Mineral resources endowment and economic growth in Southern African countries

Olawumi D. Awolusi*
Department of Economics,
School of Accounting, Economics and Finance,
University of KwaZulu-Natal, South Africa
Email: awolusi@ukzn.ac.za
Email: 217080603@stu.ukzn.ac.za
*Corresponding author

Josue Mbonigaba and Christian K. Tipoy
School of Accounting, Economics and Finance,
University of KwaZulu-Natal, South Africa
Email: mbonigaba@ukzn.ac.za
Email: tipoy@ukzn.ac.za

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 generalised method of moments (GMM) as the estimation techniques. The economic growth model was analysed based on a modified framework from Mahonye and Mandishara (2015). The findings are 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, were all important determinants of economic growth in Southern African economies during the study period. Therefore, Southern African countries with natural resources should encourage their development and not be concerned about the threat of ‘resource curse’.

Keywords: mining sector; mineral resource endowment; economic growth; OLS; generalised method of moments; GMM; Southern African Development Community; SADC.


Biographical notes: Olawumi D. Awolusi is currently a PhD candidate in the Department of Economics, School of Accounting, Economics and Finance, University of KwaZulu-Natal, South Africa. Before this second PhD program, he was a Postdoctoral Research Fellow at the Graduate School of Business and Leadership, University of KwaZulu-Natal, Durban, South Africa. Prior to this appointment, he was a Senior Lecturer at the Department of Business, Accounting and Finance, Elizade University, Ondo State, Nigeria. Before that, he was also a Manager at the First Bank of Nigeria Plc. He holds a PhD and
MSc in International Business/Economics from the Babcock University and the University of Nottingham, UK, which he obtained in 2013 and 2009 respectively. His main research interests are health economics, international economics, internationalisation strategies, and the management of cross-border mergers and alliances.

Josue Mbonigaba is a Health Economist and Senior Lecturer in the School of Accounting, Economics and Finance from the University of KwaZulu-Natal, South Africa. He holds a PhD in Economics from the University of KwaZulu-Natal, South Africa. He has worked in academia, business and international development and NGO arena for several years. In academia, teaching and researching in economics with qualitative and quantitative techniques, administering academic courses as well as academic programs has constituted his main occupation. His main research interests are health economics and international economics.

Christian K. Tipoy is a Lecturer and Specialist in Economics. In this position, he teaches economics and econometrics at the School of Accounting, Economics and Finance. He has been an AGRODEP member since April 2011. Before joining the Centre for Inclusive Banking in Africa, he worked for the JEEP NGO in Kinshasa. He holds a BA in Economics from the University of Kinshasa and MA and PhD in Economics from the University of Pretoria. His research interests include financial inclusion, poverty and applied econometrics.

This paper is a revised and expanded version of a paper entitled ‘Mining sector and economic growth in Southern Africa economies: a panel data analysis’ presented at Trade & Industrial Policy Strategies (TIPS) 2016 Annual Forum on Industrialisation and the Mining Economy, University of Johannesburg, Johannesburg, South Africa, 14–15 June 2016.

1 Introduction

In the past few decades, Southern Africa’s mining sector has played a key role in attracting foreign investment into the region (Waziri et al., 2016; Musa and Jelilov, 2016; 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). Consequently, contrary to the earlier description of Africa as a ‘forgotten continent’, the rate of foreign direct investment (FDI) inflow to many South African mining sector has accelerated in the last two decades (Muhammad-Yakubu and Jelilov, 2015; Jelilov, 2015, 2016; Aregbesola, 2014; UNCTAD, 2013). FDI inflows in the mining sector also serves as one of the most important sources of knowledge transfers, growth in productivity and economic growth (Pelinescu, 2015; Mankiw et al., 1992). Today, researchers and practitioners also agree that strategic mineral resources can be a veritable source of competitive advantage (UNCTAD, 2015). Therefore, improving FDI inflows in the mining sectors are still very important to many African economies (Aregbesola, 2014).

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 15 countries (Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe), the SADC as a whole constitutes about 37% of Africa’s total gross domestic product (GDP) during 2003 to 2012 (UNCTAD, 2015). It is an organisation that strives for regional integration to promote economic growth, security and peace in southern Africa (Abdulrahman et al., 2015; Anyanwu and Yameogo, 2015; Pelinescu, 2015). Since its inception, the 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 in the world, through to countries such as Mauritius, which is a stable and prospering middle-income country (Chidigo et al., 2016; World Bank, 2015; Anyanwu and Yameogo, 2015).

Southern Africa is highly endowed with a diverse minerals and metals, including 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 abundant mineral resources, the mining industry in Southern Africa has, however, undergone major turmoil in the past two decades – ranging from the global financial crisis, increasingly vocal calls for nationalisation of the 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 of minerals and metals in the region presents 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 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, so 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, and has preferred multi-faceted characteristics compared to other sources of capital (Mahonye and Mandishara, 2015; Papyrakis and Gerlagh, 2004; Anyanwu and 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 resource endowments and economic growth; however, there seem to be few studies on a panel analysis of Southern African countries...
Given the comparative advantages enjoyed by many Southern African economies in mineral resource exploitation, a study of the dynamic relationship between mineral resource endowment and economic growth will be beneficial to many policy-makers in terms of formulating growth, trade, and investment policies (Kahn, 2013; Kostad and Soreide, 2009; Steers and 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 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 attendant negative impact 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 study questions are: After years of exploitation of mineral resources in Southern Africa, do they contribute negatively to economic growth? And, secondly, do government institutions improve the contribution of the mining sector to economic growth? Consequently, the study tests two important hypotheses:


The remaining part of this paper is structured as follows: Section 2 reviews the related literature and Section 3 treats the adopted methodology. Section 4 presents the results and discussion of the findings. Finally, Section 5 presents the conclusion, implications and policy recommendations.

2 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 modernisation schools, and the integrative schools. This strategic tripod integrates the two traditional schools of development thinking the dependency and modernisation schools into the integrative schools (Adelakun, 2011; Pelinescu, 2015). However, this study is rooted in the integrative school, as developed further through the FDI Fitness theory. Most dependency theories see the cause of underdevelopment in the African mining sector primarily in terms of exploitation by the industrialised 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 criticism about the inability of most developing nations to maximally benefit 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 modernisation 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 lend credence to the debate on the influence of resource endowment 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 benefit to a resource-endowed country at the expense of reallocation of production and a fall in manufacturing output (an offshoot of de-industrialisation) in the long run (Mahonye and Mandishara, 2015). That notwithstanding, both the perfect and imperfect markets still do not explain the influence of mineral resource endowment on economic growth (Cawood and Oshokoya, 2013b; Ding and Field, 2005; Wilhelms, 1998).

Consequently, the institutional FDI Fitness theory posits that investments in the mining sector are determined more by institutional variables and consequently the fitness must be based on a country’s ability to recognise and utilise available opportunities, to improve economic growth (Aregbesola, 2014). Consequently, the institutional FDI fitness theory, proposed by Wilhelms (1998), stand in the tradition of the integrative school in this study. This is an attempt to address the multiplicity of heterogeneous variables involved in the FDI process, by according more importance to the meso-level (institutions), over the macro (entire economy) and micro (firm) variables (Anyanwu and Yameogo, 2015; Wilhelms, 1998).

Institutional FDI Fitness theory posits that FDI is determined more by institutional variables; consequently, the fitness must be based on a country’s ability to recognise and utilise available opportunities in their quest to attract more inflows of FDI (Aregbesola, 2014). This is also based on their quest to attract more inflows of investments into 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 (Mahoney 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 market macroeconomics (El-Wassal, 2012; Wilhelms, 1998). Hence, increasing institutional capacity is now the objective of many countries or organisations 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 originating 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 GDP, employment and poverty reduction in many SADC member countries while many of them depend on mineral exports for their foreign exchange earnings (Anyanwu and Yameogo, 2015). Despite an average 3% increase in GDP per capita in the SADC over the last decade, it is, however, important to note that economic growth in the 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 capita of a country such as Zimbabwe decreased by about 2.8% annually over the same period (UNCTAD, 2015; World Bank, 2015; Mitchell, 2013).

Studies have been conducted to understand the determinants of economic growth in developing economies (Mahony and Mandishara, 2015; El-Wassal, 2012; Adelakun, 2011; Butler, 2013; Kahn, 2013). However, there has been little focus on the various determinants of economic growth in many resource-endowed economies in Africa (Aregbesola, 2014; Butler, 2013). Onyeukwu (2006) observed a ‘resource curse’ in Nigeria. This was corroborated by a similar study by Weeks (2011), which also showed that Zambia was under a ‘resource curse trap’. Although, there were boom in the 2000s in most n the resource-rich countries, due mainly to rising prices for industrial inputs like zinc, copper, and nickel from manufacturers in China and India; but economists often noted the double-edged sword that resource extraction could be for developing economies (Waziri et al., 2016; Musa and Jelilov, 2016; Muhammad-Yakubu and Jelilov, 2015). This is mainly due to the volatility of commodity prices and focusing too much on one cash cow industry can leave other industries neglected and underdeveloped (Jelilov, 2015, 2016). In addition, resource wealth can also spark conflict. A ‘resource curse’ may also arise when a profitable mining sector makes a region potential target for rebel groups or inspire a separatist movement, environmental degradation, pollution or a springboard for cash-strapped paramilitary groups looking to raise funds or trade for arms (Abdulrahman et al., 2015). This is also on the premise that countries with weaker institutions are usually prone to ‘resource curse’ (Chidigo et al., 2016).

These studies validate the existence of a paradox, in which resource-endowed nations underperformed when compared with none 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 policy and non-policy 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 and 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 also decide to invest (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, and FDI were all 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 (Asiedu, 2006; Mohamed and Sidiropoulos, 2010); good infrastructure, macroeconomic stability, an efficient legal system, less corruption and political stability (Hailu, 2010), and human resource development (Rodríguez and 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 exports to GDP, institutional variables, and FDI (Butler, 2013; Aregbesola, 2014). In addition, interactions among government policies and institutions, organisations, and macroeconomic variables, also influence the degree of beneficiation, foreign exchange, balance of payments, 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, and 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 in formulating the desired investment-related fiscal and monetary policies, influences the growth benefits from mineral exploitation 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) in order 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 investment inflows into the mining sectors of many African economies (Asiedu and 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 potential of mineral exploitation in the region (Aregbesola, 2014; Wyk and Lal, 2008).

3 Methodology

This study employed a panel dataset of 14 of the 15 countries in the 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 were generated from World development indicators online, the World Trade Organisation (WTO) database, the World Bank, African Development Indicators (ADI), the United Nations Commodity Trade Statistics (UNCTS) database, and the United Nations Statistics Database (UNdata).
3.1 Econometric model

Like previous studies in the literature (Onder and Jelilov, 2016a, 2016b; Mahoneye 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 Mahoneye 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 endowment, infrastructural development, trade openness, and growth of FDI. The economic growth model was estimated using ordinary least squares (OLS) and generalised method of moments (GMM). The 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:

\[ Y_{it} = \beta_0 + \lambda \mu_{i,t-1} + \beta_1 X_{it} + \mu_i + \epsilon_{it} \]  

(1)

where \( Y_{it} \) is the logarithm of GDP, while \( X_{it} \) represents the set of relevant explanatory variables, \( \mu_i \) is the time-invariant country-specific effects, and \( \epsilon_{it} \) 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 country-specific effect (El-Wassal, 2012):

\[ Y_{it} - Y_{i,t-1} = \eta(Y_{i,t-1} - Y_{i,t-2}) + \beta(X_{it} - X_{it-1}) + (\epsilon_{it} - \epsilon_{it-1}) \]  

(2)

This was to control for the correlation between the new error term, \( \epsilon_{it} - \epsilon_{it-1} \), and the lagged dependent variable, \( Y_{i,t-1} - Y_{i,t-2} \). 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:

\[ GDP_{it} = \alpha_0 + \alpha_1 RGM_{it} + \alpha_2 SMEE_{it} + \alpha_3 RGA_{it} + \alpha_4 RGMAN_{it} + \alpha_4 HCD_{it} + \alpha_5 PG_{it} + \alpha_7 NRE_{it} + \alpha_8 IDEV_{it} + \alpha_9 RGS_{it} + \alpha_{10} TOP_{it} + \alpha_{11} FDI_{it} + \epsilon_{it} \]  

(3)

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.
Mineral resources endowment and economic growth

PG population growth
NRE natural resource 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 FDI
i represents the country
t represents time in years
α₀ is an intercept
εᵢ is the error term.

Table 1 The measure of constructs (dependent and explanatory variable)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>Real level of GDP per capita (GDP_PPP)</td>
<td>Aregbesola (2014) and Pelinescu (2015)</td>
</tr>
<tr>
<td>RGM</td>
<td>Real growth of mining</td>
<td>Sachs and Warner (2001) and Mahonye and Mandishara (2015)</td>
</tr>
<tr>
<td>SMEE</td>
<td>Share of mineral exports to total exports</td>
<td>Nnadozie and Osili (2004)</td>
</tr>
<tr>
<td>RGA</td>
<td>Real growth of agriculture</td>
<td>Sachs and Warner (2001)</td>
</tr>
<tr>
<td>HCD</td>
<td>Human capital development, measured by the ratio of secondary and tertiary institution enrolment in the population</td>
<td>Anyanwu (2012), Aregbesola (2014), El-Wassal (2012) and Adelakun (2011)</td>
</tr>
<tr>
<td>IDEV</td>
<td>Infrastructure development</td>
<td>Nnadozie and Osili (2004)</td>
</tr>
<tr>
<td>RGS</td>
<td>Real growth in services</td>
<td>Aregbesola (2014); El-Wassal (2012); Adelakun (2011)</td>
</tr>
<tr>
<td>GFDI</td>
<td>Growth of foreign direct investment</td>
<td>Aregbesola (2014) and Nnadozie and Osili (2004)</td>
</tr>
</tbody>
</table>
Table 2
Mean, standard deviations (SD), and correlations of the main regression variables (excluding dummy variables) – average from 1980–2013

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Obs.</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>372</td>
<td>5.21</td>
<td>6.44</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGM</td>
<td>338</td>
<td>6.33</td>
<td>7.33</td>
<td>0.39***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMEE</td>
<td>370</td>
<td>3.24</td>
<td>3.31</td>
<td>0.12</td>
<td>0.14</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGA</td>
<td>334</td>
<td>7.32</td>
<td>2.43</td>
<td>0.35*</td>
<td>0.31**</td>
<td>0.26*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGMAN</td>
<td>367</td>
<td>4.59</td>
<td>6.51</td>
<td>0.43***</td>
<td>0.22*</td>
<td>0.31**</td>
<td>0.23*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCD</td>
<td>344</td>
<td>6.13</td>
<td>11.19</td>
<td>0.29*</td>
<td>0.22*</td>
<td>0.24**</td>
<td>-0.12</td>
<td>0.35**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PG</td>
<td>302</td>
<td>3.11</td>
<td>4.33</td>
<td>-0.06</td>
<td>-0.10</td>
<td>0.10</td>
<td>0.27*</td>
<td>0.25*</td>
<td>0.24*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRE</td>
<td>342</td>
<td>6.31</td>
<td>12.33</td>
<td>0.05</td>
<td>0.11</td>
<td>0.09</td>
<td>0.12</td>
<td>0.07</td>
<td>0.13</td>
<td>0.13</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDEV</td>
<td>386</td>
<td>8.35</td>
<td>8.21</td>
<td>0.28**</td>
<td>0.27**</td>
<td>0.31**</td>
<td>0.34**</td>
<td>0.31**</td>
<td>0.27**</td>
<td>0.13</td>
<td>0.33**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGS</td>
<td>338</td>
<td>7.12</td>
<td>6.23</td>
<td>0.40*</td>
<td>0.38*</td>
<td>0.10</td>
<td>0.31**</td>
<td>0.32**</td>
<td>0.21***</td>
<td>0.11</td>
<td>0.23**</td>
<td>0.22**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP</td>
<td>384</td>
<td>11.33</td>
<td>12.33</td>
<td>0.28*</td>
<td>0.24**</td>
<td>0.31**</td>
<td>0.26*</td>
<td>0.21*</td>
<td>0.16</td>
<td>0.21*</td>
<td>0.27*</td>
<td>0.25*</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>GFDI</td>
<td>336</td>
<td>7.13</td>
<td>5.98</td>
<td>0.10</td>
<td>0.22*</td>
<td>0.29*</td>
<td>0.12</td>
<td>0.31*</td>
<td>0.31**</td>
<td>0.06</td>
<td>0.24**</td>
<td>0.31**</td>
<td>0.09</td>
<td>0.34**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes: *p ≤ 0.1, **p ≤ 0.05, ***p ≤ 0.001.
4 Results and discussions of results

4.1 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 and Todo, 2010). First, to correct for possible autocorrelation between the regressor variables and the error terms, the Hausman test was conducted (Asiedu, 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 2 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.

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF test</th>
<th>PP test</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First difference: constant with trend</td>
<td>2nd diff. statistics</td>
<td>First difference: constant with trend</td>
</tr>
<tr>
<td>Southern African panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LnRGM</td>
<td>−5.340880*</td>
<td>−3.453266</td>
<td>−6.507306**</td>
</tr>
<tr>
<td>LnSMEDE</td>
<td>−5.325263*</td>
<td>−3.865437</td>
<td>−3.07412**</td>
</tr>
<tr>
<td>LnRGA</td>
<td>−4.096229*</td>
<td>−4.445328</td>
<td>−3.096805*</td>
</tr>
<tr>
<td>LnRGMAN</td>
<td>−4.174591*</td>
<td>−3.265787</td>
<td>−3.174591*</td>
</tr>
<tr>
<td>LnHCD</td>
<td>−2.963164*</td>
<td>−4.834577</td>
<td>−4.860987*</td>
</tr>
<tr>
<td>LnPG</td>
<td>−6.428332*</td>
<td>−5.136538</td>
<td>−4.407357*</td>
</tr>
<tr>
<td>LnMRE</td>
<td>−6.709925*</td>
<td>−7.728656</td>
<td>−7.801947*</td>
</tr>
<tr>
<td>LnDEV</td>
<td>−3.965081**</td>
<td>−3.123567</td>
<td>−4.489557*</td>
</tr>
<tr>
<td>LnRGS</td>
<td>−5.552479*</td>
<td>−5.735634</td>
<td>−3.737240*</td>
</tr>
<tr>
<td>LnTOP</td>
<td>−2.907973**</td>
<td>−4.456776</td>
<td>−4.891656**</td>
</tr>
<tr>
<td>LnGFDI</td>
<td>−5.234571**</td>
<td>−5.65376</td>
<td>−4.453567*</td>
</tr>
</tbody>
</table>

Notes: Critical values: (ADF): 1% −2.8675; 5% −2.6345; 10% −2.0345; (PP): 1% −3.1212; 5% −2.8446; 10% −2.5411; *, ** and *** implies 1%, 5% and 10% levels of significant respectively.
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. Although, on the unit root, the variables become stationary on second differencing; it is important to note that unit roots test or stationarity tests are less of a concern when using GMM because the asymptotic properties of the estimators are derived under the assumption that the number of cross-sections increases to infinity while the time dimension stays fixed. That notwithstanding, 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 3.

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).

Table 4  
OLS and GMM results for economic growth in Southern Africa economies (panel)

<table>
<thead>
<tr>
<th>Variables</th>
<th>OLS</th>
<th>GMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real growth of mining</td>
<td>0.1678 (3.33)*</td>
<td>0.2012 (2.88)**</td>
</tr>
<tr>
<td>Share of mineral exports to total exports</td>
<td>0.0172 (1.11)</td>
<td>−0.0131 (−1.07)</td>
</tr>
<tr>
<td>Real growth of agriculture</td>
<td>0.1934 (3.01)**</td>
<td>0.2012 (2.23)**</td>
</tr>
<tr>
<td>Real growth of manufacturing</td>
<td>0.3031 (3.77)*</td>
<td>0.2768 (2.98)**</td>
</tr>
<tr>
<td>Human capital development</td>
<td>0.1667 (2.37)** *</td>
<td>0.1878 (2.97)***</td>
</tr>
<tr>
<td>Population growth</td>
<td>−0.0341 (−1.07)</td>
<td>−0.0704 (−1.22)</td>
</tr>
<tr>
<td>Mineral resource endowment</td>
<td>0.0827 (1.01)</td>
<td>0.0727 (1.23)</td>
</tr>
<tr>
<td>Infrastructure development</td>
<td>0.1525 (3.99)**</td>
<td>0.1322 (2.29)**</td>
</tr>
<tr>
<td>Real growth in services</td>
<td>0.4999(4.87)*</td>
<td>0.3444 (3.34)*</td>
</tr>
<tr>
<td>Trade openness</td>
<td>0.1523 (3.17)*</td>
<td>0.1439 (4.21)**</td>
</tr>
<tr>
<td>Growth in foreign direct investment</td>
<td>0.1427 (2.27)*** *</td>
<td>0.1911 (2.99)***</td>
</tr>
<tr>
<td>Constant</td>
<td>88.3234 (3.99)*</td>
<td>143.3546 (4.56)*</td>
</tr>
<tr>
<td>Observations</td>
<td>327</td>
<td>312</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6578</td>
<td></td>
</tr>
<tr>
<td>Wald chi2(41)</td>
<td></td>
<td>175.27</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td></td>
<td>0.0002</td>
</tr>
<tr>
<td>Sargan test (prob &gt; chi2)</td>
<td></td>
<td>0.2651</td>
</tr>
<tr>
<td>Durbin-Watson statistics</td>
<td></td>
<td>1.9911</td>
</tr>
<tr>
<td>Number of countries</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

Notes: t-statistics in parentheses; *, ** and *** implies 1%, 5% and 10% levels of significant respectively.
4.2 OLS and GMM results

From Table 4, 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’ was statistically significant at 5% level, while ‘human capital development’ and ‘growth in foreign direct investment’ were statistically significant at 10% levels.

4.3 Discussion of findings

Real growth of mining was found to be capable of enhancing economic growth in the Southern African economies. From Table 4, a 1% increase in real growth of mining will lead to an increase in economic growth by 0.16% holding other things constant. This shows that the mining sector had a positive impact on the growth of the Southern African economies during the study period.

Share of mineral exports to total exports, though positive, did not significantly influence economic growth in the region during this period. Likewise, a 1% increase in share of mineral exports to total exports will lead to increase growth of a 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 production is critical for the economic growth in the region— in the presence of abundant mineral resource 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 industrialisation and localisation 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 a 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. Rodriguez 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 (2013), 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 resource endowment and economic growth in Southern African economies, during the study period. This result might be a result of 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) investigated natural resource endowment and corruption, openness, investment, terms of trade, schooling, and economic growth while Boschini et al. (2007) in a study on the interplay between natural resources and economic growth in 80 nations from 1975 to 1998, also indicated 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; Asiedu, 2002). This finding was expected; as many Southern African countries often receive much of their FDI in the mining sector (Asiedu, 2006). There was also a positive relationship between infrastructure development and economic growth in Southern African economies during the period of the 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. This considered, many studies (Mahonye and Mandishara, 2015; Aregebesola, 2014) suggest the possible realisation of an improvement in the attractiveness of Southern Africa to an inflow of FDI in the mining sector if policy-makers can sustain the various economic liberalisation and market-size strategies. This also buttresses the relevance of trade openness 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 basis that multinational companies that seek to serve local markets may decide to setup subsidiaries in the host country, when it is difficult for them to import products into that country (Papyrakis and Gerlagh, 2004). However, some studies have 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 investment inflow (Anyanwu, 2012; Mitchell, 2013). Lastly, the positive relationship between growth in FDI and growth also concurs with previous studies on FDI, as being an engine of growth in many mineral-producing economies in Africa (Rodriguez and 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 share of mineral exports to total exports and economic growth, as well as the none statistically significant correlation between share 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 utilisation 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 in similar studies (Ding and Field, 2005; Kahn, 2013; Kostad and Soreide, 2009; Mitchell, 2013).

5 Conclusions, implications and policy recommendations

5.1 Conclusion 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 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 FDI, were all statistically significant at varying levels of significance. Hence, the model is intended to provide scholars, practitioners, policy-makers, and investors with a framework for analysing the relationship between mineral resource endowment and economic growth in the Southern African economies concerned.

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 findings 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 optimise 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 into the mining sector. Specifically, policies on mineral resource development, exports, agriculture, manufacturing, trade, infrastructural development, and human capital development – influence economic growth in many Southern African economies.

5.2 Policy recommendations

Real growth of mining was found to be capable of enhancing economic growth in the Southern African economies. This shows that the mining sector had 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 increased exploitation of strategic mineral resources in the region. A 1% increase in real growth of agriculture will lead to an increase in 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 production, as a panacea for achieving sustainable economic growth in the region.

Real growth of manufacturing was found to have a significant positive relationship with economic growth in Southern African economies. Governments 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 in economic growth of 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 strengthen 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 levels 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 (Aregebesola, 2014; Papyrakis and Gerlach, 2004). This will further strengthen the linkages between the manufacturing and mining sectors in Southern African (Mahonye and Mandishara, 2015).

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 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.

In addition, this study also observed an insignificant relationship between mineral resource endowment and economic growth in Southern African economies during the study period. To reduce conflicts and rent-seeking behaviour, and the attendant dysfunctional social structure, government must maintain stable political and institutional architectures, the rule of law, and robust labour management (Boschini et al., 2007). 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 real growth of mining in the region. Government and private institutions should therefore invest massively in strategic infrastructure like electricity, transport, and telecommunications (Agarwal and Khan, 2011). The huge expenditure is justified given that a 1% increase in infrastructure development will lead to increased economic growth of 0.15%.

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 Domenéch, 2006). Due to the positive relationship between growth in FDI 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 the 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 spur investment in the region. Member states should also be encouraged to sign bilateral agreements with countries outside the SADC – to increase FDI.

As a major determinant of growth in the SADC region, the services’ sector represents about half of GDP and is 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, customs, immigration and police services should be adequately funded to remedy the menace of illegal mining and trade in gemstones. These are potential sources of funding for conflicts in many 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). 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 an 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 export of minerals to generate the much needed foreign exchange in the Southern African economies during the study period. Consequently, this makes many Southern African nations less vulnerable to the resource curse trap (Mahonye and Mandishara, 2015).

In addition, this might also point to 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 utilisation of mining output for local production in the Southern African economies. This will ultimately create 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. Although the estimate for most of the explanatory variables was 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 an urgent need to arrest these negative trends by policy-makers in this region (Anyanwu, 2011, 2012).
5.3 Limitations and suggestion for further studies

Due to some inherent limitations, care must be taken in using the output of this study. Like most empirical literature on the relationships between mineral resource endowment and economic growth using cross-country pooled data, the study suffers from both endogeneity and the presence of periods and country-specific omitted characteristics (El-Wassal, 2012; Anyanwu, 2012). Although the GMM approach was adapted 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 SADC. 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 and Yameogo, 2015; El-Wassal, 2012).

Acknowledgements

This paper is based on a PhD thesis at the University of KwaZulu-Natal, Durban, South Africa. Dr. Josue Mbonigaba was the main Supervisor, and Dr. Christian K. Tipoy was the Co-Supervisor of the study.

References


Mineral resources endowment and economic growth


