The Export Led Growth Hypothesis in Lesotho: A Case of the Mining Industry.

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A B S T R A C T

This study contributes to economic literature by empirically analysing the relationship between mining exports and economic growth in order to investigate the export-led growth hypothesis in Lesotho through the employment of annual time series data covering the period 1970-2013 using the Auto Regressive Distributed Lag model (ARDL). While most studies such as Hodler (2006) as well as Brunnschweiler (2008) look at the aggregate effects of natural resources on growth and as such conceal the underlying effects of specific export categories on economic growth, this study explores the effects of Lesotho's main export namely mining on economic growth. An empirical analysis of the mining industry leads to the conclusion that mining is one of the most important sources of growth and its importance is expected to grow further. An essential point that is not missed by this research is that the government of Lesotho receives a considerable amount of revenue in the form of corporate income tax, dividends, royalties, export tax, as well as indirect receipts of both personal and consumption tax from the mining industry. The empirical results also show that bi-directional long-run causality exists between mining exports and economic growth. In conclusion, the policy prescription that the government of Lesotho should put emphasis on is promoting growth and development of export industries by ensuring increased productivity in such sectors. Therefore, the adoption and intensification of vigorous growth policies and laws is expected to stimulate the export industry. Since the export-led policy seems to be a basic tool towards sustained growth in Lesotho, emphasis on the diamonds exports should be considered as a main instrument in the export driven growth policy.

Key Words*: Export-Led Growth, Mining, Causality, Error Correction, Unit Root, Lesotho*

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1. Introduction

The concept of economic growth and what drives it, coupled with how it can be sustained in order to achieve economic development continues to occupy the minds of academics all over the world. According to Siliverstovs and Herzer (2007) as well as Daoud and Basha (2015), one of the key factors in promoting long-run economic growth is export expansion. Dar *et al* (2013) indicated that this so called "export-led growth" (ELG) hypothesis emanated from the Neoclassical school of economics that cited some of the benefits of an ELG strategy as being enhanced specialization, increased rates of investment and full capacity use of the plant size. Agosin (1999), Ramos (2001), Abou-Stait (2005), Aydin and Sari (2014) and Ajmi *et al* (2015) agreed and advanced that in the case of countries with small domestic markets that cannot support sustained Gross Domestic Product (GDP) growth on the demand side; growth can be sustained by tapping into a limitless export market. In addition, owing to the fact that small late-industrializing economies do not have the capacity to produce capital goods such as machinery; the production and thus economic growth in such economies is more often than not a function of imported capital goods. The purchases of such capital goods are financed through foreign capital inflows which are received through the expansion of exports that help relieve the foreign exchange constraint.

An important point that is not missed on this research is that there have been other papers such as Hausmann and Rigobon (2003), Bravo-Ortega and De Gregorio (2005), Stijns (2005), Matsen and Torvik (2005), Hodler (2006) as well as Brunnschweiler (2008), which investigate the relationship between natural resource endowment and economic growth. Although such studies present insightful conclusions, it must be indicated that the majority of them focus on the aggregate effects of exports on growth and as such conceal the underlying effects of specific export categories. In addition to this, few studies (See CBL, 2012 and Schiltz, 2014) over the years have focused exclusively on the relationship between Lesotho's mineral mining industry and its economic growth. Furthermore, in the case of Lesotho, several questions remain unanswered: first, which hypothesis between, ELG and Growth Led Exports (GLE), holds true for Lesotho? Second, which of Lesotho's export sectors impact significantly on economic growth in the long run? Last, what should the country do to enhance exports of mining?

In an attempt to answer these questions, this study contributes to economic literature by empirically analysing the relationship between mining exports and economic growth in order to investigate export-led growth hypothesis in Lesotho by employing annual time series data covering the period 1970-2013.

The study proceeds as follows: Section 2 provides a brief history of diamond mining exports in Lesotho. Section 3 reviews the relevant literature on mining and economic growth. Section 4 presents the analytical framework. Section 5 outlines the empirical results and lastly Section 6 concludes the study.

2. Brief History of Diamond Mining Exports in Lesotho

Wood and Mayer (2001) as well as Siliverstovs and Herzer (2007) pointed out that a country's exports emanate from sectors of the economy that enjoy comparative advantage. This results in an allocation of resources away from inefficient non-trade sectors to the more productive export sectors. In Lesotho, total exports are dominated by the manufacturing and mining sectors. Resilience (2011) identified that Africa's share of primary commodity[1] exports in 2009 rose to 81 per cent from 72 per cent in 1995. Interestingly, over 30% of the world's mineral reserves are also found in Africa. In addition, Dorin *et al* (2014) concluded that Africa accounts for half of the top 20 countries around the globe which export minerals. Furthermore, Africa alone contributed 6.5% of the world's mineral exports during 2011 with members of the Southern African Development Community (SADC) producing two-thirds of Africa's mineral exports by value.

Given the above, it is therefore not surprising that in Lesotho, a small mountainous country completely enveloped by the Republic of South Africa (RSA), Kimberlites[2] are found to occur throughout the country with an average intrusion of one per $10km^2$. Kimberlites are predominantly found in the northern parts of Lesotho with alluvial gravel[3] found in the country's south western region. Coakley (1998), Coakley and Szczesniak (1999), Coakley (2000) and

[1] Primary commodities are defined as all foods (includes basic foods, beverages and tobacco, agricultural products and oils); all metals and minerals (ferrous and non-ferrous metals, precious stones, and pearls); and all fuel (crude petroleum, natural gas and other fuel commodities) (Resilience; 2011).
[2] Rocks known to contain diamonds
[3] Also known to contain diamonds

Coakley (2001) pointed out that Lesotho's alluvial deposits have long since been known as an impressive source of diamonds. In concurrence, CBL (2012) noted that Lesotho's diamond mining industry has existed from as far back as the 1950s when prospecting rights were granted over Kao and Liqhobong pipes in 1959. Although mining operations in these areas ceased after Lesotho's independence from colonial rule due to unsatisfactory production results, in 1961, artisanal diamond mining by Basotho diggers ensued at Lets'eng-la-Terai, Kolo, Nqechane and Hololo. Moreover, although in 1968 diamond prospecting on the Lets'eng pipe commenced, poor production results led to a cease of operation once again.

2.1 *Lesotho's Mineral Industry from 1997 to 2013*

CBL (2012) noted that the regulatory framework for Lesotho's mining industry comprises of the Explosives Proclamation of 1958, Precious Stones Order of 1970 as amended, the Mine Safety Act of 1981 and the Mines and Minerals Act of 2005. These rules and regulations have helped in the progression of the mining industry since 1997. From 1997 Lesotho's mineral industry was not a significant contributor to GDP, albeit diamonds were at the core of commercial mineral resources interest. Furthermore, in the same year diamond exports were reported to have been 8,160 carats, valued at $366,533 and were obtained from sampling the Liqhobong Kimberlite pipes (Coakley, 1997). In addition, Coakley (2000) discussed that throughout 1998 and 1999 Lesotho's economic growth benefited very little from the mineral sector. However, during that time, the Lesotho Geological Survey identified 33 Kimberlite pipes and 140 dikes, of which 24 were diamondiferous. In addition, Messina Diamond Corp. of Canada, whose name later changed to MineGem Inc. in 2000, explored Kimberlite pipes at Liqhobong and disclosed in its 1999 annual report the discovery of the Main Pipe and Satellite Pipe. The discovered resources were estimated to be 2.6 million metric tons (Mt) of ore at a grade of 69 carats per 100 Mt with an average value of $39 per carat for the Satellite Pipe and 37 Mt of ore at a grade of 16 carats per 100 tons (t) with an average value of nearly $64 per carat for the Main Pipe.

A turning point in Lesotho's mineral industry came when Lets'eng Diamonds (Pty) Ltd announced plans to reopen mining of the Kimberlite pipes at Lets'eng-la-Terai. The Government of Lesotho (GoL) would have a 12 per cent stake in the enterprise with the option that it could acquire an additional 12 per cent equity interest through the reinvestment of future dividends.

Yager (2005) concluded that Lesotho's mining and quarrying sector accounted for less than 1 per cent of GDP in the fiscal year 2004-2005 with mining exports accounting for less than 1 per cent of total exports in 2004. Furthermore, in 2004, Lets'eng Diamonds (Pty) Ltd operated the newly opened Lets'eng-la-Terai diamond mine, on which the GoL now had a 24 per cent stake, and produced 37,000 carats of diamonds valued at $44.4 million. According to Newman (2006), in 2006, Gem Diamond Mining Co. Ltd. of the United Kingdom, purchased Lets'eng Diamonds (Pty) Ltd's entire 76 per cent stake in the Lets'eng diamond mine leaving the GoL with its 24 per cent shareholding. In the same year, European Diamonds plc had been given a mining licence at Liqhobong and they extended the scope of their mining licence. In December of 2006, they recovered a 27.7-carat clean D-color stone from the Main Pipe that was sold in Belgium for a reported $750,000. At this point the Lets'eng Diamond mine was recorded to have produced three of the world's largest diamonds: the 610-carat *Lesotho Brown* in the mid-1960s, the 123-carat *Star of Lesotho* in October 2004 and the 603-carat *Lesotho Promise* in September 2006 which was sold for $12.4 million.

Fast-forwarding to 2010, Gem Diamonds Ltd of the United Kingdom owned 70 per cent of the Lets'eng mine in partnership with the GoL which owned the remaining 30 per cent (Newman, 2010). Table 1 below shows the structure of Lesotho's mineral industry in 2013. The table indicates that four mines (Lets'eng Mine, Liqhobong Mine, Mothae Mine and Kao Mine) comprised the structure of Lesotho's diamond industry during 2013 with Kao having been the biggest in terms of annual capacity in carats. All of the mines were partially owned by the GoL that had a 30 per cent stake in Lets'eng and a 25 per cent stake in Liqhobong, Mothae and Kao respectively. According to Mobbs (2013), only the Lets'eng and Kao mines were fully operational in 2013.

Table 1: Lesotho's Mineral Industry Structure in 2013

Commodity	Major Operating Companies and Major Equity Owners	Location of Main Facilities	Annual Capacity (in Carats)
Diamond	Gem Diamonds Ltd., 70%, and GoL 30%	Lets'eng Mine, Northern Lesotho	100,000
Diamond	Firestone Diamonds plc, 75%, and GoL, 25%	Liqhobong Mine, Northern Lesotho	77,000*****
Diamond	Mothae Diamonds Holdings Inc. (Lucara Diamond Corp., 75%, and GoL, 25%)	Mothae Mine, Northern Lesotho	60,000
Diamond	Storm Mountain Diamonds (Pty) Ltd (Namakwa Diamonds Ltd, 62.5%; GoL, 25%; Kimberlite Investments Lesotho Ltd., 12.5%)	Kao Mine Northern Lesotho	220,000

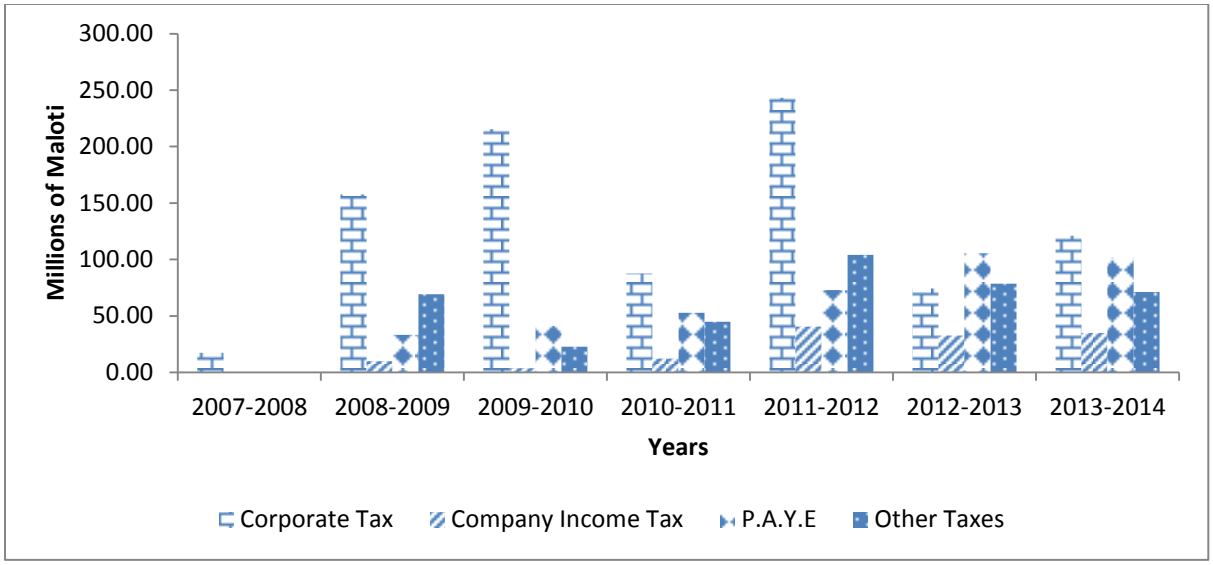
Source: Newman 2014, ***** 2012 position

2.2 *Value of Lesotho's Mineral Industry to the Economy*

CBL (2012) pointed out that the value of diamond exports as a share of GDP as well as the value of diamond exports as a share of total exports in Lesotho were both on an upward trend from 2001 to 2011. Diamond exports as a share of GDP increased from zero in 2001 to 15.2 per cent in 2011, while diamond exports as a share of total exports also increased from 0.1 in 2002 to 31.0 per cent in 2011. Noticeably, the exports of diamonds dropped to 18.3 per cent in 2009 due to the global financial crisis and recession but experienced a slight increase to 20.8 per cent as the global economy showed signs of recovery from the great recession.

Figure 1 below shows Lesotho's mining sector tax categories from 2007 to 2013. Overall, the mining sector's tax contribution to the country has been on a steady increase since 2007 with cyclical troughs given negative business shocks such as the global financial crisis of 2007-2009.

Figure 1: Lesotho's Mining Sector Tax Categories from 2007 - 2014



Source: Lesotho Revenue Authority (LRA).

As testament to the growing positive impact of the mining sector on Lesotho's labour market, the Pay as You Earn (P.A.Y.E) as depicted in Figure 1 averaged M67 million from 2008. According to CBL (2012), Lets'eng Diamonds (Pty) Ltd was the biggest employer in the mining industry between 2010 and 2012, employing around 1,300 people. The entire sector employed around 2000 people towards the end of 2012 and this translated into 0.3 per cent of the country's total economically active labour force. In addition, Figure 1 indicates that other taxes, which include taxes charged on dividends, interest payable, external consultant services as well as management fees, also increased over the period 2008 to 2014 with the period after the financial crisis (2011-2012) markedly highest at M104 million. Specifically, the surge in other taxes was due to strong performance in the Lets'eng Diamond Mine dividends declaration.

3. Literature Review

3.1 Theoretical Review

According to Abou-Stait (2005), Dar *et al* (2013) and Ajmi *et al* (2015), studies of the relationship between exports and economic growth can be traced as far back as early classical economic theories of Adam Smith and David Ricardo whose main argument was that international trade and specialization are crucial in fostering economic growth. Subsequent to these early classical economic theories, more recent economic debate on the matter can easily be

divided into two main competing schools of thought, namely the "export-led growth" (ELG) hypothesis and the "growth-led exports" (GLE) hypothesis. Ajmi *et al* (2015) and Dar *et al* (2013) reported that in addition to the ELG and GLE hypotheses, two other possible relationships can exist between exports and economic growth. The first is the bi-directional causality between the two variables while the second is no causality between the two variables at all instances where the growth of each is determined by other, unrelated variables such as investment.

It is important to note, at this juncture, that scholars such as Herzer *et al* (2006) as well as Siliverstovs and Herzer (2007) have indicated that caution should be taken when researchers study the relationship between exports and growth since exports are themselves a component of output. This means that it is almost inevitable that a significant correlation exists between exports and growth irrespective of whether or not there is a causal relationship. It is therefore crucial that the intrinsic economic effects of exports on output be separated from the influence incorporated in the "growth accounting" identity relationship. A similar point was made by Ghatak *et al* (1997) who indicated that one way of dealing with this problem would be to define output (the dependant variable) as a net of the independent variable investigated as the source of growth. This distinction can prove to be important especially when the impact of say, manufacturing exports and primary exports such as mining on economic growth is investigated. To better illustrate this point, Lucas (1993) interrogated the "north-south trade" hypothesis. In the hypothesis "north" denotes an economy that produces an interval of high quality goods while "south" depicts an economy that produces an interval of low quality products. In a free trade setting where the two economies trade with each other, free trade slows learning and growth in the south economy and speeds it up in the north economy. In essence, dynamic technological spill over effects are more associated with the production of high quality products as opposed to the low quality ones. This would mean that the export of primary goods such as mining will more often than not result in low knowledge spill overs and thus adversely affect economic growth while the opposite is true for manufacturing exports.

Lall (2000) used the technological capability analysis to further note that in an ever competitive global export environment, an economy's comparative advantage is sustained and galvanised

through technological deepening established through one or both of the following two ways: upgrading the quality and technology within existing activities as well as moving from technologically simple activities to more complex ones. Redding (1999) made a similar point, arguing that if a country maintains the production and export of goods within low technology industries where it currently holds comparative advantage, this inhibits innovation, economic growth and economic welfare moving forward especially if there is opportunity to venture into more technologically advanced industries where it lacks comparative advantage but has the potential for productivity growth when compared to its trading partners.

3.1.1. *Export Led Growth (ELG)*

According to Awokuse (2007), Dar *et al* (2013) and Ajmi *et al* (2015), the ELG hypothesis argues that since exports are a component of Gross Domestic Product (GDP), they have a direct and indeed indirect impact on GDP. Abou-Stait (2005) explained that exports prove vital in the promotion of intra-industry trade as well as enabling the integration of the domestic economy with the world economy and by so doing reduce the impact of external shocks. In addition, Kim *et al* (2009), Nguyen (2011), Daoud and Basha (2015), Gokmenoglu *et al* (2015) and Al-Assaf and Al-Abdulrazag (2015) elaborated on the notion of trade being an engine of economic growth and added that increased specialization in export goods produced by skilled labour employed within export oriented sectors of the domestic firms leads to burgeoning exports and subsequent surges in real output. An added advantage will also be greater inflows of foreign direct investment (FDI) and technology transfers that are crucial in a country's early stages of economic development. Dar *et al* (2013) agreed and further stated that as a country pursues the ELG trajectory by employing more advanced production techniques to improve its production capabilities in areas where it has comparative advantage, it achieves economies of scale to reach foreign markets and ultimately realises a higher level of real GDP relative to countries that are less export oriented. Nguyen (2011), Al-Assaf and Al-Abdulrazag (2015) and Daoud and Basha (2015) also highlighted that according to the external effect hypothesis related with production in the export sector, exports promote greater competition with foreign products by forcing the domestic economy to specialize in the production of specific products. Specialization will lead to the discovery of innovative ways to improve the quality of such products through the use of the

latest technology and dynamic learning from abroad to improve the skills of the work force and by so doing growing the supply side's industry sector.

Shihab *et al* (2014) added that compelling arguments have been levied in favour of exports playing a role in mitigating any imbalances in the balance of payments for a country and in the process promoting employment opportunities and economic growth. Daoud and Basha (2015) agreed and noted that any increase in local income within an open economy is naturally followed by an increase in imports (both durable and non-durable goods). In order to offset the balance of payment imbalance, governments are encouraged to follow policies that encourage domestic investment into local export production capacity that will in turn stimulate domestic employment and economic growth.

3.1.2. *Growth Led Exports (GLE)*

Henriques and Sadorsky (1996), Awokuse (2007) and Kim *et al* (2009) described the GLE as having a reverse causal flow when compared to the ELG. In the GLE, the growth in output leads to a growth in exports. In this case, the export growth is triggered by productivity gains that come as a result of increased domestic levels of skilled labour and technology. Moreover, an increase in productivity affords a country the opportunity to compete internationally in price and quality. Vernon (1966) used the product cycle hypothesis to illustrate that as domestic firms invest more in product development and innovation this leads to an expansion of exports associated with such a product. Dar *et al* (2013) concurred and noted that increases in technology and skilled labour in the domestic economy leads to efficiency in production and subsequently a comparative advantage for the export economy.

3.2 Empirical Review

Henriques and Sadorsky (1996) investigated the relationship between real exports, real GDP and terms of trade (TOT) for Canada over the period 1870 – 1975. The study highlighted that price fluctuations in small open economies can distort the observed relationship between exports and GDP and included the TOT variable to control for export growth which arises from price competitiveness. Furthermore, a vector auto regression (VAR) was constructed as well as the Granger causality test between the three variables. They discovered that there is a long-run

relationship between all three variables and most importantly, they found that there is a unidirectional causal relationship from GDP to exports. Gokmenoglu *et al* (2015) investigated the validity of the ELG hypothesis for Costa Rica for the period 1980-2013. Their study examined the existence of a long-run relationship between exports and economic growth by using the Johansen co-integration test. The causality between exports and economic growth was investigated using the Granger causality tests. The study found that there was a unidirectional causality between the two variables running from economic growth to exports; meaning that economic growth of Costa Rica for the period under review Granger caused export growth, and therefore supporting the existence of GLE in the case of Costa Rica. Shihab *et al* (2014) tested the causal relationship between economic growth and exports in Jordan using the Granger methodology to determine the direction of the causal relationship between the two variables over the period 2000-2012. The study found a unidirectional causality between the two variables and the direction runs from economic growth to exports. The results confirmed the existence of the GLE in the case of Jordan.

In addition, Daoud and Basha (2015) examined the ELG hypothesis for Jordan, Kuwait and Egypt during the period 1976-2013 through cointegration and Granger causality tests. They discovered that for all three countries, there existed a long-run relationship between exports and real output. In terms of causal relationships between the two variables, the study concluded that there existed bi-directional causality between exports and GDP for Jordan and unidirectional causality running from exports to GDP for both Kuwait and Egypt. Ajmi *et al* (2015) examine the causal link between exports and economic growth by using linear and nonlinear Granger causality tests for South Africa. The study used real exports and real GDP data for the period 1911-2011. Results from the linear Granger causality test reveal no causal relationship between exports and economic growth, either unidirectional or bi-directional. However, using the nonlinear causality test, the study finds a bi-directional causality between exports and GDP. This means that the study supports the existence of both the ELG and GLE for South Africa.

Furthermore, Dar *et al* (2013) studied the relationship between exports and growth in India from the period 1992 -2011. The study used the methodology of wavelet correlation and cross correlation and discovered that in lower time scales (2-8 months) export growth and output

growth do not share significant co-movement and that there is no causal link between the two variables. However, in longer time scales (8-32 months) there was found to exist a positive relationship between exports and output and a unidirectional causal link running from exports to output. Interestingly, for even longer time scales (32-64 months) the study concluded that there is not only a positive relationship between exports and economic growth, there is a bi-directional causal relationship as well.

Siliverstovs and Herzer (2007) investigated the ELG hypothesis in Chile using time series data from 1960-2001. The study specifically looked at the effects of exports on economic growth in Chile by using the Johansen cointegration technique. Importantly, the study addressed problems of specification bias that often arise when a two-variable causal relationship between output and exports is examined. The research employed a multivariate analysis which assumed total factor productivity to be a function of Chile's main exports (mining exports and manufactured exports) as well as capital goods imports. Furthermore, it isolated the economic influence of exports on output that can be found embedded in the growth accounting relationship by defining the output variable as a net of exports. The study's results confirmed the ELG hypothesis and found that a unidirectional Granger causal relationship existed between manufactured exports and economic growth running from manufacturing exports to growth. It also discovered the existence of a bi-directional Granger causality between output and mining exports. Equally important, results showed differentiated impacts of mining and manufacturing exports on output. A significant and positive relationship was discovered between manufacturing exports and output, while a significant and negative relationship was discovered between mining exports and output. This means that in the Chilean case, manufactured exports have been far more important in fostering economic growth than traditional primary exports.

Sachs and Warner (2001) investigated the credibility of the natural resource curse theory over the period 1970 – 1990 for a host of natural resource rich countries. The study examined whether the natural resources curse really existed over the period and whether it resulted in resource abundant countries missing out on ELG. They concluded that natural resource abundance resulted in a crowding out of other export sectors such as manufacturing that would otherwise be responsible for driving economic growth at a much higher level. The crowding out arises due to

an increase in the domestic price level of non-traded goods that act as inputs to these other export sectors leaving them to lose their competitiveness on international markets. In the same vein, the natural resource abundance crowds out growth promoting entrepreneurial activity when wages in the natural resource sector rise high enough to attract potential innovators and entrepreneurs away from other potential growth sectors. It is important to note that there are exceptions to this overall conclusion. Sachs and Warner (2001) discovered that Botswana experienced high levels of growth over the period under investigation emanating directly from the export of diamonds.

4. Analytical Framework

4.1. Model Specification

This paper follows the work done by Henriques and Sadorsky (1996), Daoud and Basha (2015), Gokmenoglu *et al* (2015), and Siliverstovs and Herzer (2007) to estimate the ELG hypothesis in Lesotho by specifically looking at the influence of the mining industry by following an algebraic equation where the hypothesized model is specified as follows:

$$\Delta ln\mathrm{Y_t} = \beta_0 + \beta_1 lnEXMAN_{t-1} + \beta_2 lnEXMIN_{t-1} + \beta_3 ln\mathrm{OEX}_{t-1} + \beta_4 lnTOT_{t-1} + \beta_5 lnREER_{t-1} + \beta_6 lnK_{t-1} + \varepsilon_t \quad (1)$$

Where β_0- β_6 are the coefficents explaining the elasticities of explanatory variables. *ln* is logarithms in order to have more reliable and unbiased results, Y is real GDP, EXMAN is real manufacturing exports, EXMIN is real mining exports, OEX is real other exports other than manufacturing and mining, REER is real effective exchange rate, K is capital stock and TOT is terms of trade which is computed as follows:

$$TOT = \frac{Price\ of\ Exports}{Price\ of\ Imports} * 100. \quad (2)$$

$\boldsymbol{\mathcal{E}}$ is the white noise error term.

Balassa (1978), Nguyen (2011), Daoud and Basha (2015), Gokmenoglu *et al* (2015), Al-Assaf and Al-Abdulrazag (2015), Awokuse (2007), Dar *et al* (2013), Ajmi *et al* (2015) as well as Amiti and Freund (2010) indicated that there is a positive and significant relationship between export

growth and economic growth. More importantly, a country's export structure plays a vital part in stimulating economic growth due to increased specialization and deployment of resources to the sectors where relative cost advantages are the greatest. This point is particularly important in this paper as it is the reason why Lesotho's exports have been divided into manufacturing, mining and other exports of which a positive relationship with GDP is expected.

It must be noted that the impact of REER on economic growth is theoretically ambiguous. Tilford (2009) and Özyurt (2013) explained that an appreciation in the domestic currency will result in an inrease in economic growth due to a reduction in demand pull inflation emanating from a decrease in the price of imported goods and raw materials. Moreover, household disposable income will increase and with it the levels of domestic consumption which raise the living standards and encourage development of a domestic service sector that is crucial for rebalancing and modernising the local economy. Conversely, Bleaney and Greenaway (2001), Rodrik (2008), McPherson and Rakovski (2000) as well as Ping (2011) indicated that an appreciation in the real exchange rate would dampen economic growth by impeding export growth, raising levels of unemployment and decreasing investment in tradable sectors.

Economic investigation discovered that there is a positive and highly statistically significant relationship between investment in capital and economic growth as expected in this paper. Furthermore, high levels of productive investment in capital stock were found to lead to an increase in the level of output per worker and subsequently an increase in GDP per capita (Romero-Avila, 2009, Bond *et al*, 2010 and Czernich *et al*, 2011).

Bleaney and Greenaway (2001), Mendoza (1997) and Blattman et al (2007) concluded that TOT variability in the periphery countries (primary commodity dependent price taking economies) had a negative impact on growth since these countries were less diversified and were more dependent on single commodity exports. They pointed out that TOT are a determinant of the risk and return properties of a domestic asset. This means that high variability in the TOT negatively affects economic growth prospects while more stable TOT supports economic growth. On the other hand, they also indicated that positive movements in the TOT stimulate investment and subsequntly economic growth while negative movements result in the opposite effect. Therefore,

the impact of TOT on economic growth is ambigious and it is included in this study to control for export growth which arises from price competitiveness.

To determine the long-run relationship between the GDP growth rate and exports the autoregressive distributed lag (ARDL) cointegration procedure introduced by Pesaran *et al* (1997, 1999, 2001) was used. This test of conintergration has numerous advantages. One of the important features of this test is that it is free from unit-root pre-testing and can be applied regardless of whether variables are I(0) or I(1). In addition, it does not matter whether the explanatory variables are exogenous (Pesaran *et al*, 1997). The short and long-run parameters with appropriate asymptotic inferences can be obtained by applying Ordinary Least Squares (OLS) to ARDL with an appropriate lag length. Following Pesaran *et al* (1997, 1999, 2001), an ARDL representation of equation 1 can be written as:

$$\Delta ln\mathrm{Y_t} = \beta_0 + \beta_1 ln\mathrm{Y_{t-1}} + \beta_2 EXMAN_{t-1} + \beta_3 lnEXMIN_{t-1} + \beta_4 ln\mathrm{OEX_{t-1}} + \beta_5 ln\mathrm{TOT_{t-1}} + \beta_6 ln\mathrm{REER_{t-1}} + \beta_7 ln\mathrm{K_{t-1}} + \sum_{i=1}^{p} \pi_1 \Delta ln\mathrm{EXMAN_{t-i}} + \sum_{i=1}^{p} \pi_2 \Delta ln\mathrm{EXMIN_{t-i}} + \sum_{i=1}^{p} \pi_3 \Delta lnOEX_{t-i} + \sum_{i=1}^{p} \pi_4 \Delta lnTOT_{t-i} + \sum_{i=1}^{p} \pi_5 \Delta lnREER_{t-i} + \sum_{i=1}^{p} \pi_6 \Delta lnK_{t-i} + \theta Z + \varepsilon_t \quad (3)$$

Where *t* is the time period, *βs* are long-run parameters to be estimated. $\boldsymbol{\varepsilon}$ is the white noise error term and *Z* is any exogenous variable affecting the ELG hypothesis in Lesotho. *π′s* are short-run parameters to be estimated. To test long-run relationship of the ELG hypothesis in Lesotho using bounds testing, a joint significance test for H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$ against the alternative hypothesis of H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$ is performed. The test is based on Wald-test (F-statistics); the asymptotic critical values for the test were supplied by Pesaran *et al* (2001). To confirm that cointegration exists, the F-statistics from joint test of significance should be greater than asymptotic critical values from Pesaran for upper bounds and lower bounds, otherwise there is no cointegration.

The bounds test approach enables examination of both short-run and long-run dynamics following ARDL model estimated in equation 3. This step estimates the long-run and short-run error correction models as shown in equation 4 and 5 below.

$$lnY_t = \beta_0 + \sum_{i=1}^{p} \beta_1 lnEXMAN_{t-i} + \sum_{i=1}^{p} \beta_2 lnEXMIN_{t-i} + \sum_{i=1}^{p} \beta_3 lnOEX_{t-i} + \sum_{i=1}^{p} \beta_4 lnTOT_{t-i} + \sum_{i=1}^{p} \beta_5 lnREER_{t-i} + \sum_{i=1}^{p} \beta_6 lnK_{t-i} + \theta Z + \mu_i \quad (4)$$

$$\Delta lnY_t = \beta_0 + \sum_{i=1}^{p} \pi_1 \Delta lnEXMAN_{t-i} + \sum_{i=1}^{p} \pi_2 \Delta lnEXMIN_{t-i} + \sum_{i=1}^{p} \pi_3 \Delta lnOEX_{t-i} + \sum_{i=1}^{p} \beta_4 lnTOT_{t-i} + \sum_{i=1}^{p} \beta_5 lnREER_{t-i} + \sum_{i=1}^{p} \beta_6 lnK_{t-i} + \Omega ECT_{t-i} + \theta Z + \mu_i \quad (5)$$

In equation 4 and 5 all the variables are as previously defined, μ_i is the error term and Ω is the coefficient of the error correction term (ECT_{t-i}). The ECT captures the speed of adjustment to restore equilibrium in the dynamic model. The ECT coeffieienct should be statisitically significant with a negative sign.

4.2 *Data and Descriptive Statistics*

The analysis is based on the annual time series data on variables such as real GDP, real exports, terms of trade, real effective exchange rates, real gross fixed captial formation[4], real mining exports and real manufacturing exports using equation 3. The sample period is from 1970 - 2013. The data are obtained from the Worldbank Economic Indicators (2014).

Table 2: Summary of Statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Y	44	22.31982	0.550613	21.22417	23.22005
EXMAN	44	19.86456	1.046335	18.25676	21.32491
EXMIN	44	2.242347	2.795206	-0.728557	7.871563
OEX	44	19.76365	1.770714	15.79699	22.24779
TOT	44	2.467955	0.928683	0.798914	3.783331
REER	44	4.761783	0.447014	3.987053	5.290923
K	44	21.04782	0.946928	18.67874	5.290923

Note: All variables are in real terms based on 2004 constant prices

[4] which is used in this model to proxy capital stock

4.3 Unit Root Tests

The Augmented Dickey and Fuller (1979, 1981) (ADF) and Phillips-Perron (1988) test are applied to determine the order of cointegration of the variables since the use of bounds testing is not applicable for series that are I(2). The Phillips-Perron test complements the ADF in that it is non-parametric and corrects for any serial correlation and heteroskedasticiy in the errors.

5 The Empirical Results

5.1 Unit Root Procedure

Table 3 presents the findings of a unit root test using the ADF unit root test and Philips-Perron test. According to both tests, the null hypothesis that the variables are non-stationery in levels failed to be rejected based on the basis of the p-values associated with each variable. However, when the varibles are differenced once, the p-values imply that the null hyphothesis can be rejected under both the ADF and Phillips-Peron tests. As a result, this leads to the conclusion that GDP, manufacturing exports, mining exports, other exports, terms of trade, real effective exchange rate and capital stock are intergrated of order one, I(1) at 1 per cent signifcance level. This suggests that there might be an existence of long-run relationship between the variables.

Table 3: ADF and PP Unit Root Test Results

	H_0:non-stationary in levels		**H_0:non-stationary in first differences**	
Variable	**ADF Statistic**	**PP Statistic**	**ADF Statistic**	**PP Statistic**
Y	-1.350277 (0.5974)	-1.724012 (0.4103)	-6.846047 (0.0000)	-6.724889 (0.0000)
EXMAN	-0.513151 (0.8786)	-0.513151 (0.8786)	-6.145589 (0.0000)	-6.145589 (0.0000)
EXMIN	-0.792668 (0.8111)	-0.820115 (0.8032)	-7.019860 (0.0000)	-7.643535 (0.0000)
OEX	-1.541352 (0.5034)	-1.343260 (0.6008)	-9.711051 (0.0000)	-14.30264 (0.0000)
TOT	-0.175499 (0.9338)	-0.209943 (0.9293)	-6.021737 (0.0000)	-6.059251 (0.0000)
REER	-1.862240 (0.3464)	-1.890015 (0.3338)	-6.007537 (0.0000)	-6.007537 (0.0000)
K	-2.835469 (0.0617)	-2.653821 (0.0905)	-6.039211 (0.0000)	-6.169995 (0.0000)

Note: Values in parentheses are p-values

5.2 Cointegration Test Results

The next step is to confirm the presence of a long-run relationship among the variables since they are found to be integrated of order one. The paper employs the use of bound testing approach to estimate the cointegration regression. Table 4 presents results from the bounds test for

cointegration for ELG hypothesis in Lesotho from utilizing the cointegration and error correction analysis to estimate the short-run and long-run relationship among the model variables, and to demonstrate the adjustment process by using the Autoregressive Distributed Lag (ARDL) approach. In order to determine the long-run relationship, the bound cointegration test based on critical values, which are taken from Narayan (2005) are used because of sample size, with the null of no long-run relationship and alternative hypotheses of a long-run relationship. The asymptotic distribution of critical ELG hypothesis values is obtained for cases in which all regressors are purely I(1) as well as when the regressors are purely I(0) or mutually cointegrated. The results show the rejection of the null hypothesis of no cointegration evident from the fact that the calculated F-statistic from the Wald-test exceeds the upper bound critical values at either 1, 5 and 10 per cent significance levels. As result, the empirical evidence implies that real GDP, real exports (mining exports, manufacturing exports, other exports), terms of trade, real capital stock and real effective exchange rate are cointegrated for long-run relationship.

Table 4: Cointegration Test Results

Bound Test for Cointergration					
Critical value bounds of the F statistic: restricted intercept and no trend					
90 per cent level		**95 per cent level**		**99 per cent level**	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
2.218	3.314	2.618	3.863	3.505	5.121

F-Statistics: 15.15642. Sample size: 43, K is the number of regressors: 6

5.3 Results of the Long-Run ARDL Model of ELG hypothesis in Lesotho

The selected estimated model is ARDL(1,1,1,1,1,1,0) for the long-run relatioshhip. Table 5 presents the results of the estimated long-run ELG hypothesis and corresponding diagnostic tests. The diagnostic test that examines the serial correlation, functional form, normality, and heteroscedasticity associated with the model confirms the robustness of the model. The R^2 indicates that 99 per cent of the variation in GDP is explained within the model. The Durbin Watson (DW) statistic shows that no autocorrelation exists between the variables. The Jarque Bera (JB) test for normality fails to reject the null hyphothesis that the errors are normally distributed which confirms that the errors are white noise.

Table 5: Estimated Long-Run Model

Variable	Coefficient	t-statistic	p-value
LEXMAN	0.122187	1.032591	0.3106
LEXMIN	0.059060	3.750064	0.0008
LOEX	-0.060782	-0.612626	0.5451
LTOT	0.110461	0.576148	0.5691
LREER	-0.087530	-1.096762	0.2821
LK	0.293471	3.754941	0.0008
D2	-0.256431	-2.314642	0.0282
D4	-0.488296	-2.363340	0.0253
C	15.013280	7.954113	0.0000

Diagnostics Tests

R^2 = 0.997723
Adj R^2 = 0.996584
Durbin-Watson = 2.254813
Jarque-Bera = [0.022886] (0.988622)
Wald Test =[15.15642] (0.0000)
Breusch-Godfrey Serial Correlation LM Test = [2.299597] (0.1203)
Heteroskedasticity Test: Breusch-Pagan-Godfrey = [0.709718] (0.7469)

Note: Values in brackets are F-statistics while values in parentheses are p-values

The analysis confirms the validity of ELG hypothesis in Lesotho. A 10 per cent increase in exports of mining leads to an increase in economic growth of 5.9 per cent. This finding protrays the important role of the mining industry and its contribution to economic growth. The results also suggest a potentially important benefit of capital stock accumulation for economic growth which is in line with Bond *et al* (2010) that high levels of productive investment in capital stock were found to lead to an increase in the level of output. This finding also corresponds well with the fact that mining exports in Lesotho, which are the driver in total exports, are highly capital intensive.

Finally, the dummy variables D2 and D4 capturing macroeconomic instability that affected exports in Lesotho (European currency crisis in 1992-1993, Oil price crisis of 1993 and 2008 economic and financial crisis, respectively) have a negative and significant coefficient. This reinforces the theoretical assertion that macroeconomic instability negatively affects export-led industries for economic growth, see Molapo and Damane (2015).

5.4 Results of the Error Correction Model on ELG Hypothesis in Lesotho

The short-run dynamics along with the error correction term results and their associative diagnositic tests are presented in Table 6. The model fits the data well as suggested by a favourable R^2 and adjusted R^2. The DW statisitic and JB test both fail to reject the null hyphothesis, indicating that the residuals are white noise. The Wald test rejects the null hyphothesis that the coefficients are not statistically different from zero while the Breusch-Pagan-Godfrey (BPG) Heteroscedasticity test rejects the null hypothesis that there is heteroscedasticity.

Table 6: Estimated Error Correction Model

Variable	Coefficient	t-statistic	p-value
D(LEXMAN)	0.165759	2.233287	0.0337
D(LEXMIN)	0.026649	5.264139	0.0000
D(LOEX)	-0.087619	-3.367244	0.0022
D(LTOT)	0.335808	4.150222	0.0003
D(LREER)	-0.106633	-2.328529	0.0273
D(LK)	0.100235	4.594598	0.0001
D(D2)	-0.087584	-2.558997	0.0162
D(D4)	-0.166778	-3.169206	0.0037
CointEq(-1)	-0.341550	-3.822296	0.0007

Diagnostics Tests

R^2 = 0.997723
Adj R^2 = 0.996584
Durbin-Watson = 2.254813
Jarque-Bera = [0.022886] (0.988622)
Wald Test =[15.15642] (0.0000)
Breusch-Godfrey Serial Correlation LM Test = [2.299597] (0.1203)
Heteroskedasticity Test: Breusch-Pagan-Godfrey = [0.709718] (0.7469)

Note: Values in brackets are F-statistics while values in parentheses are p-values

Similar to the results under the estimated long-run model, there is also confirmation of the export-led hypothesis for Lesotho in short-run. The error correction term (ECT) reflects the speed of adjustment to equilibrium in the long-run indicating how quickly variables return to equilibrium. The empirical results in Table 6 show that the coefficient of the ECT is negative and statistically significant, confirming the existence of a cointegration relationship among the variables. The coefficient indicates a moderate rate of convergence (34 per cent) to equilibrium and supports the finding of the presence of long-run relationship between economic growth and exports along with other variables.

Empirical results indicate that both mining and manufacturing exports play a significant and positive role on economic growth in the short-run given that they are both the main export industries in Lesotho. Other exports negatively affect economic growth confirming Lesotho's lack of competiveness in the non-mining and non-manufacturing export sectors. As endorsed by Bleaney and Greenaway (2001), terms of trade positively affect economic growth in Lesotho. According to Romero-Avila (2009), there is a positive and highly statistically significant relationship between investment in capital stock and economic growth as confirmed by the results. Devaluation of local currency has a negative effect on economic growth in the case of Lesotho. The findings are consistent with studies by Bleaney and Greenaway (2001), Rodrik (2008), McPherson and Rakovski (2000) and Ping (2011).

5.5 Granger-Causality Test Results

In Table 7, the results of the Granger-Causality test indicate that there exists bidirectional causality running from real GDP growth to exports of manufacturing and exports of mining. The findings confirm the two main theories of the relationship between growth and exports, namely the "export-led growth" (ELG) hypothesis and the "growth-led exports" (GLE) hypothesis in Lesotho, (Ajmi *et al*, 2015 and Dar *et al*, 2013). Important to note is that the two main export industries in Lesotho; mining and manufacturing, can be used in predicting GDP while on the other hand GDP growth can be used in predicting mining and manufacturing exports. In addition, the results show that there is unidirectional causality running from GDP growth to terms of trade and other exports. This implies that GDP growth can be used to predict other exports and terms of trade.

Table 7: Granger-Causality Test Results

Null Hypothesis	F-Statistic	P-Value
Y does not Granger Cause EXMAN	4.20549	0.0226
EXMAN does not Granger Cause Y	3.24695	0.0502
Y does not Granger Cause EXMIN	5.23263	0.0032
EXMIN does not Granger Cause Y	4.17135	0.0432
Y does not Granger Cause K	1.11217	0.3396
K does not Granger Cause Y	1.85379	0.1709
Y does not Granger Cause OEX	5.61600	0.0074
OEX does not Granger Cause Y	0.32047	0.7278
Y does not Granger Cause REER	0.66215	0.5217
REER does not Granger Cause Y	0.76327	0.4733
Y does not Granger Cause TOT	5.05461	0.0115
TOT does not Granger Cause Y	0.59653	0.5559

6 Conclusion

The aim of this study is to empirically investigate the applicability of the Export-Led Growth hypothesis for Lesotho over the period 1970-2013.. In particular, the paper confirms the fact that exports of mining play a significant role in enhancing the economic growth in Lesotho. The Autoregressive Distributed Lag model (ARDL) to cointegration approach is used to ensure the existence of the long-run linear combination among variables over the study period as well as the short-run dynamics. The main findings of the Granger causality test confirm the two main theories of the relationship between growth and exports, namely the "export-led growth" (ELG) hypothesis and the "growth-led exports" (GLE) hypothesis in Lesotho due to the existence of a bidirectional causality between GDP growth and exports of mining and manufacturing.

On the basis of obtained empirical results, this study supports the export-led growth trajectory for Lesotho particularly within the mining industry because exports of mining were found to positively determine real GDP both in the short-run and long-run throughout the sample period. The study advocates for the continued promotion of the diamond mining export sector by the GoL through the adoption and intensification of vigorous growth policies and laws necessary to stimulate that particular export industry and ultimately effect rapid economic growth. The GoL should encourage technological deepening and the increase of value addition within the mining sector through the prioritization of capital investment in physical infrastructure projects coupled with partnerships between mining companies and locally owned value-adding processing industries with upstream supply-chain-linkages with the mining sector. This will help facilitate

positive knowledge and technological spill overs and transcend the country from a low income underdeveloped status to one that specializes in the production of high quality products. Furthermore, the GoL should increase the participation of Basotho people in the running and ownership of the country's mining and minerals industry. This will result in fostering accelerated economic and social progress that will create employment and lift the country out of poverty.

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