5% -2.6345; 10% -2.0345; (Phillips-Perron): 1% -3.1212; 5% -2.8446; 10% -2.5411. *, ** and *** implies 1%, 5% and 10% levels of significant respectively.

The result of the unit root test assumed stationarity of the series for all the variables by the rejection of the null hypothesis for second difference at all the critical values (maximum lag of one). This simply implied that the mean, variance and auto-covariance are independent of time (Aregbesola, 2014). Therefore, the models follow an integrating order of 1(2) process and are therefore a stationary process (Ozturk, 2007). The computed value of the test statistic was also compared to the critical value for both the ADF and PP test (constant with trend) in order to reject or accept the null hypothesis. Consequently, a null hypothesis was rejected, since the former was greater (in absolute value) than the latter (Hair et al., 1998).

4.1.2 OLS and GMM Results

Table 3: OLS and GMM results for Economic growth in Southern Africa economies (Panel)

VARIABLES	**OLS**	**GMM**
Real growth of mining	0.1678 (3.33)*	0.2012 (2.88)**
Share of mineral exports to total exports	0.0172 (1.11)	-0.0131 (-1.07)
Real growth of agriculture	0.1934 (3.01)**	0.2012 (2.23)**
Real growth of manufacturing	0.3031 (3.77)*	0.2768 (2.98)**
Human Capital Development	0.1667 (2.37)** *	0.1878 (2.97)***
Population growth	-0.0341 (-1.07)	-0.0704 (-1.22)
Mineral Resource endowment	0.0827 (1.01)	0.0727 (1.23)

Infrastructure development	0.1525 (3.99)**	0.1322 (2.29)**
Real growth in Services	0.4999(4.87)*	0.3444 (3.34)*
Trade Openness	0.1523 (3.17)*	0.1439 (4.21)**
Growth in Foreign Direct Investment	0.1427 (2.27)** *	0.1911 (2.99)** *
Constant	88.3234 (3.99)*	143.3546 (4.56)*
Observations	327	312
R-squared	0.6578	
Wald chi2(41)		175.27
Prob > chi2		0.0002
Sargan Test (Prob > chi2)		0.2651
Durbin-Watson statistics		1.9911
Number of countries	14	14

Note: t-statistics in parentheses. *, ** and *** implies 1%, 5% and 10% levels of significant respectively.

From table 3 (above), the Durbin-Watson statistics of 1.9911, as a diagnostic measure, posits the absence of potential first-order autocorrelation in all the variables. The results of the OLS and GMM therefore suggest that apart from Share of mineral exports to total exports, population growth, and mineral Resource endowment, all the variables tested in this study contributed significantly to improved economic growth in the Southern African countries during the study period. Specifically, real growth of mining, real growth of services, real growth of manufacturing, and trade openness were statistically significant at 1% level; real growth of agriculture and infrastructure development were statistically significant at 5% level, while human capital development and growth in foreign direct investment were statistically significant at 10% levels.

4.2 Discussion of Findings

Real growth of mining was found to be capable of enhancing economic growth in the Southern African economies. From table 3, a 1% increase in real growth of mining will lead to an increase in the economic growth by 0.16% holding other things constant. This shows that the mining sector has a positive impact on the growth of the Southern African economies during the study period.

Share of mineral exports to total exports, though positive, but do not significantly influenced economic growth in the region during this period. Likewise, a 1% increase in share of minerals exports to total exports will lead to an increase growth by mere 0.02%. It is also important to note from the results that the influence of share of mineral exports to total exports is less that the real growth of the mining sector. This is an indication that less emphasis was placed on exports of minerals. This may be due to negative practices, like, under-invoicing, smuggling and general bureaucratic inefficiencies (Ozturk, 2007).

The significant positive relationship between real growth of agriculture and economic growth in Southern African countries is also similar to previous studies (Kostad and Soreide, 2009; Mitchell, 2013). For example, Mahonye and Mandishara (2015) observed a positive relationship between real growth of agriculture and economic growth in Zimbabwe. This implied that improvements in agricultural productions are critical for the economic growth in the region in the presence of abundant mineral resources endowment.

Real growth of manufacturing was also found to have a significant positive relationship with economic growth in Southern African economies. This further buttresses the possible impact

of industralisation and localization of the various inputs from the mining sector (Cawood and Oshokoya, 2013b; Ding and Field, 2005; Aregbesola, 2014).

The study also observed a positive relationship between human capital development and economic growth. This however concurs with previous studies in similar field (Mahonye and Mandishara, 2015; Atkinson and Hamilton, 2003; Butler, 2013; Cawood and Oshokoya, 2013a; Anyanwu, 2012). Specifically, many of these studies concluded that human capital developments are more strongly positively related to mineral resources and economic growth, especially when corruption is low. Rodríguez and Pallas (2008) also positioned human capital development as being the most important determinant of growth and poverty reduction in spain. Other studies, like Mitchell (20130), Papyrakis and Gerlagh (2004) and Anyanwu (2012) were particularly impressed by the influence of human capital development on growth in many low- and middle-income mineral producing economies (Anyanwu, 2012).

In addition, this study also observed an insignificant relationship between mineral resources endowment and economic growth in Southern African economies during the study period. This result might be as a result of the political and institutional failures, partly due to the rent-seeking behaviour, as well as, the economic shocks from conflict in the region (Boschini et al., 2007). In addition, Mahonye and Mandishara (2015) also observed that the rent-seeking behaviour could create a dysfunctional social structure, where the wealthy elite become averse to the needed economic and political reforms. This result is however, similar to previous studies. For instance, Papyrakis and Gerlagh (2004) investigation of natural resources endowment on corruption, openness, investment, terms of trade, schooling and economic growth; while, Boschini et al (2007) study on the interplay between natural resources and economic growth in 80 nations from 1975 to 1998 also indicate that oil, gold, silver, and diamonds have the strongest negative effect on economic growth (Mahonye and Mandishara, 2015). This linkage was also supported by previous studies (Kahn, 2013; Kostad and Soreide, 2009; Mitchell, 2013; Dupasquier and Osakwe, 2006; Aseidu, 2002). This finding was expected, as many Southern African countries often receive much of their FDI in the mining sector (Dupasquier & Osakwe, 2006, Asiedu, 2006). There was also a positive relationship between infrastructure development and economic growth in Southern African economies during the period of study. This however buttressed the significant positive correlation between infrastructure development and the real growth of mining in the region.

Furthermore, trade openness was found to be positively associated with economic growth in this study. Consequence upon this, many studies (Mahonye and Mandishara, 2015; Aregbesola, 2014) suggests the possible realisation of an improvement in the attractiveness of Southern Africa to inflow of FDI in the mining sector, if policy-makers can sustain the various economic liberalisation and market size strategies. This also buttresses their relevance as the major macroeconomic policies of relevance to other developing countries. However, in a deviation from this positive disposition, Anyanwu (2012) and Mitchell (2013) argued that the effect of trade openness depends on the type of investment, due to the tariff jumping theory. This is on the bases that multinational companies that seek to serve local markets may decide to set up subsidiaries in the host country, when it is difficult for them to import products into that country (Papyrakis and Gerlagh, 2004). However, some studies cautioned about the effect of trade openness on the type of investments while others found a negative impact of trade openness on market-seeking foreign investments inflow (Anyanwu, 2012: Mitchell, 2013). Lastly, the positive relationship between growth in foreign direct investment and growth also concurs with previous studies on FDI , as an engine of growth in many mineral producing economies in Africa (Rodríguez & Pallas, 2008; Mahonye and Mandishara, 2015; Atkinson and Hamilton, 2003; Butler, 2013; Anyanwu, 2012).

However, notwithstanding the observed positive results, population growth bears negative coefficients and was statistically not significant. This suggests that economic growth might not be significantly impacted by increasing population growth.

Specifically, the non significant relationships between shares of mineral exports to total exports and economic growth, as well as, the none statistically significant correlation between shares of mineral exports to total exports and real growth of mining, suggests that economic growth and real growth of mining, in Southern African economies, might not be significantly impacted even with increasing mineral exports. Consequently, various government policies and interventions should further encourage local utilization of mineral resources to boost growth in the region (Mahonye and Mandishara, 2015; Aregbesola, 2014; Papyrakis and Gerlagh, 2004).

Lastly, population growth was found to be negatively correlated with the real growth of mining and economic growth in southern Africa during the study period. This also implied that increasing population in the region contributed negatively to the real growth of mining and economic growth. This negative sentiment was also reflected similar studies (Ding and Field, 2005; Kahn, 2013; Kostad and Soreide, 2009; Mitchell, 2013).

5.0 Conclusion, Implications and policy Recommendations

5.1 Conclusions and Implications of the study

This paper evaluates the relationships between mineral resource endowment and economic growth in Southern African economies using a panel dataset of 14 countries in the Southern African Development Community (SADC) from 1990 to 2014. Findings based on the OLS and GMM estimation techniques revealed that apart from Share of mineral exports to total exports, population growth, and mineral resource endowment, all the variables tested in the study contributed significantly to economic growth in the Southern African countries during the study period. Specifically, real growth in services, real growth of manufacturing, real growth of agriculture, real growth of mining, human capital development, infrastructural development, trade openness, and growth in foreign direct investment were statistically significant at varying levels of significance. Hence, the model is intended to provide scholars, practitioners, policy-makers, and investors with a framework for analyzing the relationship between mineral resources endowment and economic growth in the Southern African economies.

Moreover, the regression analysis in this study corroborates the conceptual framework-institutional FDI fitness theory. Therefore, Southern African economies with natural resources should encourage their development and not be concerned about the threat of "resource curse". In addition, based on the finding of this study, economic growth, led by extractive industries (mining and the like) is a viable path to broader development. Consequently, for Southern African economies to optimize their mineral resource endowments there is a need to develop some unique strategic resources- like human capital, natural resources and institutions. It is also established that the institutional environments in many Southern African economies played significant roles in attracting growth induced FDI in the mining sector. Specifically, policies on mineral resources development, exports, agriculture, manufacturing, trade, infrastructural development, and human capital development, influence economic growth in many Southern African economies.

5.2 Policy Recommendations

1. Real growth of mining was found to be capable of enhancing economic growth in the Southern African economies. This shows that the mining sector has a positive impact on the growth of the Southern African economies during the study period. The hypothesis that mineral resources negatively impact economic growth was therefore rejected and the conclusion is the absence of ‘resource curse’ in the mining sector. Thus the study rejects the null hypothesis, and recommends increase exploitation of strategic mineral resources in the region.

2. A 1% increase in real growth of agriculture will lead to an increase in the economic growth by 0.19%; consequently, the significant positive relationship between real growth of agriculture and economic growth in Southern African countries juxtaposed the imperative of increasing agricultural productions, as a panacea for achieving a sustainable economic growth in the region.

3. Real growth of manufacturing was also found to have a significant positive relationship with economic growth in Southern African economies. Government must therefore increase the inflow of mineral inputs to local firms so as to increase economic growth (Kahn, 2013). This is on the premise that a 1% increase in real growth of manufacturing will lead to an increase economic growth by 0.30%. Logically, an increase in industrial outputs, income level and standard of living due to increased inflow of inputs from the mining sector may impact positively on economic growth of Southern African economies (Mitchell, 2013). In addition, government reforms should strengthened the mechanism and incentives for beneficiation and value addition of mineral resources by indigenous companies. This is important if the mining sector is to stimulate economic growth and generate higher level of foreign reserves (Mahonye and Mandishara, 2015). Most importantly, government needs to develop industrial policy and a framework to support the development of industries which process the raw materials from the mining sector (Aregbesola, 2014; Papyrakis and Gerlagh, 2004). This will further strengthened the linkages between the manufacturing and mining sectors in the Southern African region (Mahonye and Mandishara, 2015).

4. This study also observed a positive relationship between human capital development and economic growth; as well as, positive correlations between human capital development and both real growth of mining and share of mineral exports to total exports in the Southern African economies. Consequently, policy makers can adopt the Hartwick rule (Butler, 2013), by introducing a special purpose vehicle targeting strategic sectors, like agriculture and manufacturing, with long term benefits to the economy. Proceeds from mining can therefore be used to develop both human and physical capital in these strategic sectors. Member states should also encourage private sector developments, including small-scale projects that promote economic empowerment of those who have been historically disadvantaged in the mining sector.

5. In addition, this study also observed an insignificant relationship between mineral resources endowment and economic growth in Southern African economies during the study period. To reduce conflicts and rent-seeking behaviour, and the attendance dysfunctional social structure, government must maintain stable political and institutional architectures, rule of law, and robust labour management (Boschini et al., 2007).

6. The positive relationship between infrastructure development and economic growth in Southern African economies during the period however, buttressed the significant positive correlation between infrastructure development and the real growth of mining in the region. Government and private institutions should therefore invest massively in strategic infrastructures, like electricity, transport, and telecommunication (Agarwal and Khan, 2011). The huge expenditure is justified on the basis that a 1% increase in infrastructural development will lead to an increase economic growth by 0.15%.

7. Furthermore, trade openness was found to be positively associated with economic growth in this study. Consequently, to improve the attractiveness of Southern Africa economies to inflow of FDI in the mining sector, policy-makers must sustain the various economic liberalisation and market size strategies. This also buttresses their relevance as the major macroeconomic policies of relevance to other developing countries (Papyrakis and Gerlagh, 2004; De La Fuente and Domenech, 2006).

8. Due to the positive relationship between growth in foreign direct investment and economic growth, efforts should be made by Southern African economies to attract more strategic investments in the mining sector so as to induce other foreign investors to make additional investments. This is on the premise that foreign investors may view increasing investment decisions by others as a good signal of favourable conditions (Mitchell, 2013; Durham, 2004). In addition, to increase intra-regional FDI, member states of SADC should harmonise their policies and procedures for mineral extraction, technical capacity and knowledge sharing. Efforts should be made to boost awareness of the region's mineral abundance and directly spurred investment in the region. Member states should also be encouraged to sign bilateral agreements with countries outside SADC, to increase FDI.

9. As a major determinant of growth in the SADC region, the services sector represents about half of GDP and the main driver of regional growth in the region. Consequently, the financial services institutions, like banks and stock/ commodity exchanges, should be strengthened to provide the much needed capital and support for the sector. Government institutions rendering essential services, like legal, custom, immigration and police, should be adequately funded to tackle the menace of illegal mining and trade in gemstones. These are potential sources of fund for conflicts in parts of Southern Africa (Butler, 2013), which can have a devastating effect on the people living in conflict areas. In addition, the existing Kimberly process should be expanded to encompass illegal trade in other minerals (Mahonye and Mandishara, 2015).

10. Due to the insignificant relationships between share of mineral exports to total exports, population growth, mineral resource endowment, and economic growth in Southern African economies, there is urgent need for the formulation and implementation of policies to stem the negative relationships. Specifically, the insignificant relationships between share of mineral exports to total exports, and economic growth in Southern African economies is an indication that less emphasis was placed on exports of minerals to generate the much needed foreign exchange in the Southern African economies during the study period. Consequently, this makes it less vulnerable to the resource curse trap (Mahonye and Mandishara, 2015). In addition, this might also be a pointer to the potential rent seeking, under invoicing of mineral exports and smuggling activities in Southern African economies during the study period (Aregbesola, 2014). In addition, efforts should be made to strengthen the efficiency of government institutions to formulate the desired investment-related fiscal and monetary policies. This is also an avenue to increase the utilization of mining output for local production in the Southern African economies. This will ultimately creates the much desires employment, value addition, beneficiation, and economics of scale in the main intra SADC trade export

items, such as crude oil, agricultural products, electricity and some clothing and textile products

11. Another unique finding of this study was that, although the estimate for most of the explanatory variables were positive and significant for OLS, the second lags were less significant at the GMM, while few had negative signs. This indicates that most of the predictors of growth in Southern African economies deteriorated with time over the study period. Consequently, there is urgent need to arrest these negative trends by policy-makers in this region (Anyanwu, 2011, 2012).

5.3 Limitation and suggestion for further studies

Due to some inherent limitations in this study, care must be taken in using the output of this study. Like most empirical literature on the relationships between mineral resource endowments and economic growth using cross-country pooled data, the study suffers from both endogenity (since most determinants are likely to be jointly endogenous with FDI inflows) and the presence of periods and country-specific omitted characteristics (El-Wassal, 2012; Anyanwu, 2012). Although the GMM approach was adopted to address the potential endogeneity of the regressors (El-Wassal, 2012), there is still a need for future research to focus on the issue of endogeneity, based on the premise that economic growth and its predictors could be evidenced by strong bi-directional causality. The hypotheses could be tested in a larger panel of many developing economies, rather than just the Southern African development community. In addition, due to data deficiencies and the probable non reliability of data from most developing economies, the variables included in the model may be imperfect predictors of growth. Consequently, future studies might consider the inclusion of other relevant variables like institutional quality, resource dependency, and monetary/ economic union (Anyanwu & Yameogo, 2015; El-Wassal, 2012).

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