CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Resources, services and supports provided by the environment for the existence of man and his activities are numerous and unavoidable. Specifically, the environment provides natural resources to production and consumption activities; absorbs waste emanating from production and consumption activities; supports life and other human endeavours. Environment is a contributor to both production and human welfare through the provision of resources, including space for human activity; waste absorption services such as neutralization, dispersion or recycling of wastes from human activity; environmental services such as the maintenance of a habitable biosphere, including the stratospheric ozone layer, climate stability and genetic diversity; and the provision of services for human amenity, recreation and aesthetic appreciation (United Nations Integrated Environmental and Economic Accounting, 2003).

The environment is endowed with mineral deposits, access to whichhas inevitably resulted to exploration activities sometimes with heavy equipment and machineries whose impacts on the environment may distort the ecosystem and destroy the landscape. The environment forms the base on which numerous activities of man are carried out, which include industrial and other forms of activities associated with human's dependence on the environment. As a result of this crucialand inevitable nature of the environment to the existence and welfare of man, economic activities and other endeavours that support man's existence, greater concern has recently arisen of the need for businesses to incur costs on environmental remediation and preservation.Worthington (2012) and Association of Chartered Certified Accountants (2015) confirmed that environmental awareness by businesses of the environmental repercussions of their operations (products and services) has been growing.In the recent times, there has been an increased awareness of the interaction between firms and environment in which they operate, this enlightenment has been sharpened by concerns about resources depletion, resources scarcity, environmental degradation and the activities of these firms that lead to the depletion of the ozone layer and thereby causing an imbalance in the environmental system (Omodero and Ihendinihu, 2016).

The rising concern was not the case many years ago. For centuries business was done without consideration for the environment (Wingard 2001). Confirming that environmental responsibility was not the case years back,Nukpezah(2010), took a historical survey of the concern and noted that the publication of Rachael Carson's *Silent Spring* in 1962 marked the beginning of modern environmental consciousness precipitating a shift of focus from isolated symptoms of environmental degradation to the underlyinginterconnections.Therefore,it is now appreciated andbelieved that the short and long run implications of business impact on the environment and the associated growing concern by firms and other stakeholdersare huge and could affect the survival of the firms.Eco systematic interactions that occur on the environment are numerous and may be mutual (symbiotic) or parasitic. These interactions include that of the flora and fauna,interactions of the larger organisms, wildlife and human dependenceas well as the industrial and non industrial actions. These interactions and activities are made possible by the accommodating platforms naturally provided by the environment. Except in rare cases of natural catastrophe, sometimes attributable to man's mismanagement of the environment, the platformsprovided by the environment are original and wouldremain unless altered by human activities.

Obviously, the interaction with the environment has implications and costs associated with it. According to Duke and Kankpang (2013), the constant interaction of organisms and plants with the environment result to negative and positive changes on both side and usually with long-lasting implications and consequences for the physical landscape. Man happens to be at the centre stage of environmental degradation. Beredugo (2014) confirmed that like all other living creatures, humanshave clearly changed their environment, and they have done so generally on a grandeur scale than have all other species.For Zimmerman (2008), some of these human-induced changes which includepollution and the destruction of the world’s tropical rain forest for economic expansion have led to altered climate patterns, habitat destruction, species extinction, and environmental degradation. Dutta and Bose (2008), concluded that the activities of man aimed at meeting man’s numerous wants result to some consequences such as rural-urban migration, deforestation, desertification and emission of effluence and other wastes which have impacted negatively on the natural environment with these activities generatinga variety of problems including soil, atmospheric, water and mouse pollution.

The environment is crucial for production, distribution and consumption of goods and services as well as incidental waste management. The production of goods and services relies on inputs from the environment that result to depletion of resources and the attendant implications on the natural environment. Production inputs likeraw materialsdepletethe quantity of available natural resourceswith part of the inputs resulting to wastes that are subsequently returned to the environment. Wastes come in different forms and effects.One of the common effects of waste to the environment is pollution which occurs when wastes disrupt or change natural systems, including those that are important for human well-being such as air and water. According to Pramanik, Shil and Das (2007), the present civilization has involved man in varied activities, many of which generate waste with potential constituents, the ultimate of whose disposal lead to environmental pollution in many parts of the world and the magnitude of which has already reached an alarming level.

Pollution and other forms of degradation are prevalent inthe oil rich areas of Sub Saharan Africa and come in the form of oil spill pollution, oil well blow-outs, oil ballast discharges and improper disposal of drilling mud from petroleum prospecting and other production waste. Specifically, pollution hot spots are found in theNigeria's Niger Delta;Ghana's Tullow's Jubilee oil field;Ghana's Low Toxicity Oil Base Mud (LTOBM) causedby Kosmos Energy; coastline oil spills in Mandarin and Mpuela, all in Cabinda Angola; oil spills in Muanda in Bas-Congo western province of Democratic Republic of Congo. Apart from pollution and other forms of wastes, there are also instances of destruction of forest and wildlife conservation in Ololosokwan in Serengeti, Tanzania (Nelson and Makko, 2005).

Worrisomely, the aforementioned pollution and other wastes have resulted to loss of the aesthetic values of natural beaches; destruction of marine wildlife; modification of the ecosystem through species elimination and the delay in biota (fauna and flora) succession and decrease in fishery resources. Though some controversies have arisen on the basis of classification some countries into and outside of Sub Saharan region, the region is said to comprised of African countries south of the Saharan desert excluding Sudan and is made of forty-six countries which are sub divided into Eastern, Central, Western and Southern African sub-regions of eleven, eight, seventeen and ten countries respectively. Sub Saharan Africa is a rapidly developing region of great ecological, climatic and cultural diversity (Network of African Science Academies, 2015).Some unique features of Sub Saharan Africa such as dense population and abundant natural resources have made her susceptible to environmental degradation.

Degradation, environmental damages and costs therefore are the consequences of unprecedented pressureon the environment for which the traditional accounting system, structured for owners' profitability and stewardship, is deficient to adequately capture.

According to Dutta and Bose (2008) the historical development of accounting attests to the fact that accounting is a product of its commercial environment and rooted in capitalist ideology. Conclusively, Amoako, Lord and Dixon (2016); Bebbington, Gray, Hibbitt and Kirk(2001); Seal (2006); Jasch (2006); Braendle and Kostyuk (2007); Schaltegger, Gibassier and Zvezdov (2013) and Aldridge (2014) opined that conventional accounting practices do not provide adequate information to properly support decision-making on environmental management responsibilities.In line with this shortcoming,traditional accounting views environmental expenditures, whether on end-of-pipe treatment or pollution prevention efforts, as a drain on firms' resources (Filbeck and Gorman, 2004;Earnhart and Lizal, 2010).As a consequent of the observed shortcoming of the conventional accounting, environmental accounting which is variously known as green accounting or sustainability accounting came into being(Birkin, 1996); therebybringing to global focus the concept of triple bottom line reporting. Recognizing the advent of environmental accounting, Goodland (2002) and Berkel (2003)averred that the main areas of accounting development are human, social, economic and environment, which companies need to disclose in the form of a triple bottom line report. The triple bottom line which is variously noted as TBL or 3BL is an accounting framework consisting of three parts: social, environmental and financial. It is believed that a business entity is not just in business for her financial benefit but must incorporate social and environmental aspects. According to Atu (2013), the triple bottom line is established on the belief that the success of a business cannot be credited only to its financial position but also to its ability to appropriately address its ethical and environmental performance. The Global Reporting Initiative (GRI) (2006) emphasized that going beyond conventional monetary reports;the triple bottom line discloses the company's impact on the world around it by including environmental issues into accounting. Environmental accounting involves the identification, measurement and allocation of environmental costs and the integration of these costs into business and this encompasses the way of communicating such information to companies' stakeholders (Bassey, Sunday and Okon, 2013). Elliot and Elliot (2006) described environmental accounting as being in a state of evolution ranging from ad hoc comments in the annual reports to a more systematic approach in the annual report to stand-alone environmental reports.

Environmental costs are central to environmental accounting and reporting. Uwuigbe and Olayinka (2011) described environmental cost as impacts incurred by society, an organisation or individual resulting from entities that affect environmental quality.Consequently, firms' performances and parameters for measuring them, have changed from owners' profit maximization to include environmental responsiveness. Failures and successes of firms are not going to be based only on the market acceptability of their products and services or the net returns on investment but also other parameters that question their responsibility and responsiveness to the environment in which they operate and depends on. For Omodero and Ihendinihu (2016), the success or failure of a company may be determined not only by the products or services it deals with but also by the complexity of its environment. The implication of this is that the hitherto disconnect between the wellness or otherwise of firms and the consequences of their business operations on the environment is not going to be the case going forward. Firms are further adjudged not only on owners' profit maximization but also by their responsiveness and responsibility to the environment as well on the sustainability of the environment which is the ability of the environment to provide equivalent support and services to future generations.

Environmental costs can take different forms and this could be a function of the operational peculiarities of firms. Firms in explorative activities like oil exploration and mining activities are associated withoil spills, water pollution, air pollution, noise pollution, landscape degradation, employee health hazard, destruction of communal land and agricultural investments etc while industrial firms engaged in production of industrial goods will be faced with air pollution, noise pollution, employee health hazards, etc. For in-dept analysis, this study disaggregated environmental costs into three explanatory variables: community development (CD), employee health and safety(EHS) and waste management (WM). Community development (CD)costs areremediation activities of firms for the immediate community which are targeted at mitigating the environmental effects of the firms' operations on the community. These costsinclude funds granted to the community for developmental activities and projects financed by the firms for the benefits of the community. Employee health and safety (EHS) costs are firms' commitments to ensure the health and safety of employees. Employee health and safety (EHS) costs are sometimes consideredas non-environmental costs because employees are internal stakeholders but forenvironmental sensitive operations, employees are notably, the first recipients of hazardous impacts of the activities of firms such as direct contact with the hazards and or equipment.Some mine ground falls have resulted to high fatality counts or deformities on the employees. Therefore, any costs incurred to prevent or remedy the impacts on employees and to boost employees' health and safety fit as environmental costs. Waste management cost elaborately covers costs associated with engagements in appropriate waste disposal, waste recycling, investments into waste management, penalties costs of wrong waste disposal, production improvements towards better waste management etc.

Traditionally, firm performances havebeen measured predominantly as they affect shareholders benefits therebyignoring the interest of the other stakeholders. Contemporarily, this narrowed perspective has changed and given way to broader stakeholders' consideration. Consequently, firm performances measurement should include all facets of performance indicators to satisfy the wider stakeholder considerations brought to bearin firm's activities and expectations by environmental engagements, externalitiesand responsiveness. In line with this, Richard, Devinny, Yip and Johnson (2009) opined that firm's performance encompasses three specific areas ofshareholders return, financial and market performances. However, noteworthy is the fact that firm's market performance (which is measureable by share price, earnings per share, market value per share or market capitalization) is a function of and influenced by both financial performance and shareholders returns. This implies that firm's market performance is highly influenced by shareholders earning indices(dividend per share, dividend yield) and financial performance indices(Return on capital employed, Net profit margin, firm net worth etc). As a framework, this study relates proxies of financial, marketand shareholder performances to disaggregated environmental costs to ascertain the extent to which the latter affect the performances of firms in Sub Saharan Africa.In doing this, the study adopted return on capital employed, earnings per share andreturn on equity as measures of financial, market and shareholders performances respectively whiledisaggregated community development (CD), employee health and safety(EHS) and waste management costs (WM) arethe explanatory variables.

1.2 Statement of Problem

Prior empirical findings have inconclusively narrowed down the effect of environmental costs on firm performances resulting to controversies by variedschools of thoughts on the subject. According toHorvathova(2010), the inconclusive prior empirical findings of the relationship between environmental performance and firm performance have led to conflicting results due to the three competing schools of thoughts that exist recently in the field: that better environmental performance improves financial performance; the contrary that better performance does not improve financial performance and that which opine that there is no connection between environmental and financial performances.After empirical reviews, this study categorized the varied findings into negative, mixed, neutral and positive schools of thought andin addition, shortcomings and variances in the variables used, geographical and time coverage, settings, extent of analysisthereby requiring further improvements. The negative school of thought posits thatenvironmental cost imposes additional costs to firms and consequently a negative effect on firm performances(Walley and Whitehead, 1994; Palmer, Oates and Portey, 1995; Freedman and Patten, 2004; Hassel, Nilsson and Nyquist, 2005). Contrarily, contemporary studies have posited positive effectsuggesting that improved environmental performance enhances firm performance (Konar and Cohen, 2001; Al-Tuwaijri, Christensen and Hughes, 2004; Salama, 2005; Nakao, Nakano, Amano, Kokubu, Matsumura, and Gemba, 2007a). An inverse U-shape relationshipbetween environmental and firm performances is canvassed by the mixed school with prediction of positive effect at first,up to a level of environmental performance where economic benefits are maximized (Arafat, Warokka and Dewi, 2012) and , thereafter, nose-dive into a negative one(Lankoski, 2000; Wagner, 2001; Appiah, Du and Boamah,2017). The neutral school (Gonzalez-Benito and Gonzalez-Benito, 2005; Cormier and Magnan, 2007)posits that investment or otherwise in environmental responsibility will create a dual costs and market segments structures leading to higher prices for investing firms and lower prices for non investing firms and consequently cheap products and expensive products customers respectively (McWilliams and Siegel, 2001). However, central to this raging and nagging controversy with the attendant blur, unclear impression and research concerns onthe implication of environmental responsibility on firm performancesis the extreme perspectives that environmental costs negatively or positively affect firm performances. This forms a fundamental gap on which this study is anchored.Consequently, opinions have been strong and dominated between the classicalschool (proponents of negative effect) and the contemporary school (proponents of positive effect) on this aged dichotomythat thesehavegiven birth to postulations on the effect of environmental costs on firm performances. The classical proponent viewedall costs (including environmental costs) as reduction in profitswith consequential negative effect, therefore, thebasis of cost reduction strategies. For them, all manner of costs (including environmental costs) are inversely related to firm performance. This is the bedrock of traditional accounting and reporting that also anchorscost minimization strategiesand narrowed perspective on firm performances. Conversely, the contemporaries posit value relevance for environmental cost both in its propensities for increased revenue and proactive cost reduction; necessitatingtheoretical frameworks for environmental responsibility, incidental costs, sustainability and improved firm performances. In line with this, it is believed that access to resources and acceptance by host community can improvetremendously for responsible firms;that firms can enjoy peaceful co-existence with host communities resulting to annual undisrupted operations,production and revenue optimization;reduced annualfatalities on operating assets of responsible firms by hostile/restive host communitiesrobbing off to optimal operations at installed capacities, boost in revenue and reduction or elimination of avoidable hostility costs. Finally, environmental responsibility which results to environmental cost could necessitate operational efficiency and products improvement which engender greater firm performances. Therefore, the divergent opinions on the subject with shortcomings and variances ofprior empirical studies have necessitated a study to offer some improvements and toestablishthe effect of environmental costs on firm performances in Sub-Sahara African.

Obviously, literatures abound on the effect of environmental costs on firms' performances but regrettably most of them reviewed were carried out on specific country basis while the enlarged studiesfound in literature did not cover Sub Saharan Africa. For example, Vijfvinkel and Bouman, (2011)covered Dutch and Chinese firms; Cormier and Magnan (2007) studied French, German and Canadian firms whileGallego-Alvarez,Segura and Martínez-Ferrero

(2015)covered 89 firms in over eight Europeancountries such as USA, Japan, France.Regrettably and in spite of substantial evidencesof and the intensity of the consequences of environmental degradation in the regionsuch as theNiger Delta area of Nigeria;Ololosokwa in Seregeti Tanzania; Cabinda in Angola,the coastal areas of Ghana, this study, to the extent of the empirical reviews carried out, did not find any empirical study on this subject in the region.Therefore, to fill this gap istimely and critical and has necessitated this study. It is timely given the high rate of environmental degradation in Sub Saharan Africaand critical to ascertain the trend of response by firms to environmental degradation and the benefit of doing so for firms in the region.Generally, it has been the belief that cost has a reduction effect on firms' bottom-line and this is why firms engage in cost reduction strategies to ensure cost is reduced as much as possible. The philosophy of this study is to re-examine and modify this conventional belief and to adjust the perspectives of firms towards being more responsive to environmental degradation that come with their operations and activities.

Ample studies found on specific countries applied proxies of a given firm performance indicator at a time and ignored proxies ofother firm performance measurements.For example, in Nigeria, studies by Arong, Ezugwu and Egbere (2014) used only proxies of financial performance; Oti, Effiong and Tiesieh (2012), applied return on investment for manufacturing companies and Ngwakwe (2008), employed return on total assets (ROTA).In Ghana, Appiah, Du and Boamah (2017) used total cash cost and capital expenditure as proxies for firm financial performances while in South Africa, Nyirenda, Ngwakwe and Ambe (2013) employedReturn on Equityas proxy for shareholders return. Few improvements in this regard were recorded in studiesby Adediran and Alade (2013) which combined proxies of financial performance (ROCE, Net Profit Margin) and shareholders return (DPS, EPS).However, firm performance is a broad term that encompassesfinancial performance, market performance and shareholders returns (Richard, Devinney, Yip and Johnson, 2009). Unarguably, conclusions drawn from studies with single proxy or performance measurement can be successfully challenged on the grounds of being bothincomprehensive and unrepresentative.In order to address the shortcomings highlighted in prior studies reviewed, this study incorporated proxies of shareholders' returns,financial and market performances to make conclusions drawn from the study both comprehensive and representative.

Majority of prior studies reviewed applied environmental costs as an aggregate(Wingard ,2001; Wingard and Vorster ,2001; Appiah, Du and Boamah ,2017; Nyirenda, Ngwakwe and Ambe,2013). Environmental costs can be disaggregated into waste management, community development, employee health and safety, environmental penalties and fines. Applying disaggregates could be more revealing than using the cost as an aggregate. This is a gap addressed by this study using three disaggregates:employee health and safety (EHS),waste management (WM) and community development(CD). Thesevariables are justified as peculiar to high environmentally sensitive firmscovered by this study, are critical to the people and affordable by firms in the sub region.From our literature review, studies that applied these variables are scanty but the use of other disaggregates are prevalent. Wagner,VanPhu, Azomahou, and Wehrmeyer (2002)used energy and water usage; Wagner (2005)employed energy and water usage whileOberholzer and Prinsloo (2011)utilized ghg emission, water usage, and energy usage. However, explanatory variables in studies by Ngwakwe (2008) and Ifurueze, Etale and Bingilar (2013) appear closer to the ones for this study, but regrettably their studieswere restrictedto Nigeria. This study disaggregated environmental costs intoemployee health and safety (EHS), waste management (WM) and community development (CD) and these are applied in an expanded scope of Sub Saharan Africa.

1.3Objective of the Study

The broad objective of the study is to examine the effect of environmental costs on performances of quoted firms in Sub Saharan Africa. This objective is addressed at cross national and national levels with a view to determine whether there is a significant relative difference.

Specifically, the objectives are:

1. To determine the effect of waste management, community developmentand employee health and safety costs on Return on Capital Employedofquoted firms in Sub Saharan Africa.
2. To explore the effect of waste management, community developmentand employee health and safety cost on Earnings per Share of quoted firms in Sub Saharan Africa.
3. To ascertain the effect of waste management, community developmentand employee health and safety costs on Return on Equity of quoted firms in Sub Saharan Africa.
4. In each of the four countries studied, to evaluate the respective effect of waste management, community developmentand employee health and safety costs on Return on Capital Employed, Earnings per Share and Return on Equity of quoted firmsin Sub Saharan Africa.

1.4 Research Questions

In line with the specific objectives, the following research questions guided the study:

1. To what extent do waste management, community development and employee health and safety costs affect Return on Capital Employed of quoted firms in Sub Saharan Africa?
2. What is the degree of influence of waste management, community development and employee health and safety costs on Earnings per Share of quoted firms in Sub Saharan Africa?

3. What isthe extent of impactof waste management, community development and Employee Health and Safety costs on Return on Equity of quoted firms in Sub Saharan Africa?
4. In each of the four countries studied, what are the degrees of respective effects of waste management, community development and employee health and safety costs on Return on Capital Employed, Earnings per Share and Return on Equity of quoted firms?

1.5 Statement ofHypotheses

The following hypotheses were generated for this study:

Ho_1: Waste management, community development and employee health and safety costshave no significant effect on Return on Capital Employed ofquoted firms in Sub Saharan Africa.

Ho_2: Waste management, community development and employee health and safety costs exact no significant effect on Earnings per Share of quoted firms in Sub Saharan Africa.

Ho_3: Waste management, community development and employee health and safety costsdo not exact significant effect onReturn on Equity of quoted firms in Sub Saharan Africa.

Ho_4: In each of the four countries studied, waste management, community development and employee health and safety costs have nosignificant effect on Return on Capital Employed, Earnings per Share and Return on Equity of quoted firms inSub Saharan Africa.

1.6 Significance of the Study

This study is anticipated to enlarge theknowledge on the subject matter of environmental costs and firm performance and the findings will specifically benefit the following group of people once they access the study.

1. Government: If the government at national and sub-regional levels access this study, the findings will enable them know the extent of the impact of environmental responsibility on performance of firms and the recommendations will assist them in decisions and regulatory frameworks for sustainability which is the ultimate aim of indulging in environmental remediation.
2. Regulators and stakeholders inthe accounting profession: Access to this study will avail them of the regulatory and accounting issues that will provide requisite insight to formulation of regulatory enactmentsand accounting standards to ensure consistent improvement in compliance to environmental responsibility, accounting standards and disclosures.
3. Firms and their management: The study will enable firms and managers to know the extent of impact of environmental costs on performances of firms and engender improve environmental responsibility by firms for environmental sustainability.
4. The academia: This study will be a point of reference for prospective researchers and students on the effect of environmental responsibility on performances of firms.

1.7 Scope of the Study

The study examined the effect of environmental costs on performances of quoted firms in Sub Saharan Africa and for the period 2007 to 2016.This study started in 2017, therefore making it imperative and current that the scope should end in 2016 and retrospectively for ten years to include parts of the periods when most of the fundamental environmental regulatory enactments were effective in the countries covered by the study. For example, Environmental Standard and Regulatory Enforcement Agency (ESREA) Act, 2007 in Nigeria; AKOBEN, 2010 in Ghana, revised King Report on Corporate Governance, 2003 in South Africa and Environmental Management Act, 2004 in Tanzania. AKOBEN in Ghana is an environmental rating programme that has its roots in Ghana's tradition of Adinkra symbols and represents vigilance and wariness which are behaviours pertinent for environmental conservation.The study generalizes on the entire region by considering variables for the period 2007 to 2016 and the data used are restricted to waste management costs, community development costs and employees' health and safety costs as predictor variables while return on capital employed, earnings per share and return on equity are the dependent variables. The study is based on secondary data sourced from published annual reports, integrated annual reports and sustainability reports for the firms studied.

There are many variables of environmental costs such as environmental penalties and fines, emission control, pollutions and effluence, green house emission, carbon emission, energy consumption, water consumption, emission reduction,but this study is restricted to three aforementioned environmental costs variables. In the same vein, there are many variables of firm performances other than Return on Capital Employed, Earning per Share and Return on equity used by this studysuch as Net profit margin, price earning ratio, dividend per share but the study is restricted to the three aforementioned variables.

The study covered Nigeria, Ghana, South Africa and Tanzania which were randomly selected from a pool of forty-six countries in Sub-Saharan Africa and justified by ranking high in the 2015 World Bank US dollar GDP global rating(World Bank,2017)

1.8 Limitations of the Study

Very few firms studied did not disclosure all the variables: employee health and safety, community development and waste management in their annual, integrated annual and sustainability reports. However, the study obtained adequate data to carry out the analysis.

This study emanated from Nigeria therefore naira/koboare the presentation currencies necessitating translation of variable data from other currencies to the aforementioned Nigerian currencies. Translation was carried out using the closing rate as at 31st December for each of the years covered by the study.Obviously, not all firms have their accounting year closing on 31st December.Fewfirms closed as at 30th June butfor academic simplicity, the study applied across board exchange rates ruling as at 31st December for each of the years covered by the study. Historic exchange rates were obtained through on line exchange rate wizard (www.oando.com/currency/converter) andconfirmed using cross rates. Inevitably, the conversion and rates used introduced exchange gains and losses which cancelled out, translation comparative errors and complexities, all of which the researcher is optimistic that their effects are minimal on the result, findings and conclusion of the study.

Similarly, some firms covered in the study are multinational groupswhoseconsolidated annual reports are predominantly stated in dollars and pounds. Except for data in absolute values or percentages, other relevant groupdatawere first apportioned using bases considered by this study as fair and rightsuch asconfirmedmineral deposits per country (for exploration and mining firms), percentage of global expenditure per country, employee percentage per country. The bases considered as fair by this study are appliedto ascertain, first in dollar or pounds, the proportion of therelated group costs relevant to the affected countries; translated to functional currencies and subsequently to presentation currency(naira or kobo). The apportionment basesmay not be the fairest and the apportioned costs itself may vary slightly from the actual costs and these may affect the result of the study. Likewise,successive translations may result toerrors that may affect the result of the study.However, the study is confident that the apportionment, the bases and successive translation may not significantly affect the outcome of the study. Therefore, the study is limited to the extent of disclosures, exchange rate used, sources of exchange rate, translation and bases of apportionment.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Conceptual Framework

2.1.1 Concept of Environmental cost

The term environmental cost has been difficult to define. The difficulty lies in the fact that it incorporates the intangible and tangible costs; the challenge of ascertaining its burden and incidence and lastly because of the concept of externalities which are difficult to estimate or restrict to given geographical boundaries. Intangible costs are those with high level of difficulty in quantification and most times not immediately visible. In addition to the fact that the existence of the intangibles cannot be clearly noticed at inception, valuation of intangibles is usually difficult resulting to estimations thatare fraught with both complexities and subjectivity. The definition of environmental cost is made more difficult by its burden and incidence. For example, the cost of environmental degradation does not fall on those responsible for the degradation (that is, the firms whose operations result to degradation), but falls on thepresent and future generations of the society as a whole. Externality as well as its estimation difficulties further compound and complicate the definition of environmental costs.

Externalitiesare the measures of the implications of firm's operations on others outside it, and translate to what the society shares from the costs of firm's operations without equivalent benefit for those costs. This implies that environmental degradation is an externality whose costs are not recognized by the system of prices and, ultimately, external to the cost and demand functions of the organization that causes the degradation. Therefore, the present and future quantifications of externality are difficult in terms of time span, geographical delineation and the number of people the externality may catch up with. To define and quantify the environmental costs in situations like this become thorny especially as the limit of time and coverage of the externalities cannot be easily ascertained at any material point in time. In the light of this, Betianu (2005) therefore argued that the definition of environmental cost depends on utilization of information in a company and that environmental costs can include conventional costs (raw materials and energy costs with the environmental relevance), potentially hidden costs (costs which are captured by accounting system but then lose their identity in overheads), contingent costs (costs in a future time – contingent liabilities), and image and relationship costs.

Therefore, environmental costs, on a generic perspective, can be defined as the implicit and explicit consequences of human and industrial activities on the environment. It has become necessary to incorporate explicit and implicit implications of human and industrial activities on the environment in the definitions of environmental cost to accommodate non financial implications of actions or inactions of firms and to include the costs of things not done or costs that cannot be readily ascertained with respect to environmental degradation. For Beredugo (2014), environmental costs consist of environmental measures and environmental losses which include clean-up costs, costs of recycling materials or conserving energy, closure costs, capital expenditure and development expenditure. Heargued that these costs are incurred in preventing, reducing or repairing damages to the environment and conserving resources.

An enumeration of environmental costs includes but not limited to all those costs related directly or indirectly to environmental protection, such as: (a) depreciation and depletion of environmental assets belonging to the company; (b) input procurement for control, education or elimination of pollutants; (c) treatment of product residues; (d) disposal of pollutant residues; (e) recovery or repairing of contaminated areas; and (f) labour used in the activities of control, prevention or recovery of the environment (Beredugo, 2014).Environmental costscomprise both internal and external costs and relate to all costs incurred in relation to environmental damage and protection. Environmental protection costs,on the other hand, include costs for prevention, disposal, planning, control, shifting actions and damage repair that can occur at companies and affect governments or people (United Nations Division for Sustainable Development, 2001).

The U.S. Environmental Protection Agency (1996) defined environmental costs as those costs that have a direct financial impact on a company (internal costs), costs to individuals, society and the environment (external costs). Internal costs may include conventional costs, potentially hidden costs, contingent costs and image or relationship costs (US Environmental Protection Agency, 1996). To further elaborate this, Dragomir and Anghel-ilcu (2011) categorized theabove costs listing by the US Environmental Protection Agency into four:(i) conventional costs whichinclude costs of capital equipment, raw materials and supplies; (ii) hidden costs which refer to the results of assigning environmental costs to overhead pools or overlooking future and contingent costs; (iii) contingent costs which refer to environmental costs that are not certain to occur in the future but depend on uncertain future events such as the costs involved in remediating future spills and(iv) image and relationship costs which are less tangible costs that are incurred to affect subjective perceptions of management, customers, employees, communities, and regulators. External costs as defined by the U.S. Environmental Protection Agency include: (i) environmental degradation for which firms are not legally liable and (ii) adverse impact on human beings, their property and their welfare that cannot always be compensated for through legal systems(Dragomir and Anghel-ilcu, 2011).

According to Emeakponuzo and Udih (2014), environmental costs are those costs incurred in compliance with, or prevention of breach of environmental laws, regulations and company policy. Environmental costs may be explicit as usually with the cost dealt with by the conventional accounting. Environmental cost is implicit when what is not yet known is provided for to avert the consequential implications and cost of it happening. Drawing from the burden of environmental costs and the entity on which the burden impact, White, Savage and Brody (1995), categorized environmental costs into two major dimensions: those that directly impact the company's bottom line which is referred to as private costs and the other that encompasses the cost to individuals and society cost. Expounding on the scope of environmental costs, Emeakponuzo and Udih (2014) asserted that the true environmental costs to a firm can be far broader including costs of resources both those directly related to production and those involved in general business operations, waste treatment and disposal costs, the costs of poor environmental reputation, and the cost of paying an environmental risk premium. Extending the meaning of environmental costs, Wright and Noe (2006)averred that environmental losses are costs which bring no benefits to the business, such as, fines, penalties, compensation, and disposal losses relating to assets which have to be scrapped or abandoned because they damage the environment.

For Harrington (2000), environmental costs are the environmental damage costs to the environment and its users as a result of alternative competing use. In appraising the implications of environmental costs when neglected, Joshi (1997) posits that there is also the general concern that environmental cost reduces operating flexibility, slow productivity improvements in general.United Nations Division for Sustainable Development (2001) as cited in Betianu (2005) proposed a generic classification for the definition of environmental costs that distinguishes the types of costs as follows:

1. Costs related to all the efforts made by organizations to reduce the environmental effects of their activities, by using "end-of-pipe" measures and technologies;

2. Costs related to all activities made by organizations to prevent their environmental effects before the end of the production processes for example, by using cleaner technologies, or by establishing environmental management systems.
3. The third categorization is the types of cost that are defined on the idea that anything that does not enter the product produced by a company is a non-product output, such as wastes, waste water or lost energy and that costs associated to this non-product output are regarded as environmental costs. These include both the purchasing value of the materials and the production costs of producing the non-product output.

For the United Nations, environmental costs categorization is as follows:

1. Waste and emission treatment which includes depreciation for related equipment; maintenance and operating materials and services; related personnel; fees, taxes, charges; fines and penalties; insurance for environmental liabilities; provisions for cleanup costs, remediation;
2. Prevention and environmental management costs which includes external services for environmental management; personnel for general environmental management activities; research and development; extra expenditure for cleaner technologies; other environmental management costs;
3. Material purchase value of non-product output that includes raw materials; packaging; auxiliary materials; operating materials; energy; water;
4. Processing costs of non-product output which includes labour costs; energy cost (Betianu, 2005).

The International Federation of Accountants (2014) emphasized the grouping of environmental costs into:

1. Materials costs of product outputs which includes the purchase costs of natural resources such as water and other materials that are converted into products, by products and packaging;
2. Materials costs of non-product outputs to include the purchase (and sometimes processing) costs of energy, water and other materials that become non-product output (i.e., waste and emissions);
3. Waste and emission control costs which include costs for handling, treatment and disposal of waste and emissions; remediation and compensation costs related to environmental damage; and any control related regulatory compliance costs;
4. Prevention and other environmental management costs that include the costs of preventive environmental management activities such as cleaner production projects and also cost for other environmental management activities such as environmental planning and systems, environmental measurement, environmental communication and any other relevant activities;
5. Research and development costs to include the costs for research and development projects related to environmental issues;
6. Less tangible costs to include both internal and external costs related to less tangible issues, such as liability, future regulations, productivity, company image, stakeholder relations and externalities (Betianu, 2005).

2.1.2 Accounting for environmental costs

Schaltegger and Burritt (2000) defined environmental accounting as a sub-branch of accounting that includes the activities, methods and systems that record, analyse and disclose the environmental problems of a defined economic system, or the economic effects of an environmental activity. Environmental accounting is the identification and reporting of environment-specific costs, such as liability costs or waste disposal costs. Pramanik, Shil and

Das (2007), sees it as a system that attempts to make the best possible quantitative assessment (in terms of either monetary or physical units) of the costs and benefits to an enterprise due to the environmental preservation activities that it undertakes. Uwuigbe (2007) in Omodero and Ihendinihu (2016) expanded the definition of environmental accounting to a management tool which can be used for a variety of purposes, such as improving environmental performance, controlling costs, investing in cleaner technologies, developing greener processes and products, and taking informed decisions relating to product mix, product retention, and product pricing. In a more generic perspective, environmental accounting involves accounting for any costs and benefits incidental to changes to a firm's products or processes which translate to change in environmental impacts.

Though accounting is central in environmental accounting, it draws data from outside accounting profession and provides information to other fields of human endeavour. Environmental accounting therefore tracks the use of environmental resource which includes resource depletion and environmental degradation over a given reporting period, which is usually a year. Bassey, Sunday and Okon (2013) concluded that accounting has an instrumental role in disclosing environmental responsibility for different entities whether industrial, commercial, service and at all levels whether micro or macro. Environmental accounting helps to provide some measurement for environmental performances which is tied to the responsiveness of companies to the immediate environment and inflictions on the environment which affects the ability of the environment to render improved or equivalent support and services for the next or future generation.According to Bala and Yusuf (2003), accounting became concerned achieving new goals such as measuring and evaluating potential or actual environmental impacts of projects and organisation; these new goals are of great importance as they enable many users to take different developmental decisions that are economically sound. For Schaltegger and Burritt (2000), accounting for environment helps in accurate assessment of costs and benefits of environmental preservation measures of companies. Environmental accounting embodies a type of research and practice, which focuses on the effect the organization, has on the natural environment and the effect the environment has on the organisation, all of which may be interpreted and expressed in terms of financial and physical units (Schaltegger and Burritt, 2010). Environmental costs are central to environmental accounting and reporting. Uwuigbe and Olayinka (2011) described environmental costs as impacts incurred by society, an organisation or individual resulting from entities that affect environmental quality.

According to International Federation of Accountants (2005), environmental accounting (EA) is a broad term used in a number of different contexts, such as:

1. Assessment and disclosure of environment-related financial information in the context of financial accounting and reporting;
2. Assessment and use of environment-related physical and monetary information in the context of Environmental Management Accounting (EMA);
3. Estimation of external environmental impacts and costs, often referred to as Full Cost Accounting (FCA);
4. Accounting for stocks and flows of natural resources in both physical and monetary terms, that is, Natural Resource Accounting (NRA);
5. Aggregation and reporting of organization-level accounting information, natural resource accounting information and other information for national accounting purposes; and
6. Consideration of environment-related physical and monetary information in the broader context of sustainability accounting.

Until recently the awareness on environmental costs andaccounting became pronounced, traditional accounting focused on economic transactions and neglected social and environmental transactions resulting to a narrowed business perspective by management, shareholders and the larger stakeholders. Consequently, it could be viewed that traditional accounting provided less information to stakeholders on the activities of firmsand also less comprehensive one to the shareholders since it excluded environmental information and others social matters. For Schaltegger and Burritt (2000), the exclusion of environmental transactions is on the premise that natural resources are not owned by the company and as such are not featured in the balance sheet. However and for whatever reason that gave rise to the exclusion of environment from corporate accounts and reports, Ogbuagu (2006) cautioned that currently there are wide acceptance of broadened and diversified perspective on business considerations and activities, which in concept and practice lie beyond traditional or classical economic objective and therefore a contemporary corporate organisation should be normally mindful of the entire social milieu of its enterprise including attending to the multifaceted social responsibilities.

Unarguably, pressures placed on the environment by man and his business activities have directly or indirectly resulted to increasing environmental awareness on the parts of firms and the stakeholders which include host communities and government. At the front burner of the awareness and consciousness of the environment is the need to account for the enormity of the consequences of the interactions between all spheres of humanity and the environment. Confirming the increased awareness, Adediran and Alade (2013) stated that in the recent times there has been an increased awareness of the interactions between firms and environment in which they operate and that this enlightenment has been sharpened by concerns about resources depletion, resources scarcity, environmental degradation and the activities of these firms that lead to the depletion of the ozone layer thereby causing an imbalance in the environmental system. Elliott and Elliott (2006) affirmed that companies are realizing that it is there corporate responsibility to achieve sustainable development whereby they meet the needs of the present without compromising the ability of the future generations to meet their own needs.

Though literature has provided evidences on the consensus that the pathway has been identified, the destination is still far. It is in the light of this that Elliott and Elliott (op cit) cautioned that there is still a long way to go considering the recognition by the European Union (EU) in her sixth action programme tagged: ‘Environment 2010, Our Future, Our Choice’, that effective steps have not been taken by all members states to implement environmental directives and that there is still weak ownership of environmental objectives by stakeholders. The EU programme had focused on climate change, health and environment, nature and biodiversity and natural resource management with emphasis on the need for all stakeholders to be involved in achieving more environmental friendly forms of production, consumption and integration into all forms of the people’s life.From accounting and assets recognition perspective, the natural environment can be seen as an embodiment of natural resources that represents a stock of natural capital which in the conventional accounting can be likened to stock of assets majorly disclosure in the Balance Sheet of firms (now, Statement of Financial Position, in the International Financial Reporting Standard). On the other hand, the use of the natural resources for human productive activities translates to depletion of the resources (stock of natural capital). Depletion of the stock of natural resources is equivalent to stock depletion which is a charge to the cost of goods sold (COGS) in the Profit and Loss Account (now, Statement of Comprehensive Income, in the International Financial Reporting Standard).

It therefore follows that the totality of transactions covering the use of the natural resources, associated costs on the environment for so doing, consequential effects in terms of resources depletion and incidental wastes,impact of the waste on the environment, products emanating from there, etc. can be treated and accounted for in the same way other kinds of capital/assets are accounted for such as accounting for Property, Plant and Equipment (PPE), stock/inventory, accounting for expenses/costs etc.Environmental accounting therefore tracks the environmental costs incidental to the use of environmental resources that includes resource depletion and environmental degradation over a given reporting period, usually a year. Environmental costs and environmental accounting provide some measurements for environmental performances which centre on the responsiveness of companies to their immediate environment and remediation of the environment of damages caused by their business operations that affect the ability of the environment to render equivalent support and services to the next or future generation. Schaltegger and Burritt (2000), confirmed that accounting for environment helps in accurate assessment of costs and benefits of environmental preservation measures of companies. Environmental accounting embodies a type of research and practice, which focuses on the effect the organization has on the natural environment and the effects the environment has on the organization, all of which may be interpreted and expressed in terms of financial and physical units (Schaltegger and Burritt, 2010). Environmental accounting provides a common framework for organisations to identify and account for past, present and future environmental costs to support managerial decision making, control and public disclosure (KPMG, 2005).

2.1.3 Environmental Management Accounting(EMA)

Some consciousnesses have evolved to ensure that firms take environmental matters more seriously. Environmental Management Accounting (EMA) is a designated area of accounting for firms to internally record and process environmental costs towards producing environmental reports that will meet firms' decisions regarding environmental degradation as well as proactive measure to forestall it. This is separate from Financial Accounting and Management Accounting even though Environmental Management Accountingtremendously draws from both and contributes to them too.Judging from the difficulty of assigning a universally accepted definition for environmental costs, Environmental Management Accounting also has no single and universally accepted definition. The International Federation of Accountants (2005) in her Statement of Management Accounting Concepts defined Environmental Management Accounting as the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some firms, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessments, and strategic planning for environmental management. The scope of Environment Management Accounting therefore begins from the scope of environmental costs because the former flows to catch up, analyse, present and report the latter. Environmental costs varies from disposal costs, to investment costs on environmental remediation and other externality costs which are usually outside the reach of the firm and cannot be easily restricted to time.

Environmental Management Accounting is broadly defined to be the identification, collection, analysis and use of two types of information for internal decision making: (i) physical information on the use, flow and destinies of energy, water and materials (including wastes) and (ii) monetary information on environment-related costs, earnings and savings

(United Nation Expert Working Group on Environmental Management Accounting , 2001).The imperative of Environmental Management Accounting to a great extent is on the observed shortcomings of the conventional accounting which lumps environmental costs together in general overheads and as such suffocatesthe clarity of transactions and necessary management decisions on environmental actions. In firms' financial accounting structures, environmental costs are indistinctivelyclassified as such in the charts of accounts resulting to generic and wrong classifications thereby leading to loss of identity of the cost in overheads that translate to poor decisions on environmental matters. Consequently, access to financial information by environmental managers and experts on environmental costs is also restricted and when made available, there is difficulty of separating environmental costs from the general overheads.

International Federation of Accountants (2005) posits that Environmental management accounting represents a combined approach which provides for the transition of data from financial accounting and cost accounting to increase material efficiency, reduced environmental impact and risk and reduced cost of environmental protection. Environmental Management Accounting (EMA) provides the following application fields for the use of Environmental Management Accounting data (1)assessment of annual environmental costs/expenditure (2) product pricing (3)budgeting(4) investment appraisal, calculating investment options (5) calculating costs, savings and benefits of environmental projects (6) design and implementation of environmental performance evaluation, indicators and benchmarking (7) setting quantified performance targets(8) cleaner production, pollution prevention, supply chain management and design for environment projects (9) external disclosure of environmental expenditures, investments and liabilities(10) external environmental or sustainability reporting (11) other reporting of environmental data to statistical agencies and local authorities (International Federation of Accountants, 2002).

2.1.4Concept of Environmental Risk and Environmental Responsibility

The entire society is at risk; Sub Saharan Africa is at a greater risk. The risk includes that of environmental degradation which is caused by man in his quest for existence,ultimate present or future incidence and effect of the risk on human generation. This risk by all measure is enormous. The time frame of the risk includes those obviously facing the present generation that occupy the environment and those that affect the future generation that will depend on the environment for equivalent support services (which is, the sustainability risk).

Sustainability risk is the tendency that the environment cannot adequately sustain the future generations as a result of present degradation.Pelser and Van Rensburg (1997) as cited and translated in Wingard (2001) captured this risk from the perspective of ecological crisis and argued that the related problems of a growing world population, depletion of natural resources and pollution have led to an ecological crisis that is endangering natural systems of which humans are part. The historical foundation of sustainability risk dates back to the evolution of man but the contemporary environmentalists attribute this anomaly to the westernization culture which through the instrumentality of colonization has swept over the whole world. Similar to the westernization proponent of sustainability risk, Enderle (1997) averred that many contemporary environmentalists have accused the Judeo-Christian tradition of containing the historical roots of our ecological crisis.Pelser and Van Rensburg (1997) op cit therefore concluded that the western view of life can be traced back to Judeo-Christian times and is founded in the assumptions that humans have the obligation to master and manipulate nature to their benefit and that the natural environment has unlimited possibilities for exploitation.

Environmental responsibility is an aspect of corporate social responsibility and measures the extent to which a firm indulge in wholesome or unwholesome practices to protect the environment or otherwise.Wingard(2001) posits that corporate social responsibility is the obligation of decision makers to take actions which protect and improve the environment as a whole, along with their own interests. It is the obligation of both business and society (stakeholders) to take proper legal, moral-ethical, and philanthropic actions. It has been widely argued that the environment and employees are facets of social responsibility and as such environmental responsibility can be defined as the social responsibility of enterprises which encompasses the attitude of enterprises to do business in accordance with the ethical and moral standards acceptable to society. Social responsibility is the moral but fast becoming statutory duty of both business and society (stakeholders) to take proper legal, moral-ethical, and philanthropic actions that will protect and improve the welfare of both society and business as a whole(Wingard, 2001). These responsibilities must be accomplished by all parties within an economic framework and capabilities which are the bedrock for the accomplishment of the responsibilities.Judging from the above and given that environmental responsibility draws from corporate social responsibility, a firm is considered environmentally responsible when it first considers the legal, ethical, moral actions in its operations and business undertakings with the ultimate objective of ensuring that the environment is not left worse-off that it fails to sustain the present and future generations. Wingard (2001) therefore considers environmental responsibility as manifesting itself in a strategy that the management of a firm decides to follow relating to the level of environmental performance it wishes to attain; the levels ranging from mere compliance with legal requirements to following sustainable development principles. Though environmental responsibility is a strategy, planning the strategy for a firm’s environment-related activities is a function of not only where the company is at present but also where the company intends to be in terms of its environmental performance.

2.1.5 Concepts of Eco-Efficiency and Sustainability

Eco-efficiency relates to the most efficient use of resources with the least possible damage to the environment, e.g by recycling materials in products, use of raw materials and of energy to convert the raw materials (Wingard, 2001). At the heart of eco-efficiency and environmental responsibility is the concept of sustainability. After taking due considerations to operate eco-efficiently and environmentally responsible, further and conscious appraisalmust be carried out to ascertain that what has been done in terms of eco-efficiency and environmental responsibility translate to good results in terms of assurances that future generations receive equivalent benefit and due share from the same environment.

Sustainability is more to development than growth in the sense of realizing or returning the potential inherent in the eco system which is the subject of considerationunlike growth that relates more to physical increase. In a well thought view of a renowned economist,DesJardins (1998) as cited in Wingard and Vorster (2001), to growmeans 'to increase naturally in size by the addition of material through assimilation or accretion'. He further stressed that todevelopmeans 'to expand or realize the potentialities of; to bring gradually to a fuller, or better state. When something grows it gets bigger but when something develops it gets different.

Therefore, the earth's ecosystem develops (evolves), but it does not grow. Its subsystem, the economy, must eventually stop growing, but can continue to develop. The term sustainable development therefore makes sense for the economy only if it is understood as development without growth. The widely accepted general standard of environmental soundness is sustainability and this was defined by the United Nations Division for Sustainable Development (2001) as to meet the needs of the present without compromising the ability of the future generations to meet their own needs. In their views, corporate environmental responsibility should be committed to sustainable development by consuming less natural resources and burdening the environment less with effluents.

2.1.6Costs and Benefits of Environmental Responsibility

Environmental responsibility is not without some costs and benefits. The benefits are the gains derived or derivable by firms as a result of being responsive to environmental issues and for ranking high in environmental performances. The benefits are the opportunity cost of actions taken to remedy the environment and in being responsible. Benefits can be explicit and/or implicit, monetary and/or non monetary, short run and in most cases long run.Environmental performance may affect revenues (Earnhart and Lizal, 2010). Benefits from environmental responsiveness may come in various ways and varied channels. For example, perception of customers may change favorably for environmentally responsible firms and this may snowball into increase patronage for products offered for sale irrespective of high price disparity when compared with products of non complying firms and may result to positive revenue relationship. Justifiably, this may be anchored on the willingness of the customers to pay or buymore of environmentally friendly products (green products). Thus, a firm is able to increase its revenues by reducing its environmental impact in order to sell green products.Environmental responsibility may be an investment strategy targeted for long run benefit of the firm. Firms may adopt greater investment in the environment as strategy for better and visible placement in a complicated and crowded market. Ambec, Stefan and Lanoie (2008) confirmed this and identified environmental responsibility as a differentiation strategy to exploit niches in environmentally conscious market segments.

Environmental investment strategy may not be an automatic guarantee forrevenue improvement if other crucial factors are isolated. The extent to which a niche can be carved by firms' environmental investment strategic decision; the extent to which the niche can result to the expected positiveinfluence or relationship withimprove revenue, is a function of other factors which if isolated may constrain the expected result. The factors include (1)the level of awareness of the market of the benefits of green products (2) customers' financial standings which provide sound purchasing powers, capacities and flexible preferences for improved products when faced with choice of unimproved products irrespective of high price differential (3) market efficiency which has to do with free availabilityof valid market information as well as access to such information by the market (4)the overall literacy of the market or any targeted segment of the market (5)identifying the weak links of other products and ability to capitalizing on the weak links to convince the market that the green products are better.Firm revenue may increase as a result of environmentally friendly technology that helps to establish an industry standard, reduce production costs and facilitate greater production. Such technology places firms that adopted them asearly users andmarket leaders and there are competitive advantages for firms operating both as early user and market leader. Though early user and market leader status endow firms with tremendouscompetitive advantages and benefits, it is a function of the market patronage and its ability to sustain such position. This line should be treaded with caution since decline in customer patronage shortly after introduction of technology can be fatal thereby leaving out the firm with unrecoverable huge costsof the technological investment.Though the above scenario is usually rare, firms are meticulous in investment strategies to be sure that the technology will yield positive result. Early bird firms may enjoy improved production associated with the new technology as well as cost reduction which such innovations come with. A firm may be able to increase its revenues by using an environmentally friendly technology to establish an industry standard; this establishment provides the firm with an early mover advantage and status as an industry leader (Hart and Ahuja, 1996; Klassen and McLaughlin, 1996; Porter and Kramper, 2006).

Outside the firms' traditional market, early bird status associated with deployment of environmental friendly technology allows them access to other markets.Ambec, Stefan and Lanoie (2008) argued that better environmental performance may facilitate access to certain markets, such as public contracts which may involve the third-party certification of particular environmentally friendly management practices (for example, ISO 14001). Public perception is a factor in attracting markets outside the routine operational marketas well as in resource access and control. Firm's revenue has tendencies to grow with improved public perceptions which precipitate better legitimacy. Improved legitimacy is directly or positively related to enhanced access to natural resources in the immediate community as well as hostile-free operations.Environmental responsible firms stand out as environmentally friendly and are endeared to the host communities. Legitimacy theory has found some relevance in the area of benefits of firms' environmental responsibility. In oil host communities, legitimacy is much deepened by being environmentally responsible culminating to easy or unhindered access by firms to resources for production.A reverse has always been the case where firms are environmentally irresponsible and unfriendly. In Nigeria for example, just like itmay happen in other Sub Sahara African countries, hostilities to Shell Petroleum and other oil firms in Ogoni land and other oil-rich communities have been associated with environmental irresponsibility. Specifically, Ogoni people demanded oil spill clean up from oil firms especially Shell Petroleum and this was neglected for many years resulting to hostilities and threats to oil installations, with consequences on the firms, environment and host communities. It follows therefore thatmanaging resources well can benefit the environment, the community and thecorporation (Wingard, 2001).

There are more benefits accruable to firms for better environmental performances. Wang and Lin (2007) identified some environmental opportunities which have some tendencies to be beneficial to the overall financial performance of a corporation as follows: pollution prevention, resource conservation, reduction of capital project and process changes mistakes, eliminating accidental releases, eliminating fines and penalties, reducing site remediation reserves, disposing of previously unsalable properties. According to Wingard and Vorster(2001), other benefits include improved production yields, improved product quality, reduced operating costs and improved profitability.For Wingard(2001), the benefits of environmental responsibility are in forms of decrease in cost of operations; enhanced revenues; decrease in cost of capital and decrease in regulatory risks. Summarily Wingard (2001) posits that environmental responsibility has the following benefits (1) a decrease in cost of operations, e.g. by using recycled items as inputs decreasing excess packaging(2) enhanced revenues, e.g. able to attract a growing segment of the world population that is demanding environmentally friendly products(3) a decrease in cost of capital, e.g. a more environmentally responsible firm will receive a higher credit rating (4) a decrease in regulatory risks, e.g. an environmentally responsible company will adapt easy to new legislation while competitors will have to bear the additional costs of complying.

In terms of costs of environmental responsibility, the implication is a two-way thing: one to the positive and the other to the negative. Negative cost implication relates to the additional cost imposed on the firms by improved environmental performance while the positive cost implication is the cost reduction to the firm as a result of improved environmental performance. Whichever side it swings, these costs are the implicit and/or explicit, monetary and/or non monetary, long run and, in most cases, short run implications of being environmentally responsible or otherwise and this can either be in the form of cost incurrence or cost reduction.

According to Wingard (2001),environmentally responsible firm exceeds regulatory compliance. This has a specific cost implication on the firm which may not apply for non complying firms in the same market. Therefore, environmental responsibility can result to a firm pricing itself out of business by incurring huge environmental costs that cannot be recovered from her product prices when compared with prices from firms that do not incur such huge investment or that sparsely comply with the environmental standards. This is usually the case in societies where compliance is poor or absent and where not all firms are keen or coerced to comply. This leaves out few responsive firms that operate in the same unregimented market with huge initial cost that soar their current prices above what is obtainable in the market thereby resulting to poor sales revenue and negative effect on the bottom line. The situation is complicated in non segmented markets, whereproducts are not well differentiated between environmentally complying and non complying firms. Rational decisions of customers for cheaper products associated with poor purchasing powers and domestic financial pressures will always result to lesser considerations for improved products and preference for cheap products. Firms with huge environmental investment that translate to higher prices may befrustrated.

One of the biggest risks in environmental investment strategy is the frequency of technological change which is associated with high probability of more efficient and/or cheaper technology coming up shortly after the firm undertakes a huge cash outlay for technological equipment. This risk is heightened by weak regulation and standardization which complicate the tendency to recover the costs within a shorter time frame while allowing competitors that chose only to comply (or not to comply) to produce with old technology and cheaper cost.

On the other hand, environmental responsibility can be a lot more cost saving. According to Earnhart and Lizal(2010) when firms invest in more efficient production processes, frequently these new technologies are also environmentally friendly; the new production processes require less energy, generate less waste, demand fewer toxic inputs, etc. Better environmental performance may lower the costs of regulatory scrutiny, such as lost productivity due to inspections(Earnhart and Lizal, 2010). Similarly, it should lower the costs associated with regulatory sanctions, third-party lawsuits, and emission charges (Klassen and McLaughlin, 1996). Likewise to regulatory scrutiny, better environmental performance may lower the costs imposed by local community pressure, e.g., increased zoning restrictions (Konar and Cohen, 2001; Earnhart, 2004). Related to regulatory sanctions and third-party lawsuits, better environmental performance may reduce financing costs because lenders associate lower financial risk with better environmental management (Moneva and Ortas, 2010).Obstinately, there are cases of results showing that better environmental performance may not lower cost. For example, new technologies that are environmental friendly may result to increased and sustained cost of training of staff to effectively apply them, learning curve costs associated with using technologies for the very first time as well as cost attributable to failures of the technologies to march in the local applications.This means that application as well as production costs may increase with new technologies.Bosch, Jean, Woodrow, and Lee (1998) opined that in contrast to these enhancements to cost minimization, complex pollution-reducing devices and processes may reduce overall productive efficiency, thus, raising production costs. This effect is causal and consistent with the traditional perspective on pollution control, which views efforts to reduce emissions, whether with end-of-pipe treatment or pollution prevention methods, as a real drain on firm resources (Filbeck and Gorman, 2004).

However, environmental performance may give double negative blows to both revenue and cost by reducing revenue and increasing cost. Horvathova (2010),confirmed that from a more general perspective, investments in environmentally responsible behavior may drag down financial performance because resources are being committed to an ostensibly non-productive use. More specifically, environmentally responsible business decisions may limit a firm's strategic alternatives, thus, driving down revenues and driving up costs (Earnhart and Lizal, 2010). For example, a firm may opt out from certain decisions such aspursuing certain product lines or avoid plant relocations and investment opportunities in certain locations.Interestingly, the relationship between environmental performance and cost has been causal in nature suggesting a future outcome of the present environmental actions and costs. The direction of the causality may be to the left or to the right in terms of cost, revenue and profitability. That is to say that the consequent of the causality as to the final effect of the environmental performance and the cost incurred may be of subsequent cost reduction, increased revenue or lack of those. Postulations abound on the direction to which environmental responsibility takes firms performances to, either to better or worse-off situations.This forms the basis of the theoretical dichotomy between the classical and contemporary schools of thought. The dichotomy which the subsequent sub section of this study is dedicated to theoretically explain forms the critical gap, the resolution of which necessitates this empirical study aimed at ascertaining the direction to which environmental costs relate with firm financial performances in Sub Saharan Africa.

2.1.7Postulations on theNexus of Environmental and Firm Performances

Scholars are divided in their opinions and postulations as to the directions which environmental performance (encapsulated in firms' environmental responsibility) drive firm performances. The classical school of thought has persistently classified environmental performance as additional cost on the firm whose bottom line implication is a reduction in firm's profitability as well as in other performance measures. Investments in environmental friendly technologies are either seen as not necessary, incurrence of additional heavy cost or as having no accruable benefit associated with it. Poor compliance to environmental standards which globally is yet evolving from voluntary compliance to quasi- mandatory compliance is an offshoot of the classical thought that perceives environmental investment and cost outlay as not compelling and as suchnot key to the firms' business objective. It follows therefore that host communities and environmental stakeholders who are affected by firms' operations and associated degradation are neglected.Consequently, environmental stakeholders and host communities are rarely considered as important stakeholders in business decisions resulting to neglect of the consequences of business operations and the externalities caused to the environment and host communities. Scholars have followed this school to canvass for lack of positive connectivity between environmental performance and firm performance. The traditional school of thought views environmental expenditures, whether on end-of-pipe treatment or pollution prevention efforts, as a drain on firms' resources. Filbeck and Gorman (2004) argued that in contrast to these enhancements to cost minimization, complex pollution-reducing devices and processes may reduce overall productive efficiency thus, raising production costs. From a generic perspective,this schoolargued that investments in environmentally responsible behavior may drag down financial performance because resources are being committed to what may appear as an ostensibly non-productive use. Specifically, environmentally responsible business decisions may limit a firm's strategic alternatives, thus, driving down revenues and driving up costs. For example, a firm may decide not to pursue certain product lines or avoid plant relocations and investment opportunities in certain locations.

On the other hand, the contemporary school has a divergent view point anchored on value relevance of environmental responsibility to firms' performance. The school constituting mainly of environmentalists sees environmental performance as key to business as well as its successes. Accordingly, it becomes part of the critical business decision and strategiesto indulge in environmentally friendly investments that have positive trade off between benefits and costs of such investments. Many scholars have followed this thought with strong indications that environmental performances have negative impact on cost, positive impact on revenue and firms' bottom line. Contemporary scholars have indicated strong direct and positive links between environmental performance and performance of firms. In this line, Wingard (2001) posited that a major costs faced by most manufacturers is waste disposal and especially hazardous waste disposal and further asserted that an environmentally responsible firm may be able to reduce these costs along with the liability associated with them. It seems rational and reasonable to believe that it would cost less to prevent pollution rather than clean up after it (Wingard, 2001). Neely(2015) argued thata total quality environmental management program can help organizations comply with increasingly stringent environmental regulations; reduce manufacturing costs by lowering the tangible costs of chemical disposal, waste treatment and licensing and laboratory fees.

Opinions have it that manufacturer who demonstrates efforts to minimize the negative environmental impacts of their products and processes, recycle post-consumer waste, and establish environmental management systems are poised to expand their markets or displace competitors that fail to promote strong environmental performance. Environmentally responsible firm may have the ability to attract extremely competent and capable board members which conceivably could enhance the corporation's image and profitability. For Wingard (2001), an environmentally responsible firm is able to market itself and its products to attract a growing segment of the world population which is demanding more environmentally friendly manufacturing, packaging and eventual recyclability of products. Environmentally responsible behavior may improve a firm's perception and overall reputation among customers while better environmental performance may reduce financing costs because lenders associate lower financial risk with better environmental management.

Fundamentally, risk management is very crucial to business survival. Environmental performance which results to environmental cost may be a risk reduction strategy for firms that indulge in it. Environmentally responsible firm need not be concerned about a riskof non-compliance resulting in fines, negative publicity, a subsequent costly public relations campaign and expensive litigation. Wingard (2001) confirmed that the potentially high cost of not complying with environmental legislation includes direct monetary losses due to fines and lost production as well as adverse market impact due to negative public perception. This high cost of non-compliance compels firms to actively cultivate a green image based on ecologically sound production practices.Therefore, the practical resolution of the theoretical dichotomy between the classical and contemporary schools does not lie in the quantum of research studies or scholarly references that support either side but specifically on the outcome of any specific research into the interplay between environmental performance and firm performance applicable to any population or selected sample for such study. This forms the objective of this study for quoted firms in Sub Saharan Africa.

2.1.8The Revolution of Traditional Accounting by Environmental Accounting

Unarguably, traditional accounting has for many decades developed into axiomatic definitions, principles and concepts on the fulcrum of which both the theories and practices of traditional accounting have all revolved. The entity principle has remained undisputedly restricted to the happenings in a typical organisation and specifically delineated to events and transactions of such reporting organisation called the entity. According to Gray, Owen and Adams (2005), accounting provides a very selective yet powerful symbolic representation of the corporate entity. The language of 'assets', 'liabilities', 'costs' and 'profits' define the operational and ontological limits of the enterprise and provide a technique which configures the organizational autonomy and sensitivity to environmental disturbances(Gray, Owen and Adams, 2005).

Logically, the entity principle is responsible for the domestication of costs, assets, liabilities and profits to a given entity and this logic is now being challenged by environmental accountingboth in practical definitions and applicability. The contemporary accountants who are the champions of environmental accounting have come to the conclusion that numerous costs are omitted out there (outside the operational and ontological limits of the entity) which are attributable to the impact of the entity's operations and activities on the environment. These costs which are derived from theexternalities and implications of the externalities span beyond the present generation and go beyond the entity's immediate operational scope. The contemporary accountants have held divergent views from the classical accountants with the understanding of the latter for entity costs limited to those costs reasonably and justifiably incurred for/by the entity to whom they are responsible for. It is, however, becoming compelling that entity's considerations of what constitutes reasonable and justified costs will have to extend to externalities which the society has got to suffer either now or later.

Specifically, traditional accounting had perceived costs from 'private-cost' perspective which is not only narrow but contrary to the holistic perspective which environmental accounting has brought to bearand on the basis of which costs include private, public and externalities. In the views of Fleischman and Schuele (2006), the entire concept of an accounting transaction is bound to the notion of 'private cost'; with result that many social costs in the form of polluted air, water and soil, and the large chunk of ecological damage are not recognized by the accounting process.Therefore, it follows that from the expanded scope and definitional realignment of the traditional accounting which environmental accounting has brought to bear, revolution is a better term to describe what is going on in the field of accountancy. In the views of Wingard (2001), the concept of environmental accounting with its numerous complexities is leading to a revolution in the accounting field. The boundaries of accounting are being pushed and challenged to the extent thatit will be necessary to redefine accounting concepts, rules, conventions and methodology in order to permit accounting to internalize all external environmental costs. Gray (2000), identified three phases of development in accounting thought and practice that are very possible: (1) development which clearly falls within conventional accounting (2) the evolutionary process- within which accounting begins to recognize environmental considerations which will produce changes in the accounting itself and (3) new developments because conventional accounting cannot really be fully responsive to the change in culture that comes with greater environmental sensitivity. Conclusively, Wingard (2001) averred that genuine environmentally sensitive business and environmentally sensitive accounting will require far more fundamental changes and that the very framework of conventional accounting will have to be rebuilt from scratch. It is obvious therefore that environmental accounting is revolutionary in concept and practice having raised queries to most of the fundamental concepts and principles on the basis of which the traditional accounting was founded as well as the definitional foundation base of accounting.

Reviewing accounting definition critically, it can be averred that the definitionalfoundation of accounting is gravely affected by this revolution. The committee on terminology of the American Institute of Public Accountants in 1953 as cited in Belkaoui and Jones (2006) defined accounting as the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the result thereof. This definition fundamentally narrowed accounting down to capturing, summarizing and analysing transactions that have taken place and thereby making accounting more of post mortem in terms of transactions and events that have already taken place. Environmental accounting goes beyond post mortem to include transactions and events that are yet to take place as well as about the concern of the future generations.Considering the obvious implication of environmental accounting to the universally accepted definition of accounting, it is convincingly clear that the basic accounting concepts can also be modified to reflect the unique interests of environmental accounting stakeholders. A redefinition of accountingis therefore imperative. In line with this, Accounting can be defined as a measure of the resources consumed in producing goods and services for trade and for promoting public welfare, as well as the resources preserved, and wealth created for future use, in accordance with conventions mutually agreed upon by the stewards of these resources and the stakeholders to whom they are accountable(Wingard, 2001). For Dragomir and Anghel-ilcu (2011), environmental accounting has been used to describe attempts to determine environmental costs and benefits to the organization; the main focus being internal, including the costing of energy use and waste disposal, and quantifying the benefits from the sale of environmentally friendly products or from environmental subsidies.

According to Wingard(2001),external impacts on the natural environment relate to the organization’s use of resources and generation of emissions and waste and these impacts can be measured; for example in terms of tones of carbon dioxide emitted and also in monetary terms, such as through the costs for acquiring certificates for greenhouse gas emissions. Thus environmental accounting is usually involved in several areas, such as energy accounting; waste accounting; environmental criteria in capital expenditures; target setting for efficiency improvements. Dragomir (2008) confirmed that environmental accounting system is part of a larger corporate environmental policy, which aims to prevent and reduce environmental impact, through life-cycle analysis, integration of environmental values into the supply chain, eco-design of products and services and environmental monitoring and auditing. Wingard (2001) further defined environmental accounting as a set of practices within firms that leads to a better understanding and management of environmental issues and their associated costs.However, Wingard and Vorster (2001), slightly varied that environmental accounting need not require a major overhaul of existing accounting and information systems. In their views, as environmental costs are pooled in overheads and later allocated, crucial links are lost between environmental costs and the responsible products, processes and underlying activities.

Further on the revolutionary implication of environmental accounting on the entire field of accounting is the thought that the rational for annual reports will no longer be for shareholders' stewardship and creditors' evaluation but should extend to the interest of stakeholders in the present generation as well as the concerns of future generation. Though still retained in traditional accounting, stakeholders' concepts may need to be expanded both in scope and time given that it should include the entire society of present and future generations. Stakeholders therefore include but not limited to investors, employees, lenders, suppliers, customers, government, government agencies, the public, local communities, regulators/policy makers, opinion-formers (journalists, academics, and pressure groups), shareholders, etc. Researchers in environmental accounting stakeholders have given greater considerations to the public and local communities in environmentally related matters and mention of these stakeholders cannot be limited to present public and local communities but extended to future generation which is the fulcrum on which the concept of sustainability development rests. Sustainability development refers to one generation enabling the next generation to be as potentially well-off both in natural resources and economic perspective (Wingard, 2001). Externalities tendencies in environmental accounting have made precise delineation of public and local community's stakeholders practically difficult and always expanding. This has tended researchers to use more incorporating and generic classifications as 'general public' 'society', 'global community'.

The revolution introduced by environmental accounting is justified to recapture accounting back to its historical basis. From inception, accounting was intended to serve the society which is practically dynamic. It becomes worrisome why, where and when accounting lost the trend of dynamism and care for the larger society in her conceptualization and reporting that narrowed it down to just shareholders considerations. Therefore, there is the need and properly articulatedfor accounting to adapt to serve the societal needs as it changes. The society is beginning to demand and expect financial information on a corporation's environmental performance just as society has demanded and come to expect cash flow information, future oriented financial information andcurrent information. Conspicuously, traditional accounting is fundamentally challenged by this revolution in the traditional entity concept. The concept defined an entity as being separate from the owners and by implication, others stakeholders outside the delineation of the entity. This concept is the fulcrum on which many accounting theories and practices revolve including the recognition and treatment of costs, revenue, liabilities, assets and profit delineations. To this effect, any cost, revenue, liability and assets that do not justify or meet the criteria for recognition in the organisation's entity delineation is not considered as appropriation for recognition and reporting. By virtue of its stakeholders and externalities perspectives, environmental accounting has taken costs, revenue, liability, assets, profits and benefits beyond the entity delineation and as such the entity concept has lost its values on the utter of wider scope of corporate considerations.

Another prominent area environmental accounting has introduced revolution in the field of accounting is in the redefinition of cost, assets and liabilities and their applicability in the accounting system of an entity. This is made more evident by the enlargement of corporate entity and externality principle which now recognizes transactions that hitherto would have been excluded from the entity in traditional accounting. The enlargement of the entity principle and the redefinition of cost, revenue, liabilities, assets and profit as well as their applicability in the contemporary accounting havefurther raised challenges on the skill and inter-disciplinary knowledge of accountants, prerequisite for proper understanding of the implications (both financial and otherwise) of the actions and activities of firms. The special skill and knowledge needed of accountants are very crucial for quantification, measurement and valuations of the activities/actions of firms and to have the cost implications appropriately reported to a very wide range of stakeholders who have varied pecuniary and non pecuniary interestsand the effectiveness or otherwise of doing thismay make or mar the existence or survival of the firm. For example, environmental liability may be contractual or constructive and in either case must be appropriately valued and reported. According to the European Commission's recommendation on the recognition and disclosure of environmental elements in the annual accounts (EC, 2001) as cited in Dragomir and Anghel-ilcu(2011), liabilities can be seen from a double perspective: either as a legal /contractual obligation to prevent, reduce or repair environmental damage, or as a constructive obligation arising from the enterprise's own actions, when the enterprise has committed itself to protect the environment.Dragomir and Anghel-ilcu(2011) further stressed that environmental liabilities are strongly tied to specific costs, since an environmental liability is recognized when a reliable estimate of the costs derived from the obligation can be made different from provisions which refers to environmental liabilities which are uncertain either in terms of their due date or in terms of their amount to be settled.

Capital budgeting is also implicated in the revolution.Practically, financial accounting and capital budgeting are concerned also with environmental expenditure and associated procedures, such as depreciation and impairment. It follows therefore that environmental expenditure should be capitalized (that is, recognized as an asset for use on a continuing basis) when that expenditure is intended to extend the life, increase the capacity or improve the safety or efficiency of other assets owned by the enterprise which are in tandem with the capitalization criteria specified in the definition of assets. Therefore, to the extent that the assets and liabilities as explained above are material, they should be disclosed in the financial performance or the financial position of the reporting entity.

Theoretically, financial accounting has been bulged with the principles of faithful representation, tax impositions and true and fair view and they are critically required by the International Financial Reporting Standards (IFRS). Meanwhile, the extent that these principles arepresently translated into realities in the financial statements of firms remains a subject of critical argument and analysis given that firmsindulge in various unwholesome practices in the preparation of their books. That not withstanding, environmental accounting revolution has raised the need to reappraise the principles of faithful representation, true and fair views, profits as well as government taxations imposition on firms' profit before tax (PBT) as presently asserted and found in firms' published financial statements. What is faithful representation in financial reporting that firms understate their costs by ignoring environmental costs and externalities while reporting huge profits for their shareholders andleaving out the society with the brutal huge burden of externalities and costs caused by their careless operations and activities? Where lies the true and fair view in the audited financial statements (as external auditors rhetorically assert) when in the present dispensation the burden of substantial costs and externalities are dumped on a greater percentage of the citizen/society and unrecognized in firms' financial reporting, thereby limitingtrueness and fairness to fragmented costs recognized and reported in the financial statements for the benefit of shareholders only? Are firmsnot declaring false profits and dividends when both are derived from incomplete considerations of the enormity of costs involved in business operations and activities? Are government taxes not unjustified that they are merely imposed on firms' profit before tax (PBT) derived from incomplete costs considerations andwhen the enormous environmental regulatory responsibilities and commitments required to mitigate externalities are neglected or unenforced by the same government that slams taxes on firms' profit before tax (PBT) derived from fragmented costs report? Are the government taxes not overstated having been derived from profit before tax (PBT) that neglected the huge externalities and costsand resulting from sub-optimal considerations and recognition of fragmented costs that excludes externalities and social costs arising from the activities of the firms? These puzzles challenge the principles of faithful representation, true and fair view, firms' profit and government tax impositions. Summarily, environmental accounting revolution has fundamentally questioned the primordial entity concept and by extension other relatedpractices that are associated with domestication and restriction of entity's costs with considerations to only transactions and activities relating to entity's operations while ignoring huge costs/externalities which the entity has caused the society.

However, what remains a puzzle in the whole quest for all- costs-inclusiveness canvassed by environmental accounting and the contemporaries is whether the forces of demand and supply will ever have any equilibrium when firms recognize and incorporate all costs including reasonable amount of externalities. In the line of this, one of the problems that comes to mindis that all-cost-inclusiveness will result to high overheads,for which competitive prices may not immediately absorb all costs and prices for which the market cannot accept for effective demand. However, opinions have come to the conclusion that water will still find its level under all- costs –inclusiveness since it is believed that environmental sensitivity will result to improve processes, automations and products that will absorb the earlier or initial huge overheads or reduce the overheads and result inenvironmentally/customer-friendly products for which rational consumers will be willing to pay marginally more in price to access. Wingard (2001) confirmed this opinion that an environmentally responsible firm is able to market itself and its products to attract a growing segment of the world population which is demanding more environmentally friendly manufacturing, packaging and eventual recyclability of products.

Whatever may be the future outcome of postulations and champagne for all-costs-inclusiveness and full environmental accounting, it is unarguably clear that the society is not presently better off with the enormity of costs that are not accounted for;for which firms are unconcerned about and in respect ofwhich the society suffers huge damages that are associated with the degradations caused by firms' operations and activities. For instance, in Sub Saharan Africa it is unimaginable the cancerous health hazards the citizens are exposed to and threat to air travelbytelecommunication masts sporadicallyinstalled in all the nooks and crannies by telecommunication firms. Damages caused to the environment, host communities, the fishes, the natural habitats and the eco system in general by the oil spills in the Niger Delta of Nigeria by insensitive operations and activities of oil corporations remain alarmingly huge.In Ghana,the amount of damages to the environment and eco system by oils spills and toxic injections in the Tullow's Jubilee oil field and Low Toxicity Oil Base Mudcannot be quantified.Similarly, oil spills in the Mandarin and Mpuela in Cabinda in Angola and those at the Muanda in Bas-Congo of the Democratic Republic of Congo are unquantifiable. The perilous effect on the health of the generality of Sub Saharan Africa are numerous arising from the gaseous emissions andtoxic waste disposals here and there by manufacturing firmsscattered in cities. The dangers to life occasioned by mines and mine ground falls in South Africa and Ghana are numerous to the extent that fatality has become inevitable and mining firms are only battling to reduce the rate of fatality and not to eliminate it.

2.1.9 Application of Financial Reporting Standards in Environmental Accounting

It is worrisome to note that irrespective of the revolutionary changes environmental accounting has brought to the field of accounting,no direct or specific standard has been provided in environmental accounting rather only referencesin other specific standards exist on environmental matters. Regulatory frameworks on environmental accounting have remained voluntarywhile compliance to environmental reporting has not been made mandatory. However, in view of huge riskon the firms and larger society, the International Accounting Standard Board (IASB) which is presently represented by the International Financial Reporting council (IFRC) has released some indirectguidelines on environmental accounting through other specific standards which are expected to elicit compliances towards mitigating environmental risk.

According to Dragomir and Anghel-ilcu (2011),the IASB considers that environmental reports presented outside financial statements are not within the scope of IFRS, even if many companies operate in industries in which environmental factors are significant.EC (2008) as cited inDragomir and Anghel-ilcu (2011) enumerated international accounting standards (IAS) containing guidelines on the recognition and measurement of financial elements connected to environmental protection as follows:(1) IAS 16 recognizes items of property, plant and equipment acquired for environmental reasons. Such items qualify for recognition as assets because they enable an entity to derive future economic benefits from related assets. (2) IFRIC 6 recognizes obligations in the form of penalties or clean-up costs for unlawful environmental damage. Similarly, an entity should recognize a provision for the decommissioning costs of an oil installation or a nuclear power station to the extent that the entity is obliged to rectify damage already caused.(3) IFRIC 5 recognizes that the purpose of decommissioning, restoration and environmental rehabilitation funds is to segregate assets to fund some or all of the costs of decommissioning plant (such as a nuclear plant) or certain equipment (such as cars), or in undertaking environmental rehabilitation (such as rectifying pollution of water or restoring mined land).

Barbu, Dumontier, Feleag and Feleag(2012) presented a more detailed explanation of international accounting standards and the way they are related to environmental accounting.

Some of them are expressly stated while others are constructive and implied:(1) IAS 1 *Presentation of Financial Statements,*prescribes the basis for presentation of general purpose financial statements. Their objective is to provide information about the financial position, financial performance, and cash flows of an entity that is useful to a wide range of users in making economic decisions. For this reason, financial statements provide information about an entity, including environmental assets, environmental liabilities and environmental expenses. In addition, IAS 1 contains several remarks on additional information and reports issued by companies, to provide their stakeholders with a comprehensive view of their environmental and social impacts. Entities are encouraged to produce such reports, whenever managers consider that they are useful in shaping the external users' opinions and actions.(2) IAS 2 *Inventories*,is relevant whenever highly polluting industries, such as mining, recognize their waste as assets with a residual value. This standard requires such wasteto be recognized as inventories only if additional costs were to be incurred to convert the waste products into marketable goods. (3) IAS 8 *Accounting policies, changes in accounting estimates and errors*,stipulates the criteria for selecting and changing accounting policies, together with the accounting treatment and disclosure of changes in accounting policies, changes in accounting estimates and corrections of errors. Though the standard did not specifically mention any of the environmental elements, these prescriptions are applied, for example, when the company changes the estimates of environmental provisions or it corrects material errors in accounting of environmental costs and liabilities.(4) IAS 10 *Events after the Balance Sheet Date*,describes the steps to be taken by any entity when disclosing relevant events occurring after the balance sheet date. Such events, which may carry an environmental impact, should be described in concert with the causes that had generated them before year-end. (5) IAS 12 *Income taxes*,prescribes the accounting treatment for income taxes. The general principle of this standard is that deferred tax liabilities and assets should be recognized, with some exceptions, for the taxable/deductible temporary differences.For example, when the carrying amount of an environmental asset is bigger than its tax base, results include a taxable temporary difference and a deferred tax liability.

(6)IAS 16 *Property, plant and equipment,*indicates that some fixed assets may be acquired for safety or environmental reasons. The acquisition of such elements, even in the absence of future economic benefits, may be necessary for the uncompromised use of other operating fixed assets. IAS 16 also requires the incorporation of future dismantling and decommissioning costs into the value of the fixed asset. These costs are estimated at the beginning of the asset's useful life, and are assimilated to a provision in compliance with IAS 37. Future expenses with dismantling and site restoration may also be derived as a consequence of the continuous use of an asset whose environmental impact is not negligible. However, PriceWaterhouseCoopers(2004) as cited in Barbu, et al (2012) argued that whenever environmental degradation is outside the industrial parameters for the use of a certain asset, the supplementary expenses should be incurred immediately. Barbu, et al (2012) further enumerated other areas financial reporting frameworks have reference for environmental accounting to include: (7) IAS 20 *Accounting for Government Grants,*whichcontains an implicit reference to the initial distribution of emission rights and their recognition in the financial statements.(8) IAS 32, IAS 39, IFRS 7 and IFRS 9 on *financial instruments,*which are related to the present and future risks emerging in such cases as hedge accounting, the measurement of environmental derivatives, and the treatment of other financial elements occurring as a result of environmental impacts. (9) IAS 36 *Impairment of Assets,*which applies whenever a company's environmental assets are suffering impairment, either as consequence of a contamination, physical accident, loss of contractual rights or depletion of mineral resources.(10) IAS 37,*Provisions, Contingent Liabilities and Contingent Assets,*whichpresent several details on the recognition and measurement of provisions, contingent liabilities and contingent assets. A provision is a liability whose value and date of payment are uncertain and which is recognized whenever: (a) the company has a current obligation (for example, of an environmental nature) from a past event; (b) an outflow of future economic benefits is to be expected in this circumstance; and (c) a good estimate can be provided for this obligation. Barbu et al (2012) argued that unlike ordinary liabilities, the standard defines a constructive obligation as an uncertain liability imposing the recognition of a provision. The conditions qualifying for contingent liability are: (a) that a possible obligation exist consequent from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of the entity; or (b) that a present obligation exists that arises from past events but is not recognized because: (i) it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation; or (ii) the amount of the obligation cannot be measured with sufficient reliability. For example, when a lawsuit or other legal measure has been taken against the firm's environmental cleanup and protection responsibility that generate a contingent liability but the monetary impact of new regulations or penalties on the company is uncertain. An entity should not recognize contingent liabilities in the financial statements but should disclose them, unless the possibility of an outflow of economic resources is remote.

(11)IAS 38 *Intangible Assets,* whichis linked to the recognition and measurement of environmental assets such as development expenses or emission rights, either received as a subsidy or acquired from the market.(12) IAS 41 *Agriculture*, whichis a specialized standard with no mention of environmental elements, but targeting a sector with a highly sensitive environmental profile. This standard introduced fair value accounting for all biological assets. The fair value measurements may imply monetizing the environmental contribution of biological assets. For example, the development of markets in forest carbon credits will impact forest valuation and hence financial reporting.(13) IFRS 3 *Business combinations*,specify the financial reporting by an entity when it undertakes a business combination. It provides that identifiable assets and liabilities acquired in a business combination should be evaluated at their fair value.Consequently, all environmental liabilities assumed in business combinations (such as environmental liabilities associated with the retirement of tangible long-lived assets) must be measured at their acquisition-date fair value. (14)IFRS 6 *Exploration for and Evaluation of Mineral Resources*thatis linked to extractive activities, which are widely acknowledged as environmentally-sensitive. The standard is a guide to the recognition of exploration expenses, including the recognition of mineral resources as assets. It also imposes the recognition of any dismantling and relocation obligations as a result of the exploration of mineral resources.(15) IFRS 8 *operating segments,* whichestablishes certain disclosure elements to be provided in the annual reports of large companies. Diversified firms sometimes own an operating segment having a clear connection with environmental services and environmental protection, such as clean energy, urban services, decontamination services, recycling, green technologies, etc.On matters of IFRS Interpretations, the following details are provided by Barbu et al (2012) as extracted from the IFRS:(16) IFRIC 1 *Changes in Existing Decommissioning, Restoration and Similar Liabilities,* thatpresents several details on the recognition and measurement of liabilities generated bydecommissioning and dismantling activities, such as the closure of a chemical plant,the restoration of sites after extractive activities or the removal of heavy equipment.(17) IFRIC 3 *Emission Rights,* thatprovides that a cap-and-trade scheme gives rise to three elements: an asset for the allowances held, a government grant for the value of the allowances at the date of receipt, and a liability for the obligation to deliver allowances equal to emissions that have been made. According to Barbu et al (2012), IASB decided to withdraw IFRIC 3 in 2005 due to the pressure exerted by the business community and the disapproval from the European Commission and considering that no new interpretation has been issued, the recognition of emission quotas has remained a controversial problem. Adopting the methods applicable under US GAAP is a viable solution, as IAS 8 allows use of accounting policies from other standard-setters if no specific international standard exists.(18) IFRIC *5 Rights to Interests Arising from Decommissioning, Restoration andEnvironmental Funds*, thatdiscusses the integration into the accounting process of all these rights. The purpose of decommissioning, restoration and environmental rehabilitation funds is to segregate assets to fund some or all of the costs of plant decommissioning (such as a nuclear plant) or certain equipment (such as cars), or in undertaking environmental rehabilitation (such as rectifying pollution of water or restoring mined land). (19) IFRIC 6 *Liabilities Arising from Participating in a Specific Market – Waste Electrical and Electronic Equipment* whichclarifies when certain producers of electrical goods arerequired to recognize a liability under IAS 37 for the cost of waste managementrelating to the decommissioning of waste electrical and electronic equipment suppliedto private households (Barbu et al,2012).

Though no local standards are expected from Sub Saharan African countries on environmental accounting given the convergence of jurisdictional GAAPs to the International Financial Reporting Standard, ample pronouncements and local enactments should be expected from the countries of the region in view of the magnitude of environmental degradation suffered in the region. However, this study will highlight few pronouncements and enactments on environmental management in countries covered by this study.

2.1.10 Country-Specific Enactments on Environmental Management.

Nigeria

The study found evidencesin literature of selective pronouncements relating to environmental accounting in the banks and financial institutionsas contained in the Central Bank of Nigeria(CBN) circular of September 24, 2012 tagged Implementation of Sustainable

Banking Principles by Banks, Discount Houses and Development Finance Institutions. The objective of the circular is to deliver positive development impacts to society while protecting the communities and the environment in which financial institutions and their clients operate. The initiative, which is principle-based,is backed with strong commitment by CBN to provide incentives to financial institutions that embed the principles in their regular compliance report to CBN and aimed at enhancing institutions financial success over the longer term while ensuring that they remain environmentally and socially responsible. The nine principles enunciated by CBN in the said pronouncement are as follows: Principle 1: *Our Business Activities: Environmental and Social Risk Management*. This stipulates integrating environmental and social considerations into decision-making processes relating to banks' business activities to avoid, minimize or offset negative impacts.Principle 2*: Our Business Operation: Environmental and Social Footprint*. Theprinciple aims at banks avoiding, minimizing or offsetting the negative impacts of their business operations on the environment and local communities in which banks operate and, where possible, promote positive impacts.Principle 3: Human Rights. This is for banks to respect human rights in their business operations and business activities.Principle 4: *Women's Economic Empowerment.*This will promote women's economic empowerment through a gender inclusive workplace culture in bank business operations and seek to provide products and services designed specifically for women through bank business activities.Principle 5: *Financial Inclusion*. This prescribes banks to promote financial inclusion, seeking to provide financial services to individuals and communities that traditionally have had limited or no access to the formal financial section. Principle 6: *Environment & Social (E&S) Governance*. Banks will implement robust and transparent E&S governance practices in their respective institutions and assess the E&S governance practices of their clients. Principle 7: *Capacity Building*. Banks will develop individual institutional and sector capacity necessary to identify access and manage the environmental and social risks and opportunities associated with their business activities and business operations. Principle 8: *Collaborative Partnerships.* Banks will collaborate across the sector and leverage international partner to accelerate their collective progress and move the sector as one, ensuring their approach is consistent with international standards and Nigerian development needs. Principle 9: *Reporting***.** Banks will regularly review and report on their progress in meeting these principles at the individual institution and section level.

Prior to the pronouncement by Central Bank of Nigeria for banks and allied institutions, some enactments have been made in Nigeria with the central objective of managing and protecting the environment. The attention of this study was drawn to the following enactments: (a) The National Effluent Limitation Regulation S.1.8 of 1991, which makes it mandatory for industrial facilities to install anti- pollution equipment. (b) The Pollution Abatement in Industries and Facilities Generating Wastes- Regulations S.1.9, of 1999, which among other things impose restriction on the release of toxic substances and stipulates requirements for monitoring of pollution; to ensure that permissible limits are not exceeded as well as spelling out generator's liability.(c) The Solid and Hazardous Waste Management Regulation S.1.15 of 1991, which regulates the collection, treatment and disposal of solid and hazardous waste from municipal and industrial sources. The regulation also provides a list of over 1000 hazardous chemicals to be controlled by FEPA by toxicity category. (d) The Harmful Wastes (Criminal Provisions) Act 42 of 1988, which sentences individuals who trade, dispose, or transport toxic waste in Nigeria or its Exclusive Economic Zone to life imprisonment. Koko toxic dump in Delta State in 1988 gave rise to this Act. (e) The Environmental Impact Assessment (EIA) Act 86 of 1992, which provides the procedure for conducting an EIA of any major development.The sectoral guidelines for the EIA Act have now been developed for oil and gas, mining, agricultural, manufacturing and infrastructure sectors. (f) The Sea Fisheries and Inland Fisheries Act, 1992, which control access to fisheries resources. The Act includes wide provisions for the regulation of catch species, sizes and fishing zones. The regulation sets minimum net size for both finfish and shrimp. (g) Federal Environmental Protection Agency (FEPA) Act, No. 58 of 1988. The Act specifies establishment, membership, functions and powers of the Federal Environmental Protection Agency and National Environmental Standards. In 2007, the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act repealed the FEPA Act. NESREA has amongst other functions the power to enforce compliance with laws, guidelines, policies and standards on environmental matters (Emeakponuzo and Udih, 2014). Worrisomely, most of the Nigerian pronouncements and enactments in environmental protection and management have not been effectively implemented resulting to more enactments that appear to conflict with prior ones.

Ghana

For over four decades ago, Ghanaian Environmental Protection Agency has been inaugurated and been in operation to manage environmental challenges especially from the mining and manufacturing industries. Despite the various interventions by the Environmental Protection Agency (EPA), some of the challenges have remained problematic in the areas of waste management, illegal mining, logging, deforestation, noise, water and air pollution thereby requiring a drastic approach to the environmental management. A major millstone by the Ghanaian government in addressingthis concern is the launching of theAKOBEN in November 2010. The main aim for AKOBEN program is to disclose environmental performance ratings of mining and manufacturing companies using five-colours rating scheme (Ransford, 2011). The performance ranges from excellent to poor using colours as Gold, Blue, Green, Orange and Red respectively. The purpose of the rating is to measure the environmental performance of companies' day to day activities once the companies have passed Environmental Impact Assessment(EIA) standard.

South Africa

Three pronouncements adopted by South Africa are responsible for ensuring that companies in the country adhere to the principle of environmental management and sustainability practices. They are the King II report, the Global Reporting Initiative (GRI), and the Johannesburg Stock Exchange (JSE) Socially Responsible Investment (SRI) index. In 1994, corporate governance in South Africa was institutionalized by the publication of the King Report on Corporate Governance aimed at ensuring transparency and accountability within companies. Revised versions were released in 2002 and 2003 making compliance with certain aspects of this report a compulsory requirement for companies listed on the Johannesburg Stock Exchange (JSE). The report compulsorily demanded that companies should comply with the recommendation of the King II report and where compliance is exceptionally difficult, detailed explanation must be made. The King II report contains a full chapter on integrated sustainability reporting, including the requirement that every company should report at least annually on the nature and extent of its social, transformation, ethical, safety, health and environmental management policies and practices. Further, with King II report, the importance of risk management received official consideration for the first time in South Africa. The report recommends that companies audit their risk exposure annually and disclose this information to their shareholders.

South Africa queued into the Global Reporting Initiative which was designed to address the global concern on environmental degradation by providing investors with complete, transparent and consistent reports from companies on a broad range of social environmental issues.The Global Reporting Initiative (2006) expanded this by arguing that, going beyond conventional monetary reports, the triple bottom line discloses the company's impact on the world around it by including environmental issues into accounting. Wang and Lin (2007) call the three main areas of focus, 'people, planet, and profit'. The Socially Responsible Investment (SRI) Index was launched by the JSE in 2004 as a means of identifying companies that have integrated the triple bottom line approach into their business activities. For the three categories of triple bottom line: environmental sustainability, economic sustainability and social sustainability, the SRI is structured to reflect the complex nature of social responsibility in South Africa and aimed at facilitating investment in such companies.

Tanzania

Environmental protection policies and practices applicable in Tanzania have been neatly and comprehensively codified in the Tanzania Environmental Management Act, 2004 followed by regulations codified in Environmental Impact Assessment and Audit Regulation Act, 2005. The Environmental Management Act, 2004 also specified the establishment of National Environmental Management Council and the Environmental Appeal Tribunal responsible for overseeing the implementation of the environmental management issues and adjudication of matters connected to environmental management respectively. The codification of environmental management issues into an Act by Tanzania goes a long way to underscore the country's understanding and appreciation of the need for sound environmental management as well as the associated environmental hazards prevalent in Tanzania.

2.1.11International Efforts on Environment Accounting

The world has been described as a global village implying that activities in a country can result to externalities and grave implications in other countries. This scenario is greatly implied in environmental degradation and pollution which is the fulcrum of environmental accounting and reporting. Global reporting initiative therefore is designed to address this concern by providing investors with complete, transparent and consistent reporting from companies on a broad range of social and environmental issues. Some fundamental principles are explicit in global initiative reporting frameworks and these include transparency, inclusiveness, auditability, completeness and relevance. Others are context, accuracy, neutrality, comparability, clarity and timelines. The important role these guidelines play in driving transparency, balance, continuous improvement and accountability across sustainability reporting cannot be overemphasized.

Apart from indirect references made of environmental matters in international reporting standards, a number of international summits charters and recommendations have been issued. In most jurisdictions, especially in Denmark, the Netherlands, Norway and Sweden, there are legislations requiring environmental statements from environmentally sensitive industries, either in their financial statements or in a stand-alone report. In other countries, voluntary disclosures are recommended.Some of the voluntary disclosures as proposed by United Nations, Europe and USA are explained below:

(1) United Nations Voluntary Disclosure**.**

The United Nation Environmental programme (UNEP) was the driving force behind 1987 Montreal Protocol on substances that deplete the Ozone layers whereby industrialized countries ceased production and consumption of a significant proportion of all ozone-depleting substances in 1996.

(2) Europe Voluntary Disclosure

In Europe, the Eco-management and Audit scheme (EMAS) was adopted by the European council on 29th June 1993, allowing voluntary participation in an environmental management scheme. It is aimed at promoting continuous environmental performance improvements of activities by committing organizations to evaluating and improving their own environmental performance. The elements of the EMAS regulation include, (i) making environmental statements more transparent;(ii)the involvement of employees in the implementation of EMAS and(iii) a more thorough consideration of indirect effects including capital investments, administrative and planning decisions and procurement procedures.

(3) The USA Voluntary disclosure

The Environmental Accounting project began in 1992 in the USA to encourage companies to adopt environmental accounting techniques which would make environmental costs more apparent to managers and therefore make them more controllable. This was aimed to achieve three positive outcomes as follows:(i)the significant reduction of environmental costs;(ii)the gaining of competitive advantage and(iii)the improvement of environmental performance with the initial concern of pollution reduction.

In addition to the voluntary disclosures, a number of self-regulating schemes and codes of conducts have been pronounced by notable world institutionssuch as: (i) the International Chambers of Commerce (ICC) (ii) the International Organization for Standardization (ISO). The ICC launched The Business Charter for Sustainable Development in 1991 to help business around the world improve its environmental performance relating to health, safety and product stewardship. On the other hand, the ISO is a non-governmental organization established in 1947 and comprises a worldwide federation of national standards with the aim of establishing international standards to reduce barriers to international trade. The society has become increasingly concerned with the health of the natural environment and the role of corporations in impacting ecosystems and human health. Investors are calling for the use of the Global Reporting Initiative by companies to improve their public disclosure to shareholders on pressing environmental and social issues.

Regrettably, Sub Saharan Africa is yet to evolve any regional charter or guideline on environmental accounting and reporting. At present, what is available is few local or national promulgations and patchy provisions that give insight into environmental costs and accounting but lacking in sound and strict compliance directive or enforcement. This situation has resulted to poor environmental responses and performances by firms culminating to weak environmental practices, accounting and reporting by local firms as well as multinational corporations operating in Sub Saharan Africa. It is expected that growing research concern like this as well as resistances, hostility and militancy in environmentally sensitive areas of Sub Sahara Africa will raise the consciousness of countries in this region in evolving a regional charter or guideline on environmental accounting and reporting.

2.1.12 Factors Responsible for the Vulnerability of Sub Saharan Africa

Population of Sub Saharan Africa is a critical factor of consideration in environmental degradation ravaging her. According to Viek and Steg (2009) and Ezeabasili (2009), as human population continues to grow, material consumption intensifies and production technology further expands, there is a steady decline in the quantity and quality of environmental resources. Population figures of the sub region are huge and growing. By mid 2016, Sub Saharan Africa was reported to be densely populated with population of over nine hundred and seventy four million (2016 mid-year World Population Data Sheet). It is expected that the population of Sub Saharan Africa would hit 1.388 billion and 2.128 billion in mid 2030 and 2050 respectively (2016 mid-year World Population Data Sheet). By a different projection of the United Nations, it is expected that the population of Sub Saharan Africa would approach two billion in 2050 with likelihood of growing to nearly four billion by 2100 (UN Department of Economic and Social Affairs, 2016). The aforementioned population projections point to the fact that the region is densely populated with a high population growth rate. The population evidence of the region is further buttressed by the fact that out of the ten World highest fertility countries in mid 2016, nine were from Sub Saharan Africa namely, Niger, Congo Dem Republic, Chad, Somalia, Burundi, Angola, Mali, Mozambique and Uganda; with Nigeria ranking seventh among the ten most populous countries of the World (2016 mid-year World Population Data Sheet). The increasing growth in population of the region is a function of factors such as (i) high fertility, (ii) culture and natural endowment of the people that encourage or predispose them to high fertility, (iii) high orthodox medicinal values, (iv) reliance on and sustenance of the population by agricultural and natural resources, (v) slow pace of development/civilization which is further blended by poor literacy level, strong affinity to cultural orientations and tenacious belief in traditional religion; all of which directly discourage birth control and promote high fecundity. These reasons, among others, have encouraged high population growth rate as against birth control and also sustained the growing population of the region.

As a consequent of human dependence on the environment and the implication of such on the environment, it is evident therefore, that the population of Sub Sahara Africa and its alarming growth rate will place much pressure on the environment. Prior to civilization and its attendant industrial pressure on the environment, Sub Saharan Africa had naturally managed her environment and the pressures thereto without the alarming degradation which the advent of civilization has brought up. Ogbe (2006) confirmed that the management and conservation of the environment and natural resources in many African countries was largely a community responsibility. Similarly, UNEP (2000) recorded that the survival of the community depended on extensive and very intimate knowledge and sustainable use of land, forests and wildlife resources.

Apart from population, existence of abundant natural resources for exploration, a unique feature of Sub Saharan Africa, has been a source of pressure on the environment. According to the International Monetary Fund Annual Report (2012), the driving force of the Sub Sahara African economy lies in the predominance of resource-rich countries in the region; the resources of which accounts for over 80% of the total GDP of Sub Saharan Africa. The International Monetary Fund (IMF) categorize a region or country as ‘resource-rich’ when her exports of non-renewable natural resources such as oil, mineral and metals account for more than 25% of the value of the total exports. For example, the export of non-renewable natural resources for the region in 2012 amounted to US$288 billion which represents more than 25% of total export of Saharan Africa for the year (IMF Annual Report, 2012). Drawing from data for 2005 to 2010 for non-renewable natural resources and total exports for Sub Saharan Africa, the International Monetary Fund in 2010, classified the following twenty Sub Sahara African countries as resource-rich countries: Angola, Equatorial Guinea, Congo Dem. Rep., Nigeria, Guinea, Gabon, Congo Rep., Chad, Botswana, Zambia, Sierra Leone, Mali, Namibia, Niger, Cameroon, Zimbabwe, Tanzania, Ghana, Central African Republic and South Africa. Between 2010 and 2013, five more countries were added to the resource-rich classification as follows: Ivory Coast (Cote d’Ivoire), Mauritania, Liberia, Burkina Faso and Mozambique (IMF Annual Reports, 2010 and 2013).

It is in the light of the aforementioned classification of Sub Saharan Africa as a resource-rich region and the pressure from global commercialization, industrialization and population explosion which have jointly and excessively predisposed the region to exploitative exploration for the non-renewable and other natural resources that the region is at a risky threshold of an unprecedented environmental degradation and calamity. At present, the region has experienced a wanton drive for exploration of natural resources as if to extinction with consequential environmental degradation. In Democratic Republic of Congo and coming from exploitative exploration of natural resources by foreigners, Petitjean (2014) confirmed that the entire history of the Democratic Republic of Congo has been marked by the bloody exploitation of its natural resources – from rubber to “conflict minerals” – by international business and foreign powers.

2.1.13 Historical Perspective of Environmental Crises in Sub Saharan Africa

Historically and prior to the advert of colonialism, the management and conversation of the environment and natural resources in Sub Saharan Africa was largely a community responsibility. The survival of the community depended on extensive and very intimate knowledge and sustenance use of land, forests and wildlife, resources (UNEP 2000). On his account of the management of the environment, Ogbe (2003) narrated that those living in large dry lands in the savannah belt, for example, led pastoral lifestyles and migrated with their families and livestock in response to recurrent droughts and other environmental challenges. Those in the rain forest belt developed agricultural systems that are adapted to the fragile nature of the soil while retaining the protective features of the forest canopy virtually undisturbed. Though undocumented as standard principles and practices, the traditional knowledge and culture of these communities in addition to related conservation practices and principles were generationally enhanced and passed on by successive generations, including social taboos and community sanctions that were imposed on those who violated the norms. Wars were fought between communities and tribes to maintain the integrity of their domain and prevent unauthorized access to their natural resources (Ogbe 2003). Prior to the European inversion of Africa, in the countries of the North, the availability of cheap agricultural products from the south provided a source of industrial feedstock for their impressive economic development (Ogbe 2003).

During the colonial period, the European powers imported and imposed laws and regulations which undermined and replaced the traditional community-based approach to conservation and sustainable use of natural resources. This paradigm shift arising from colonization and clamp down on African resources also frosted a development pattern focussed mainly on economic growth, with the export of key commodities and natural resources given priority over subsistence agriculture and internal food security (Ogbe 2006). Contemporarily, it is postulated that colonialism was targeted at the abundant natural resources of the African continent not for African emancipation as claimed by the colonialist. This contemporary perspective has given rise to the concept of neo-colonialism which in principle and practice is an extension of economic colonization years after the dismantling of political colonialism. It is the aforementioned paradigm shift from African traditional and environmental conservation to colonialism and developmental pattern of export of raw materials that gave rise to the need for mass production or exploitation of natural resources in Sub Saharan Africa to meet the growing need of the European countries. It is not surprising, however, that this was the beginning of mechanizations aimed at easing off exploitation process for mass production that inadvertently resulted to environmental degradations in the sub region. Colonialism therefore was a helpless strategic mistake which created many problems for African countries including unrealistic dependence on commodities processed in world trade system dominated by major industrialized countries and the inherent vulnerability to fluctuations in the prices of unprocessed natural resources. The situation was helpless for the poor Africans given that colonialism was foist on them with all manners of forces and deception and Africans saw themselves engulfed in helpless colonialism which their level of emancipation never endowed them to resist. Therefore the European pattern of economic development forced on Africans led to over consumption of natural resources endowment of Sub Saharan Africa by the European with the consequential implication on environmental pollution and degradation. It became worrisome whether the natural resource endowment in Sub Saharan Africa and Africa in general is a curse or blessing.

This worrisome curse or blessing situation has given rise to the theory of natural resource curse; a phenomenon where countries endowed with natural resources experience worse economic and political outcomes than countries with no natural resource endowment (Siegle 2008). In the views of Demissie (2014), the Sub-Saharan Africa (SSA) region has become a classic case of the resource-curse phenomenon characterized by the abundance of natural resources, low economic development, and misuse of natural resources. Apart from impoverishing the African environment through degradation, the people are also impoverished. According to Mutharika (2010), as cited in Demissie (2014), Malawi's President Bingu Wa Mutharika is known for his statement that 'Africa is not a poor continent; but the people of Africa are poor'. Preferably, the poverty ravaging African people can be described as imported poverty which is poverty forced on African people by resource colonization that was disguised as colonial emancipation. Colonialism, in whatever form it was presented, destroyed the natural growth of Sub Saharan African and in the recent times the situation has further been aggravated by neo-colonialism which is a remote control of the political and economic well-being of the African people years after political colonization seems to have given way.

As a consequent of the colossal environmental damage European economies did to Africa, in 1972, the United Nations convened a conference in Stockholm on the environment and human development at which the concern was raised that despite tremendous improvements in the technological, economic and material well being in some parts of the world, that humanity faces significant danger from environmental degradation caused by flawed perception that economic development can be de-linked from the processes of the biosphere (Ogbe 2006). Yet long after the conference, nations still paid lip service to the concept of sustainable development with industrial countries still stuck with their outdated perception that technological development and economic activities could be separated from the inherent ecological consequence of unplanned economic growth.

From the 1990s to the recent days, it has become clearer that a new global policy imperative is very necessary and urgent to overcome the vulnerability of the entire humanity to unbridled economic growth based on internalizing the economic-cost of development. It is on the basis of the ravaging environmental degradation that the need for accounting for environmental cost as well as ascertaining the impact of environmental costs on firms' financial performance and survival has become unavoidably necessary in Sub Saharan Africa. Efforts in this direction have been scanty in Sub Saharan Africa and not until that is taken seriously that the region will experience sustainable environment.

2.1.14 Constituents of Environmental Costs in Sub Saharan Africa

According to Adediran and Alade (2013), man is a rational and economic being, and in a bid to make ends meet, man is seen to engage in a lot of activities; some of these activities have positive effects on the environment, while others have negative effects which tend to bring about an imbalance in the ecosystem (Emevon, 2001). The impacts on the environment of these activities of man constitute the environmental degradation and the costs associated with the degradation are the environmental costs which form the fulcrum of environmental accounting and reporting. Odocha (2002) refers to the environment as (1) the biosphere, comprises of all living organisms i.e. plant and animal kingdoms; (2) the geosphere, which is made up of soils and rock bodies; (3) the hydrosphere, represented by all water masses; (4) the atmosphere, comprising the air we breathe and the space above; and (5) the techno sphere, which represents man's creations.It therefore follows that environmental costs are the costs incurred by companies affected by or involved inany activity that create environmental problems in any of the spheres of the environment either in remedying the loss or damages created by them or to prevent the occurrence of any of the environmental challenges. Likewise, environmental costs include costs incurred by the firms to proactively prevent or ameliorate the potential damages or environmental challenges which includes but not limited to product modification, production process modification, bye or waste product conversion and re-processing aimed at ensuring that no further damages are inflicted on the environment. Environmental costs could be active, reactive and proactive when compared with the environmental challenges it addressed or aimed at addressing. It could be remedial or preventive also. Active costs are those incurred presently to address the environmental challenges of the past while re-active costs are those incurred presently as a result of failures to address the challenges of the past. Proactive costs arethose incurred presently to avert future damages of environmental neglect or from potential environmental challenges. Whereas remedial costs are generic and cover both active and reactive environmental costs, preventive costs are the proactive costs.

2.1.15 Need for Firms to Report their Environmental Activities

Adediran and Alade (2013) recorded the under listed reasons why companies must report their environmental activities in the annual report: (1) environmental accounting may lead to the avoidance of penalty or fines imposed by Environmental Protection Agency; (2) environmental accounting promotes research and development which will eventually translate into significant reduction in many environmental costs through the design of more environmental friendly production process; (3) environmental accounting can attract more investors because investors sometimes need information on environmental performance and expenditure to make decisions;(4)environmentalaccounting can promote more accurate costing and pricing of product;(5) environmental accounting may attract incentives from the government in form of tax reduction and subsidies and (6) environmental accounting can lead to the development of Environmental Management System (EMS) which is necessary for companies engaged in International Trade.

According to Bala and Yusuf (2003), accounting has an instrumental role in disclosing environmental responsibility for different entities whether industrial, commercial or service and at all levels whether micro or macro; thus accounting became concern with achieving new goals such as measuring and evaluating potential or actual environmental impacts of projects and organizations. Environmental Agency UK, Glossary of Terminology and Definitions (2006) as cited in Emeakponuzo and Udih (2014) stated that there are several reasons why businesses may consider adopting environmental accounting as part of their accounting system as follows (1) possible significant reduction or elimination of environmental costs; (2) environmental costs and benefits may be over looked or hidden in overhead accounts; (3) improved environmental performances which may have positive impact on human health and business success; (4)may result in more accurate costing or pricing of products and more environmentally desired processes and (5)possible competitive advantages as customers may prefer environmentally friendly products and services.

In the view of Ali (2002) as cited in Bassey, et al (2013), the main reasons of accounting interest in the environment are as follows:

a) Many environmental costs can be significantly reduced or eliminated as a result of business decisions ranging from operational and house-keeping changes to investment, in cleaner production to redesign of processes/product.

b) Environmental cost (and, thus potential cost savings) may be obscured in overhead accounts or otherwise overlooked).

c) Many organizations have discovered that environmental cost can be offset by generating revenues through sale of waste, by products or transferable pollution allowances, or licensing of clean technologies.

d) Accounting for environmental cost and performance can support an organization's development and operation of an overall environmental management system (EMS). Such a system will soon be a necessity for companies engaged in international trade due to international consensus standard ISO 14001, development by the International Organization for Standardization.

e) Environmental expenditures whether capital (CAPEX) or operating costs (OPEX) increase dramatically day after day.

f) Management needs financial data about these expenditures.

g) For strategic cost leadership (Driving Cost).

h) There is need to prioritize these expenditures

i) There are increasing needs from different stakeholders (governments, investors, lenders, banks, non-governmental organization, etc) to have financial data on the environmental performance of different organisations.

j) If accounting does not provide financial data on environmental performance of organisations that will help non-complying organisations/entities to pollute environment and spoil resources and yet appear more economic efficient than others which incur costs to protect the environment.

k) Naturally any entity have a main output and a secondary outputs of which mainly pollutes and thus if the entity does not incur costs to mitigate or prevent it a third party in the society have to bear it (the concept of externality)

l) Environmental risks may result in huge environmental liabilities and subsequently the organisation entity may be obliged to outlay payments which may affect seriously the liquidity and the financial position of the organisation.

m) Managing resources properly in an environmentally friendly way will result in a competitive advantage to such organisation.

n) There is a general trend to evaluate the organisation performance according to its social and environmental effectiveness and not only on its economic effectiveness.

o) Current practices demonstrate that no track for environmental costs was available as it was charged randomly. Therefore there is need for proper charging and allocation. Distinguishing between environmental costs and other costs will lead to a proper cost allocation of these costs and thus precise pricing and will help to develop sustainability indicators.

According to Dorwayiler (2002) as cited in Adediran and Alade (2013), environmental accounting when well handled can be of great benefit to both the individuals and the companies as follows:

a) It can bring about increased turnover for the companies due to enhanced company and product usage.

b) Environmental accounting can make a company's share more attractive to investors due to enhanced company or product image and environmental risk rating.

c) Environmental accounting can guarantee better access and terms from lending institutions due to favourable environmental risk incidents.

d) Environmental accounting ensures compliance with environmental law which in turn will minimize its exposures to future financial loss arising from environmental incidents

e) Environmental accounting brings about an increase in the company's profile as a result of an increase in the area of environmental responsibilities.

f) Environmental accounting can lead to new inventions because organizations can recycle what was formally considered waste to invent new products.

2.1.16Factors Determining Compliance to Environmental Reporting.

An empirical study on the impact of environmental costs on firms' performances relies on data and disclosures in the financial statements or annual reports and relevant information in stand-alone sustainability report for firms that have adopted such stand-alone report.To a large extent, environmental reporting regarding social and environmental matters in the financial statement of firms has remained voluntary but great improvements have been recorded in South Africa, Ghana and Tanzania when compared with what is obtainable in Nigeria. Until recently, environmental costs were disregarded as either inconsequential, of non-business concern or perceived as difficult to conceptualize into financial data for financial statement reporting. Accounting was dominated by concern for what was regarded asbusiness-related costs which were perceived to add value to firms' profit maximization objective. Environmental costs were not at the centre stage of business transactions and reporting. Such perspective is fast changing since environmental costs and reporting are now considered critical in business survival strategy.In line with the new mentality, Junaini and Ahmad (2008) identified the main determinants of environmental accounting and reporting to include:

2.1.16.1 Company Size

It is presumed that larger companies will have higher tendency to disclose environmental information in their annual reports than smaller companies for a variety of reasons. Number of employees, total assets value, sales volume, assets based etc can proxy firm size. Agency theory which applies substantially in large firms where ownership is separated from management supports that environmental costs disclosure can be used to reduce political costs, which in turn, could reduced wealth of a firm. According to Junaini and Ahmad (2008), since the magnitude of political costs has a higher positive relationship with size and environmental disclosure, all things being equal, size of companies becomes a critical determinant of environmental reporting compliance. According to Bassey, et al (2013), larger firms would have higher political costs because the firms are more politically visible and may attract more resentment due to their perceived market power.

2.1.16.2 Financial Leverage

As cited inBassey et al (2013), agency theory has been used to assert that political transfers of wealth from bondholders to shareholders can take place in highly leveraged firms. Agency theory in highly leveraged companies predicts the possibility that restrictive covenant may be factored into debt contracts to protect firm's economic interests. Management may also voluntarily disclose information in financial report for monitoring purposes. Thus, agency theory predicts that level of voluntary disclosure increases as the leverage of firm grows (Bassey et al, 2013). Companies with high leverage may disclose more information to satisfy the needs of long-term creditorsand to remove suspicion of debt holders regarding wealth transfer.

2.1.16.3 Profitability

Profitability or corporate financial performance has been used by a number of researchers as an explanatory variable for differences in disclosure level. The relationship here is still controversial. The results of different studies measuring the relationship between corporate financial performance and corporate social and environmental disclosure show mixed results.According to Junaini and Ahmad (2008), schools of thought differ in the profitability standing of firms and their tendencies to environmental accounting disclosures. The proponents argue that there are additional costs associated with the social and environmental disclosure and the profitability of the reporting company is depressed. This school therefore suggests that more profitable firms are more likely to disclose more while less profitable firms tend to be more secretive.According to Wingard (2001), profitable firms may be more inclined to disclose more information in order to distinguish themselves from less profitable company in order to raise capital on the best available terms and one way to do this is through disclosure. Junaini and Ahmad (2008) asserted that from agency theory perspective, managers of very profitable companies would use external information in order to obtain personal advantages such as continuance of their positions and compensationarrangement, while providing some agency notion of this variable. It is therefore arguable that for profitable companies whose rate of return or return on investment is more than the industry average, the management of the companies will have greater incentive as such higher propensity to communicate more information (including social and environment information) which is favourable to them as the basis of explaining their good news and are likely to disclose social and environmental information in their corporate annual reports.

The second school of thought propounds a situation of ambiguity regarding the relationship of profitability standing and tendency of firms to disclose environmental information. Lang and Lundhlom (1993) as cited in Bassey el at (2013), found a certain ambiguity in theoretical and empirical studies regarding the sign of profitability in relation to disclosure and therefore concluded that the relationship between disclosure and profitability is non-monotonic; this is because less profitable firms may disclose more information to explain the reasons for the negative performance and reassure the market about future growth. Companies also disclose bad news at an early opportunity in order to mitigate the risk of legal liability, severe devaluation of share capital and loss reputation.

2.1.16.4 Effective Tax Rates

In most countries, tax regimes differ from one company to the other in consideration of their sizes, pioneering status, infancy, ownership structure (private or public companies). Taxation system provides the most direct means by which wealth transfers can be made from companies to the government and as such income tax can be viewed as one of the components of political costs borne by a company. This implies that high level of tax payment by a company is consistent with high level of political cost borne by her. A company which is subjected to high taxation burden, may be motivated to employ technique that reduce these costsand one way to achieve this is by disclosing environmental related activities performed by the company (Bassey et al, 2013).

2.1.16.5 Industrial Membership

Junaini and Ahmad (2008) affirmed that industries differ incharacteristics relating to competition, growth and risks, specificculture and historical factors and that these may provide scope of differential disclosures policy. These characteristics may constitute limitation and tradition that can ensure that new entrants to an industry are likely to follow accounting methods used by industry leaders.

2.1.16.6 Audit Firm

Bassey et al (2013) asserted that auditors play a major role in limiting opportunistic behaviour by agents, thereby reducing the agency costs borne by principals and agents. According to Junaini and Ahmad (2008), external auditors incur costs by entering into contracts with audit clients and as such will influence clients to disclose as much information as possible in their annual reports. In same vein, big auditing firms that have garnered high reputation over years with wide range of clients to select from would place strict criteria in selection of clients and incidentally would less likely be associated with clients that disclose low levels of information in their published annual reports. Risk assessment of potential clients becomes a critical consideration in minimizing their audit risk by considering the potential client disclosures in current and prior audit reports.

2.1.17 Firms Performance and Measurement

Richard, Devinney, Yip and Johnson (2009) averred that firms' performance encompasses three specific areas that comprise financial performance, market performance and shareholders returns. In this study, firm performance is the dependent variable and shall be considered from the aforementioned three components of firms' performance measurement. The study regresses the disaggregated components of environmental costs on the proxies of the three components of firms' performance to ascertain the relationship between the independent and dependent variables.Firm performance measurement is a process and also generic. Al-Matari, Al-Swidi and Fadzil(2014) confirmed that firms' performance is a generic process of measuring the efficiency and effectiveness of the actions and activities of firms. Firm performance is an appraisal of the actual results of operations and activities of firms based on pre-determined set of goals and objectives.It is an internal mechanism set by firms to judge themselves, their goals and objectives against their actual results on the basis of which any external due diligence if carried out on the firms can confirm the authenticity or otherwise of the firms' success. Jat (2006) asserted that the subject of corporate performance has received significant attention from scholars in the various areas of business and strategic management. However, finding useful components of performance measures is a relevant area for research and a major difficulty is defining the appropriate components and showing whether the interpretations that result are reasonable and applicable elsewhere (Banker, Chang and Majumdar, 1993).

2.1.17.1Firm Financial Performance

Firm financial performance is a part of overall firm performance measurement that concentrates on use of financial indicators to ascertain the wellness and success or otherwise of firm's activities within a period. Adebimpe and Ekwere(2015) asserted that firm's financial performance can be measured by looking at the organisational profitability and efficiency such as operating profit, return on investment and return on assets; and organizational size which is measured by sales level and cash flows. For Neely(2015), financial performance measures aimed at three major functions: (1) as a tool of financial management concerning the efficient provision and deployment of financial resources to support business operations; (2) as a tool signifying achievement of the major objective of the organisation and (3) as a mechanism for motivation and control within the organisation.It follows therefore that using a typical firm's financial statement, a lot of financial measures can be derived from the combination of two or more performance indicators such as turnover, profit(gross or net), equity, market price etc.

A combination of more than a year's financial statement of a typical firm can also give a trend analysis of the firm's performance by using the financial indicators over a period. This gives an indication of the direction of change and reflects whether the firm's financial performances has improved, deteriorated or remained constant over time (Pandey, 2004). Pandey(2004) further asserted that the easiest way to evaluate the performances of a firm is to compare its present ratios with the past ratios and when financial ratios over a period of time are compared, it is known as time series (or trend) analysis. Cross sectional analysis can also be carried out drawing from financial indicators of firms in a typical industry for a period of time and this can be a useful financial analysis whose result can provide a clearer comparative analysis. Further on comparative analysis, financial indicators of firms in related industries can be obtained for a given period from different countries and analyzed. This could be termed cross national analysis and the result can be very useful in comparative studies that are aimed at ascertaining the behaviors of related variables in different countries. One of the challenges usually experienced in cross national comparative studies is the thorny issue of exchange rate and exchange rate fluctuations given that the financial indicators from different countries haveto be converted to a common unit before carrying out the analysis. The conversion to a common unit is usually done to the currency of the country from where the research is being carried out, referred to as the presentation currency.

However, challenge of exchange rate, its fluctuation and translation problems were more pronounced prior to the convergence to the International Financial Reporting Standards (IFRS) when national standards were in vogue. Though the International Financial Reporting Standard did not directly target conversion of data for researches, it can be appropriately adopted that presently the International Accounting Standard (IAS) 21(*the effect of changes in foreign exchange rates)* has addressed this thorny concern since it specified the ruling rate at which conversion of exchange rates should be done for translation of financial statements of foreign operations to the presentation currency.In managing the exchange rate and exchange rate fluctuation challenges which is peculiar in this study,the specifications of IAS 21 were applied in the translation of relevant data from functional financial statements of selected companies to the presentation currency prior to analysis for the study. The study applies Return on Capital Employed (ROCE)as measure of firms' financial performance and is explained below.

Return on Capital Employed (ROCE)

ROCE = Net profit after tax / Total capital employed

This performance measure relates net profit after tax to total capital employed. It shows the productivity of business assets and their ability to generate revenue that can take care of the cost of the business yet with returns to the owners of the business. ROCE is widely considered as one of the best measures of corporate performance in view of the indices applied in calculating it. For Stewart (1990), the rate of return on total capital is the return that should be used to assess corporate performance as it measures the productivity of capital employed without regard to the method of financing; free from accounting distortions that arise from accrual bookkeeping entries; free from the conservative bias of accounting statements, and from the tendency to understate capital by writing off unsuccessful efforts. However, he cautioned that simply measuring ROCE is not enough, as it is important to consider the cost of capital employed as well as the return upon it.

2.1.17.2 Firm Market Performance

Market performance of a firm is a measure of the wellness or otherwise of the firm in the capital market. As cited in Umobong (2015) market performance is the behavior of a security or asset in the market place. Though it is moderated or influenced by the available information in the market, it measures the strength or weakness of a firm’s security in the market. In an efficient market environment where costless information is freely available to all parties in the market and at all times, market performance becomes a critical ranking criterion for firms operating in a given market and the survival or otherwise of any firm is critically hinge on her market performance. Market performance is signified by proxies such as Earnings per Share(EPS), Price Earning Ratio(P/E) and Dividend Yield (Umobong, 2015). This study proxies firm market performance on Earnings per Share and is explained below.

Earnings per share (EPS)

EPS = Net profit after tax / Number of shares in issue

Earning per share relates the earnings of a firm to the number of shares in issue. It is a double barrel measure for both management performances and shareholders' expectations and as a result both management and shareholders pay a great deal of attention to it. Earnings per share is ameasure of the practical implication of the agency theory in business ownership and management given that shareholders (owners of the business) delegated management of the business to their agents (the management) for returns which is anchored on earnings. Failure to achieve a good EPS has some obvious implications both for firm's managers and on the shareholders who may demonstrate unwillingness to retain the same crop of management and retention of their investment in the firm if the earnings are not justified. It follows therefore that EPS is a good valuation for common stock and can be the basis for setting specific corporate objectives and goals as part of strategic planning.

2.1.17.3Firm Shareholders Returns

Shareholders are investors who parted with their funds for the establishment of a firm in anticipation of dividend and value appreciation as return for their investment. A crucial objective of firms therefore is to create and maximize wealth for the shareholders. According to Jensen(2001) one of the main objectives for the existence of an organization is to create and maximize shareholders return; and key determinants in the shareholders value creation are organizational profitability, growth and free cash flow (Shuka, 2009). To drive the value creation, Shuka(2009) outlined revenue enhancement, low production costs, operational efficiency and better utilization of resources as critical for shareholders' value creation. The study considers return on equity(ROE) as a measure for shareholders returns.

Return on equity (ROE)

ROE = Net profit after tax / Total equity

Relating net profit to equity is a measure of the wellness of shareholders in the firm's business performance for a given period. The strong variables that affect ROE, which are also used in determining the level of ROE, are net income and shareholders' equity (Singapurwoko and El-Wahid 2011). Vigario (2005) stated that the ROE shows how much of the profit generated by the company belongs to the shareholders. He further alluded to the fact that shareholders are always expectant of increases in this measure as it has a direct impact on their investments.Recent research in developed countries has established a linkage between ROE and firms' environmental management practices (Moneva and Ortas 2010). Contemporary research has indicatedthat equity holders (investors) may influence the environmental management practices of their firm (Azapagic 2004; Jenkins and Yakovleva 2006; Sumiani, Haslinda, and Lehmann 2007).

2.1.18 Disaggregated Environmental Costs

In this study, environmental costs are disaggregated into three components of employee health and safety (EHS), wastes management (WM) and community development (CD). These components are not exhaustive of the environmental costs. Others include emission reduction, carbon capture and storage (CCS), biodiversity through waste recycling, water treatment and quality of waste water discharged into the environment, product life cycle management, business environmental research and development, equal opportunity in employment, product innovation and packaging and employee training and development. However, the choice of aforementioned three components for the study is informed by the fact that they are peculiar and more related to Sub Saharan African environment and being the least expected areas of remediation firms in the sub region should engage in.

2.1.18.1 Waste Management (WM)Costs

In the views of Rose (2002), waste management involves identifying what is there, sorting, separating, transforming, returning to service what can be used and properly disposing what is left. Waste emanates from the activities of man and this is pronounced in the case of industrial activities. According to Ghush, (2009) wastes are inevitable human activity being either a by-product of initial production process or they arise when objects or materials are discarded after they have been used. Elaborately, Novick (2009) enumerated the accounting for waste management in any community, town or city to include associated cost on the reduction in the speed of sanitation related diseases, reduction on occurrence of non communicable diseases and reduction on environmental pollution (degradation of land, water and air) etc. Waste management costs are those emanating or associated with waste management.

2.1.18.2 Employee Health and Safety (EHS)Costs

Employee health and safety costs comprise those incurred by a company to ensure that health and safety of the employees are protected. It includes investments in safe equipment, production process and environment that minimize work place fatalities. Costs in this category can be preventive and reactive when the harm has been done. Under this costs classification, companies incur some costs in ameliorating the impact of environmental hazards which theoperations expose the employees. Indices of employee work place hazard include lost-time injury frequency, fatality rate etc and investment in employee health and safety is expected to have a negative relationship with these indices.There are cases natural phenomenon contributes immensely to the employee health and safety hazards' in which case, no amount of investment can prevent the incidence. Mine falls (fall of ground), earth quakes and other natural phenomenon have defiled investments in employee health and safety to unleash calamities on companies resulting to reactive costs to manage the happenstance.

It is trendy these days for companies to adopt Journey to Zero (JTZ) programmes in managing employee health and safety. Journey to Zero programme engages all employees to work towards the common goals of zero fatalities and to virtually eliminate lost time injuries. Employee health and safety costs include HIV prevention and management as well as management of other terminal and occupational diseases such as noise-induced hearing loss(NIHL), coal workers pneumoconiosis, chronic obstructive airways disease(COAD), occupational tuberculosis, Asbertosis musculo-skeletal disorders; most of which are associated with mining and exploration engagements

2.1.18.3 Community Development(CD) Costs

Community development costs are those incurred for host communities in recognition of the fact that the company's operations are being carried out in the domain. These costs take different shapes and can be in cash or kind. It includes cash donations to carrying out soul-targeted projects for the community to enhance their wellbeing. In line with the principle of externality whose definition can not be geo-fenced to a specified community, it has also followed that the definition of community has been expanded beyond the immediate community. Except for the financial implication, companies prefer to adopt the concept of general public to host community as the former gives better and larger coverage that extends the companies' legitimacy, resource dependency and enlarge their stakeholder's coverage, totality of which minimize the companies' operational risk and boost her opportunity to access more resources for production.

2.2 Theoretical Framework

Some postulations have lent credence to the state of firms' indulgence in environmental costs and activities. Generally, the study found three theoriesrudimentary and explanatory of firms' indulgence on environmental costs and activities in Sub Saharan Africa. These are the legitimacy, resource dependency and stakeholders' theories. The three theories are explained in the study and the shortcomings are highlighted towards a preferred theory. Each of the theories provides some basic reasons for firm's indulgence in environmental remediation and cost within a defined scope but the study found superior reasons and enlarged scope in stakeholders' theory and thereforeanchored on the latterwhich not only explains the reason for firms' indulgencein environmental costs and remediation but also provides a substantial and broadtheoretical scope for firms' indulgence akin to the effect of environmental cost on firms' performances that cuts across different stakeholders (the firm, shareholders and wider market).

2.2.1 Legitimacy Theory

In the views of Suchman (1995), legitimacy theory is a generalized perception or assumption that the actions of an entity are desirable, proper and appropriate within some socially constructed system of norms, values and definitions.Deegan, Rankin and Tobin (2002), argued that legitimacy is a dynamic construct and community expectations which are not static but rather change across time thereby requiring organisations to be responsive to the environment in which they operate. Legitimacy theory is a generic theory that can apply to different disciplines. For environmental cost and accounting, Tilling (2004) opined that legitimacy theory offers a powerful mechanism for understanding voluntary social and environmental disclose made by corporations, and that this understanding would provide a vehicle for engaging in critical public debate. Gray (2000) claimed that there has been significant growth in environmental and social auditing and reporting since the 1990s, that possible explanation for this trend is not unconnected with business firms' desire to create, maintain or repair their societal legitimacy. Agreeing to the above, O'Donovan (2002) affirmed that legitimacy theory is the more probable explanation for the increase in environmental disclosures since the early 1980.

Legitimacy theory places firms in the four different stages of legitimacy: establishing legitimacy, maintaining legitimacy, extending legitimacy and defending legitimacy and a firm must be at any stage of the legitimacy at any point in time and must be geared towards responding to happenings and requirements of her immediate environment. To establish legitimacyrepresents the early stages of a firm’s development and tends to revolve around issues of competence, particularly financial, but the firm must be aware of socially constructed standards of quality and desirability as well as perform in accordance with accepted standard of professionalism. Maintaining legitimacy in the views of Ashford and Gibbs (1990) as cited in Bassey et al (2013) is the phase most firms would generally expect to be operating in, where their activities include: ongoing role performance and symbolic assurance, that all is well and attempts to anticipate and prevent all potential changes to legitimacy.Extending legitimacy requires that firms enter new markets or modify the way it relates to their current market. Extending legitimacy comes from managerial proactive responses not induced by external forces or pressure. Bassey et al (2013) asserted that extending legitimacy is apt to be intense and proactive as management attempts to win the confidence and support of wary potential constituents.Defending legitimacy is externally or internally induced by forces wishing to displace the firm from her established legitimacy. It occurs when legitimacy is threatened by an incident (internal or external) and therefore requires defence (Bassey et al, 2013). Bassey et al (2013) further clarified that legitimating activities tend to be intense and reactive as management attempts to counter the threat.Researchers have come to a consensus that it is the defending legitimacy stage that offers a lot of explanation to why firms respond to the environment; and that it also provides the clearest opportunity to examine the crucial link between legitimacy and resources. The theory is fascinating as it raises high velocity on the part of the firm to engage in environmental remediation but suffers on the ground of being narcissistic in the reason for firm's engagementand mindless of the concerns of the larger society.

2.2.2 Resource Dependence Theory

Resource Dependence theory is an improvement on legitimacy theory and tries to address the self-centred deficiency of the latter. Resource Dependence theory sees the increased environment remediation activities by firms as a strategy in drawing resources from the environment. This theory believes that the firms' intrinsic aim of environmental responsiveness is to afford her continued use of resources endowed of the environment. This theory anchors on the premise that firms' inability to engage and to disclosure her environmental engagements have the tendency of obstructing her further access to the resources. This theory has a tremendous relevance in the happenings in the Sub Sahara African countries where hostilities associated with resources exploration activities have remarkably hampered the operational activities of firms engaged in resource exploitations in the affected areas. According to Uwuigbe and Olayinka (2011) resource dependency theory concerns itself with the strategy organisations adopt in drawing resources from the environment and this position is imperative because firms are interdependent with themselves and the environment. Though, Resource Dependency theory is adopted as a strategy that takes in more into consideration, it is still limited in scope of parties considered.

2.2.3 Stakeholders Theory

Stakeholders theory is an elaborate theory that both explains reasons for firms' indulgence in environmental remediation and also take into consideration a wide range of parties. The theory is based on the fact that a firm is in a chain relationship with different stakeholders and the success or otherwise of the firm is a function of her ability to respond to needs of the stakeholders. This theory suggests that the firm in respond to the varied stakeholders' requirement conducts its business and activities to ensure the satisfaction of the stakeholders' needs and/or not to compromise any. According to Trotman (1999), the stakeholders' theory proposed an increased level of environmental awareness which creates the need for companies to extend their corporate planning to include the non traditional stakeholders like the regulatory adversarial groups in order to adapt to changing social demands. The resolution by organisations of different and conflicting expectations of different stakeholders is what stakeholders theory engages in (Uwuigbe and Olayinka, 2011).Historically, stakeholder theory is traceable to the works of Ian Mitroff, who in his book 'Stakeholders of the Organisational Mind' published 1983 in San Francisco detailed the stakeholders of an organisation. Similarly, in late 1983, Edward Freeman made an article on Stakeholder theory in the California Management Review without reference to Ian Mitroff but rather credited the concept to internal discussion in the Stanford Research Institute (Miles, 2012). Stakeholder theory states that firm's success is dependent on the success of management's ability to manage relationships of firm with its stakeholders (Brammer and Millington, 2008); (Munilla and Milles, 2005; Phillips, 2003, both as cited in Appiah, Du and Boamah, 2017). It is a theory that blends organisational management with business ethics thereby addressing morals and values in managing firms or organizations. Strategically, stakeholder theory also blends firm's internal management view with numerous views of shareholders, resource sources, market expectation, social-political expectation and other interest that can crop up. Therefore the theory is usefully explanatory of the rationale behind firms' undertaking of environmental and social engagements in their efforts and their part of the contract (Cho and Pattern, 2007).

After due consideration of the legitimacy, resource dependency and stakeholders theories, the study found the stakeholders theory as not only superior but suited to the perspective of the research. The study is therefore anchored on stakeholders' theory given that it provides substantial theoretical basis for firms' indulgence in environmental costs and remediation. The unprecedented and growing concerns on environmental costs, remediation, firms' environmental responsiveness and responsibility, the consciousness of the public to firms' environmental obligations (whether voluntary or otherwise) as well as the clarion calls for governments to institute strong standards and regulatory frameworks for environmental management that will spur firms to mandatory responsibility are the concerns of a wide range of stakeholders who are directly and indirectly affected by the activities of firms that affect the environmentand its natural ability to service the present and future generations.These concerns by numerous stakeholdersare both generic and successiveand form the platform on which this study was conceptualized having practically overshot the ontological limits of firms within which the narrowed concerns and perspectivesof the shareholders are paramount. In view of the conceptual framework and scope of this study as well as the generic and successive concerns of numerous stakeholders which form the fulcrum of environmental costs and remediation, an equivalent theoretical framework is imperative to match these considerations. Additionally, the dependent variables of the study are proxies of three measures of firm performance (financial performance, market performance and shareholders returns) which are beyond the interest of shareholders.The expanded performance measurements capture the concerns of wide range of stakeholders whose perceptions have tremendous implication on firm survival. This study, therefore found Stakeholders theory asappropriate.

2.3 Empirical Review

This study did not find any documented research on the effect of environmental costs on firm performances at Sub Sahara Africanregional level. However, scanty research evidences were found on the subject matter on specific countries in Sub Saharan Africa while international literatures provided elaborate studies in this area.

Studies in South Africa

Huckle (1995) conducted a study on the relationship between profitability and environmental responsibility for industrial or mining companies in South Africa and confirmed that the profitability of a company in the industrial or mining sectors of the Johannesburg Stock Exchange is unrelated to the level of environmental responsibility demonstrated by that company.Wingard (2001) studied financial performance of environmentally responsible South African listed companies. The study utilized annual financial statements for active companies listed in Jonesburg Stock Exchange for periods ranging from 1994 to 1998 to ascertain the correlation between environmental responsibility and financial performance. The study found a slim positive correlation between financial performance and environmental responsibility. Wingard and Vorster (2001) carried out an in-depth examination of the financial performance of environmentally responsible South African listed companies. Using correlation analysis, they argued that a positive relationship existed betweenenvironmental responsibility and financial performance of South African listed companies. Delmas and Nairn-Birch (2010) examined the impact of greenhouse gas emissions (ghg) on firm financial performance. Interestingly, their findings indicated that increasing carbon emissions resulted in a positive impact on firm financial performance when employing accounting based measures of financial performance, while the same linkage was negativewhen using market-based measures of firm financial performance.Oberholzer and Prinsloo(2011) carried out study on South African gold mining firms. Using multiple environmental performance proxies such as green house emission, water usage and energy usage as independent variables, the study revealed that gold mining firms did not realize economic gain from efficient use of the environmental variables. Focusing on South African mining firms, Nyirenda, Ngwakwe and Ambe(2013) carried out a study on environmental management practices and firm performance using shareholders return measure of firm performance(Return on Equity) as proxy. The result from the study revealed lack of significant relationship between the dependent and independent variables.

Studies in Nigeria

Related empirical evidences were obtained from Nigeria. Drawing evidence from sixty Nigerian manufacturing companies, Ngwakwe (2008) studied environmental responsibility and firm performance.The study used only Return on Total Assets (ROTA) as proxy for financial performance and disaggregated environmental responsibility into employee health and safety (EHS), waste management (WM), and community development (CD) and revealed that environmental responsibility affect financial performance in Nigeria. The study further revealedthat the sustainable practices of the ‘responsible’ firms are significantly related with firm performance and sustainable practices are inversely related with fines and penalties. The study concluded that within the Nigerian setting at least, sustainability affects corporate performance. Oti, Effiong and Tiesieh (2012) conducted a study on environmental costs and implication on return on investment for manufacturing firms in Nigeria and revealed a positive relationship between return on investment and environmental costs.

Peter, Sunday and Tapang (2012) studied environmental costs and its implication on the returns on investment with finding that shows that investment in social and environmental responsibilities are related to improved return on investment. From disclosure angle, Oba, Fodio and Soje (2012) investigated the value relevance of environmental responsibility information disclosure using evidence from eighteen (18) environmentally sensitive listed firms in Nigerian for the year 2005-2009. The study revealed a positive and significant relationship between quality of environmental disclosure and financial performance and vice versa. Adediran and Alade (2013) studied the impact of environmental costs on corporate performance. With secondary data collected from annual reports of fourteen companies randomly selected and analyzed using multiple regression analysis, it was revealed that a significant negative relationship exist between environmental costs and Return on Capital Employed and Earnings per Share.

Drawing research evidences from oil companies in Niger Delta Nigeria Ifurueze , Etale and Bingilar(2013), conducted a study on the impact of environmental cost on corporate performance. The study which applied multiple regression analysis investigated the possible relationship between corporate performance and three selected indicators of sustainable business practices: community development cost (CDC), waste management cost (WMC) and employee health and safety cost (EHSC). The study revealed that sustainable business practices and corporate performance are significantly related given that sustainability may be a possible tool for corporate conflict resolution as evidenced in the reduction of fines, penalties and compensations paid to host communities of oil companies. Therefore, the researchers recommended that the management of oil companies in the Niger Delta States of Nigeria should develop a well articulated environmental costing system in order to guarantee a conflict free corporate atmosphere needed by managers and workers for maximum productivity and eventually improve corporate performance.

Arong, Ezugwu and Egbere (2014) conducted a study on environmental cost management and profitability of oil sector in Nigeria. Using multiple regressions to analyze data obtained from the Central Bank of Nigeria (CBN) that covered 2004 to 2013, the study revealed that there exist a significant relationship between influence of environmental cost management and the profitability of oil sector in Nigeria. Extending to corporate social responsibility, Osisioma, Nzewi and Okoye(2015), carried out a study on corporate social responsibility and performance of selected firms in Nigeria and revealed a significant relationship between social responsibility cost and corporate profitability. The study concluded that social responsibility was vital to organizationalperformance and recommended that firms in Nigeria should increase their commitment to social responsibility by setting aside substantial amount of their income to social responsibility programmes. Also on corporate social responsibility and drawing evidence from selected listed firms in the Nigeria Stock Exchange,Omodero and Ihendinihu (2016) carried out a study on impact of environmental and corporate social responsibility accounting on organizational financial performance. Using five years time series data of selected companies quoted in the Nigerian Stock Exchange, the study revealed that oil companies' CSR expenditure cannot be compared with the destructive effect of their activities in the host communities. Similarly, Agbiogwu, Ihendinihu and Okafor (2016) conducted a study on the impact of environmental and social costs on performance of manufacturing companies in Nigeria. Adopting non-experimental design for 2014 data of ten randomly selected companies, the study found out that environmental and social costs significantly affect net profit margin, earnings per share and return on capital employed. Okoye and Adeniyi (2017), though specifically on a disaggregated cost (environmental protection cost) varied slightly into a study of the effect of environmental protection cost on product price in Nigerian brewery industry. The study discovered that there was negative relationship between environmental regulatory cost and product pricing decision.

Studies in Ghana

Arafat,Warokka and Dewi(2012) conducted a study on environmental costs and firm performances. Using descriptive analysis, the study revealed an inverse U shape relationship which commenced on a positive trend and thereafter nose-dive into a negative relationship. Appiah, Du and Boamah(2017) did an empirical study of the effect of environmental performance on firms' performance. The study applied total cash cost and capital expenditure as proxies for firm performances and energy consumption, water consumption and carbon emission as proxies for environmental performance. The study revealed mixed relationships between the variables.

Studies inTanzania

Daniel (2013) carried out a study on effect of Environmental regulations on financial performance of manufacturing companies in Tanzania. The study used regression analysis with a sample of five (5) selected listed manufacturing companies and found out that environmental compliance has no significant effect on the financial performance of listed financial companies in Tanzania. Extending to corporate social responsibility and drawing from Tanzania perspective, Isanzu and Fengju (2016) conducted a study on impact of corporate social responsibility on firms' financial performance. The study which adopted content analysis on one hundred and one companies for three years period covering 2010 to 2012 revealed that return on assets(ROA) and return on investment(ROI) of companies that engage in corporate social responsibility are significantly different from those that do not.

Studies outside Sub Saharan Africa

Ampleresearchevidences in related study were found in the literatures. Wallay and Whitehead (1994) conducted a study on British listed companies. Using proxies of environmental performances as independent variables on shareholders performance indicators, the study confirmed a significant negative relationship between environmental management and shareholders returns. For Indian listed firms, a study by Palmer, Oates and

Portey(1995) revealed also a strong negative relationship between return on investment and environmental costs. Klassen and McLaughlin (1996) proposed a theoretical model aimed at establishing a linkage between strong environmental management and improved future financial performance. Using empirical methods, the study discovered that significant positive financial returns were measured for strong environmental management while significant negative financial returns were measured for weak environmental management. Hart and Ahuja (1996) studied the relationship between emissions reduction and firm financial performance. The study, using return on equity, return on assets and return on sales as some of their variables, revealedthat a relationship between emissions reduction and return on equity could only be partially confirmed but that adopting pollution prevention systems positively influences company performance (return on sales and return on assets). Turban, and Greening (1997) conducted a study on the effect of corporate social performance and organizational attractiveness to prospective employees and found out that qualified employees are influenced by the social responsibility habits of their potential employers. This finding has positive implications for job satisfaction and productivity and is a wake up call for companies to take corporate social performance seriously especially in the present competitive labour market where quality of a company's employees serve a vital part in its value placement and competitive strategy.

Inquisitively, Balabanis, Philips and Lyal (1998), sought to ascertain the link between corporate Social responsibility and economic performance using return on capital employed and return on assets and revealed a positive relationship between theindependent and dependent variables.Also from an inquisitive background as to whether corporate global environmental standards create or destroy market values, Dowell, Hart and Young (2000), found answers to the effect that environmental performances and compliance to environmental standards positively impact firm performances. Lankoski (2000) in his doctoral dissertation analyzed, at firm level, the relationship, between environmental performance and economic performance. The research evidences of the studydemonstrated an inverted U-shaped association between environmental and financial performances and revealed a correlation between environmental performance and economic performance. It further suggested that this relationship is case- specific and dynamic, and it varies in accordance with six main determinants of environmental profit (technology, regime, visibility, willingness to pay, benchmarks, and discount rate). In their study, McWilliams and Siegel (2000) investigated the correlation or misapplication of corporate social responsibility and financial performance and arrived at an informative finding which statistically shows that research and development expenditure tends to erode the immediate financial benefits of a company's environmental investment.

Wagner(2005) in his study revealed an inverse U shape relationship between the environmental performance proxies and firm performances.Applying empirical methods, King and Lenox (2001) investigated whether a causal relationship existed between firm's environmental management practices and firm financial performance. The main thrust of their study was to test whether other underlying firm's attributes had a direct effect on this relationship. The resultrevealed a link between a measure of environmental management practices and firm financial performance, but failed to illustrate the direction of this linkage. In a similar vein, Hillman and Kein(2001) investigated the bottom line implication of the relationship between shareholder value, stakeholder management and social issues and found out that not all social investment may yield return in a financial form but may boost corporate competitive strategy and be of strategic value. ForKonar and Cohen, 2001 as cited in Appiah, Du and Boamah (2017) the relationship between environmental performance and firm performance remains validly positive.Interestingly, King and Lenox(2002) measured company performance in two ways: return on assets (ROA) and Tobin's Q. Their study produced a result signifying that reducing environmental pollution through prevention of waste is profitable (albeit moderately) contrary to ex-post waste treatment for which no attributable positive economic effect exist.Watson, Klingenberg, Polito, and Geurts (2004) in their study analyzed the impact of several environmental management systems (EMS) on company performance, using both accounting and market indicators without any proof of a positive relationship between adoption of an EMS and economic-financial performance.Extending to corporate social responsibility Tsoutsoura(2004) studied the relationship between corporate social responsibility and financial performance and came to the conclusion that a positive relationship exists between them.

In their study on the relationship between environmental performance and financial performance, Filbeck and Gorman (2004) found a positive relationship between financial and environmental performances; and to demonstrate this point, the study regressed three-year holding period returns against environmental penalty magnitudes. Al-Tuwaijri, Christensen and Hughes, (2004) investigated the combined relationship between environmental disclosure, environmental performance, and economic performance for 198 firms appearing in Wall Street Journal Index, listed in IRRC's directory and generated at least 1 pound of toxic waste per $10,000 of revenue in 1994. The study found significant and positive relationship between good environmental performance and more extensive quantifiable environmental disclosure and also a significant and positive relationship between environment performance and economic performance. It also observed a positive relation between past environmental disclosure and current environmental performance. Coming from the perspective of environmental performance disclosure, Freedman and Patten (2004) sought for evidence on the pernicious effect of financial report on environmental disclosure for one hundred and twelve (112) USA firms included on EPA's listing of top 500 toxics releasing companies for 1987. The study revealed that firms with worse pollution performance (as per mandatory TRI data) suffered more negative market reactions. However, companies with more extensive voluntary environmental disclosures suffered less negative market reactions.

Wagner,VanPhu, Azomahou, and Wehrmeyer (2002) and Wagner (2005) explored the relationship between environmental and economic performance. Energy and water usage was used as one of the variables and the results showed no significant relationship between environmental and financialvariables.Paton and Elsayed, (2005) as cited in Appiah, Du and Boamah (2017) carried out a study on the effect of environmental performance on firm performances but found a neutral implication of such engagement.Lars and Henrik (2005) carried out a study on the value relevance of environmental performance with critical emphasis on the effect of environmental information on the market value of listed companies is Sweden using a residual income valuation model. The study revealed that environmental information disclosed by sample companies has value relevance since it is expected to affect the future earnings of the listed companies. Salama (2005) used regression analysis to measure the impact of environmental performance on financial performance. The findings showed that a positive relationship existed between environmental performance and firm financial performance and revealed a positive relationship between environmental responsibility and financial performance of a company. Gonzalez-Benito and Gonzalez-Benito (2005) taking sample from 186 industrial companies from 2002 Dun and Bradstreet census of 50,000 largest Spanish firms having more than 100 employees, conducted a study on the relationship of environmental proactivity and financial performance and found no single, precise or significant association between environmental proactivity and business performance. However, it argued that environmental proactivity and environmental management practices can provide competitive opportunities to firm, but also warned that some environmental practices have negative impact on business performance. Finally, no evidence was found to support that environmental proactivity ends in higher profitability, at least in short term.

Drawing research evidences from Swedish firms listed in Stockholm Stock Exchange over a period of 9 quarters from June 30, 1998 to September 30, 2000, Hassel, Nilsson and Nyquist (2005) investigated association between environmental and financial performance and applied residual income valuation model (modified version of Ohlson, 1995 Model) and used data on cum-dividend market value of equity, environmental performance ratings from caring company environmental index, disclosures in interim and annual reports, dummy and control variables. The study found negative relationship between environmental ratings and market value of equity. The findings of the study have enormous implications for companies that pollute the environment with the propensity of washing away their future solvency as earnings drop. Bansal and Gao, (2006) as cited in Appiah, Du and Boamah(2017) did an empirical study on the relationship between environmental performance and firm performance with result that confirms a positive relationship.With UK evidence from disaggregate measures, Brammer, Brooks and Pavelin (2006) carried out an inquest into the relationship betweencorporate social performance and stock returns, the study revealed negative correlation between environmental and financial performance (as measured by stock returns) and asserted that negative relation between aggregate social performance and stock returns can be largely attributed to environmental dimension due to large amount of expenditures involved in it. For Telle (2006) in a similar study that used OLS regression it was found out that there is a positive relationship between environmental performance and financial performance but no relationship was found using a random effects estimator.Coming from corporate reporting perspective, Montabou, Sroufe and Narasimhan (2007) conducted an examination of corporate reporting, environmental management practices and firm performances. The result of the study lends credence to the predictions that environmental performances portend positive impact on firm performance.

Nakao, Nakano, Amano, Kokubu, Matsumura, and Gemba(2007a) investigated corporate environmental and financial performances and the effects of information-based instruments of environmental policy in Japan. The study which utilized recycling, pollutant release and transfer register (PRTR), environmental accounting and carbon emissions as proxies for the dummy independent variable, applied Tobin's Q minus 1 and return on assets as proxies for the dependent variable. The study confirmed that positive effect of corporate environmental activities on financial performance was verified more clearly when information about firms' responses to environmental policies were included with information about environmental management activities. Similarly, Nakao, Nakano, Amano, Kokubu, Matsumura, and Gemba(2007b) took an empirical analysis of the relationship between environmental performance and financial performance for Japanese corporations and came out with the result that firm's environmental performance has positive impact on its financial performance and vice versa with further insight that this trend is not limited to top-scoring firms in terms of both financial and environmental performance. Cormier and Magnan (2007) carried out a study relating environmental performance disclosure and stock market value for French, German and Canadian companies. The study affirmed that interaction between firm's environmental performance disclosure and stock market value depends on reporting context that firms face and that results suggested that additional voluntary environmental reporting potentially reduces cost of equity of German firms; but it has neutral effect for French and Canadian firms.

Clause and Pall, (2008) carried out a study on the implication of environmental investment on investment decision and concluded that environmental information disclosure influences investment allocation decisions. In her study, Horvathova (2010) argued that the inconclusiveness of results regarding the impact of environmental performance onfinancial performance was due to underlying factors. The results of her study showed that the probability of obtaining a negative association between environmental management practices and financial performance drastically increases when using correlation coefficients while the use of panel data techniques and multiple regressions had a neutral effect on the outcomes. Coming from Czech Republic background, Earnhart and Lizal (2010) conducted a study on the effect of corporate environmental performanceon financial outcomes – profits, revenues and costs for 1996 to 1998 and conclusively asserted that better environmental performance improves profitability by driving down costs more than its drives down revenue. Rennings and Rammer (2010) in their study vied into the impact of regulation driven environmental innovation on innovation success and firm performance. Applying data from the German innovation survey, the study revealed that both product and process innovations driven by environmental regulation generate similar success in terms of sales with new products and cost savings as other innovations do. The study observed different effects when examining innovations reacting to environmental regulation.

Iwata and Okada (2011) carried out a comprehensive study on the impact of carbon emissions on firm financial performance in Japan. The study examined this relationship in Japanese manufacturing firms for a five-year period and employed return on equity as one of their measures of firm financial performance. They discovered that carbon emission reductions increase long run firm financial performance.The study also provided scientific evidence demonstrating how different effects on economic-financial performance correspond with different environmental indicators, in both sign and value. Yang, Hong, and Modi (2011) who studied the impact of lean manufacturing and environmental management practices on business performance, measured environmental management practices against market and financial performancesand their study discovered that a negative relationship existed between the two variables. In their study on the relationship between eco-efficiency and firm performances, Guenster, Bauer, Derwall and Koedijk (2011) confirmed that eco-efficient firms have higher returns on equity thereby proving research existence of a positive relationship between eco-efficiency and firm performances, although not linear, between Tobin's Q and environmental performance.

Vijfvinkel and Bouman(2011) investigated environmental sustainability and financial performances of SMEs of Dutch and Chinese firms in terms of profit and revenue developments. The results suggested a significant positive association between environmental sustainability and firm performance. From the study, different indicators of environmental sustainability display a distinct relationship with the two performance measures and further revelations that when firms have a policy on the re-usage of materials they perform significantly better in terms of profit development and when firms have a policy on the reduction of pollution they perform significantly better in terms of revenue development.Arafat, Warokka and Dewi (2012) conducted a study on Indonesian manufacturing firms using return on assets as proxy for dependent variable and revealed that environmental performance has significant influence on financial performance. Makori and Jagongo (2013) conducted an empirical analysis on environmental accounting and firm profitability on selected listed firm in India and revealed a significant negative relationship between environmental accounting and return on capital employed.An inquest into the dynamics of environmental and financial performance by Delmas,Nairn-Birch, and Lim(2015) applied greenhouse gas emission as a proxy for environmental performance, two indicators of corporate performance and established that in the short run, improving corporate environmental performance causes a decline in return on assets but manifested an increase in Tobin’s q-1 which signifies that investors see the potential long-term value of improved environmental performance.Gallego-Alvarez,Segura and Martínez-Ferrero (2015) relying on data from sample of international firms from countries not restricted to USA, France, Japan, Italy, Portugal etc, carried out a study on the impact of Carbon emission reduction on the financial and operational performance of international companies with study revealing that companies promote greater environmental behaviour in order to obtain higher financial performance and that there is no evidence of that on operational performance.Drawing research evidence from Italian companies, Bartolacci, Paolini, Soverchia and Zigiotti (2016) specifically investigated the relationship between waste management and financial performance. The study carried out economic-financial analysis on these firms by calculating several balance sheet indicators particularly return on investment, return on sales, working capital turnover ratio with the results of the analysis performed not showing a clear and evident relationship, positive or negative, between the profitability of companies operating in the sector of collection, treatment and disposal of municipal solid waste(MSW) and separate collection (SC).

2.4Tabulated and Summarized Empirical Reviews

	Author Name/Year	**Scope of study**	**Independent Variable/Indicators**	**Dependent Variable/Indicators**	**Findings**
	South Africa	**Empirical Studies**			
1	Huckle (1995)	Industrial or mining in South Africa	Environmental responsibility indicators	Net Profit Margin	Profitability is unrelated with environmental responsibility
2	Wingard(2001)	Listed companies in South Africa	Environmental responsibility indicators	Financial performance indicators like ROE, ROA, Profit margin	Using correlation analysis, the study showed a slim positive correlation between environmental responsibility and financial performance.
3	Wingard and Vorster (2001)	Listed companies in South Africa	Environmental responsibility indicators	Financial performance indicators	Positive relationship established between environmental responsibility and financial performance.
4	Delmas and Nairn-Birch (2010)	Mining firms in South Africa	Environmental performance indicators such as greenhouse gas emissions (ghg)	Financial performance indicators	Using accounting based measure of Financial performance, increasing carbon emissions resulted in a positive impact on firm financial performance, while the same linkage was negative when using market-based measures of firm financial performance
5	Oberholzer and Prinsloo (2011)	South African Gold mining firms	Environmental performances using as proxies ghg emission, water usage, and energy usage	Financial performance	The study found out that gold mining firms did not realize economic gain from efficient use of their environmental variables.
6	Nyirenda, Ngwakwe and Ambe (2013)	Mining firm in South Africa	Environmental management practices indicators	Shareholders return indicator such as ROE.	With multi collonearity analysis on secondary data for nine years, the result revealed lack of significant relationship between the dependent and independent variables.
	Nigerian	**Empirical Studies**			
7	Ngwekwe (2008)	Manufacturing companies in Nigeria	Environmental responsibility disaggregated into Employee Health, Community development and waste management	Financial performance indicator as such Return on total assets(ROTA)	By multiple regression analysis, the study revealed that environmental responsibility affect financial performance in Nigeria. Further, that sustainable practices of the 'responsible' firms are significantly related with their performance and sustainable practices are inversely related with fines and penalties.
8	Oti, Effiong and Tiesieh (2012)	Manufacturing firms in Nigeria	Environmental costs	Return on investment	Through multiple regression analysis, the study revealed a positive relationship between return on investment and environmental costs.

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

9	Peter, Sunday and Tapang (2012).	Manufacturing companies in Nigeria	Environmental costs	Returns on investment	The finding shows that investment in social and environmental responsibilities are related to improved return on investment
10	Oba, et al (2012)	Environmentally sensitive firms listed in Nigeria.	Environmental Disclosure Index Scores using 12 checklist items and rating on scale of 0-1 using content analysis	Return on Capital Employed	The study found positive & significant relationship between quality of environmental disclosure & financial performance and vice versa
11	Adediran and Alade (2013)	Listed companies in Nigeria	Environmental costs	Corporate performance such as Return on Capital Employed and Earnings per Share	Study used multiple regression and revealed a significant negative relationship between environmental costs and Return on Capital Employed and Earnings per Share
12	Ifurueze , Etale and Bingilar(2013)	Oil Companies in Niger Delta Nigeria	Environmental costs disaggregated into Employee Health and safety, community development and waste management.	Corporate performance indicators.	Study revealed that sustainable business practices and corporate performance are significantly related given that sustainability may be a possible tool for corporate conflict resolution as evidenced in the reduction of fines, penalties and compensations paid to host communities of oil companies.
13	Arong, Ezugwu and Egbere (2014)	Oil Sector in Nigeria	Environmental cost management	Profitability	Using multiple regression, their study revealed that there exist a significant relationship between influence of environmental cost management and the profitability of oil sector in Nigeria.
14	Osisioma, Nzewi and Okoye(2015)	Selected listed firms in Nigeria	Corporate Social responsibility	Corporate performance	Utilizing pearson's product moment correlation, the study revealed a significant relationship between social responsibility cost and corporate profitability.
15	Omodero and Ihendinihu (2016)	Selected listed oil firms in Nigeria	Environmental and corporate social responsibility accounting	financial performance	Study found out that oil companies' CSR expenditure cannot be compared with the destructive effect of their activities in the host communities.
16	Agbiogwu, Ihendinihu and Okafor (2016),	Manufacturing companies in Nigeria	environmental and social costs	Corporate performance indicators such as net profit margin, earnings per share and return on capital employed.	The study found out that environmental and social costs significantly affect net profit margin, earnings per share and return on capital employed
17	Okoye and Adeniyi (2017	Breweries industries in Nigeria/	Disaggregated environmental protection cost	Product price	The study discovered that there was negative relationship between

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

					environmental regulatory cost and product pricing decision.
	Ghanaian	**Empirical study**			
18	Arafat, et al (2012)	Listed firms in Ghana	Environmental costs	Firm performance proxies	Using description analysis, the study revealed an inverse U shape relationship, commencing on the positive and thereafter nose-dive to negative relationship.
19	Appiah, Du and Boamah (2017).	Listed Firms in Ghana	Environmental performance indicators such as energy consumption, water consumption and carbon emission	Firm performance indicators such as total cash cost and capital expenditure	The study revealed mixed relationships between the variables
	Tanzanian	**Empirical Studies**			
20	Daniel (2013)	Manufacturing companies in Tanzania	Environmental regulation proxies	Financial performance indicators	The study found out that environmental compliance has no significant effect on the financial performance of listed financial companies in Tanzania
21	Isanzu and Fengju (2016)	Listed companies in Tanzania	Corporate social responsibility	Financial performance proxies such as return on assets, return on investment.	The study revealed that return on assets (ROA) and return on investment (ROI) of companies that engage in corporate social responsibility are significantly different from those that do not.
	Studies Outside	**Sub Saharan Africa**			
22	Walley and Whitehead (1994)	British listed companies	Environmental management proxies	Shareholders performance indicators	The study revealed a significant negative relationship between environmental management and shareholders' returns.
23	Palmer, Oates and Portey (1995)	Listed firms in India.	Environmental costs	Return on investment	The study revealed a strong negative relationship between return on investment and environmental costs.
24	Klassen and McLaughlin (1996)	Indonesian listed firms	Environmental management proxies	Financial performance indicators.	Using empirical method, the study revealed that significant positive financial returns were measured for strong environmental management while significant negative financial returns were measured for weak environmental management.
25	Hart and Ahuja (1996)	Listed companies in United States of America	Environmental management practice like emissions reduction, and	Financial performance indicator such as return on equity, return on assets	The investigation revealed that a relationship between emissions reduction and return on equity could only be partially confirmed and

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

			pollution control.	and return on sales	thatadopting pollution prevention systems positively influences company performance (return on sales and return on assets)
26	Turban, and Greening (1997)	British listed companies	Corporate social performance	Organizational attractiveness to prospective employees	It was revealed that qualified employees are influenced by the social responsibility habits of their potential employers.
27	Balabanis, Philips and Lyal (1998)	British listed companies	corporate Social responsibility	Economic performance proxies such as return on capital employed and return on assets.	It was revealed that a positive relationship exists between the independent and dependent variables.
28	Dowell, Hart and Young (2000)	British listed firms	Environmental performance indicators	Firm performances	The study found answers to the effect that environmental performances and compliance to environmental standards positively impact firm performances
29	Lankoski (2000)	Listed firms in Finland.	Environmental performance indictors	Economic performance	The research evidences of the studydemonstrated an inverted U-shaped association between environmental and financial performance and revealed a correlation between environmental performance and economic performance. It further suggested that this relationship is case- specific and dynamic, and it varies in accordance with six main determinants of environmental profit (technology, regime, visibility, willingness to pay, benchmarks, and discount rate).The research evidences of the study revealed a correlation between environmental performance and economic performance.
30	McWilliams and Siegel (2000)	British listed firms	Corporate social responsibility with research and development cost as proxy	Financial performance	The result shows informative finding which statistically shows that research and development expenditure tends to erode the immediate financial benefits of a company's environmental investment
31	King and Lenox (2001).	Publicly traded U.S. manufacturing firms.	Environmental management practices : Total emissions, Relative emissions and Industry emissions	Firm financial performance indicators like Tobin's Q	Using empirical methods, study finds evidence of association between pollution reduction and financial gain. It also shows that firms in cleaner industries have higher Tobin's Q, but unable to rule out possible confounding effects from fixed firm attributes. It was discovered

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

					that a link exists but failed to illustrate the direction of this linkage.
32	Hillman and Kein(2001)		Social issues	Shareholders value and stakeholders management	It was found out that not all social investment may yield return in a financial form but may boost corporate competitive strategy and be of strategic value
33	Konar and Cohen (2001)		Environmental performance	Firm performance	The study came to the conclusion that the relationship between environmental performance and firm performance remains validly positive.
34	Wagner (2001)		Environmental performance proxies	Firm performanc	The study revealed an inverse U shape relationship between the dependent and independent variables.
35	Wagner,VanPhu, Azomahou, and Wehrmeyer (2002)	British paper industry	Environmental performance with Energy and water as variables	Economic performance	Using empirical methods, the study revealed no significant relationship between environmental and financialvariables.
36	King and Lenox(2002)		Environmental waste management	Financial performance using return and assets and Tobin Q	Their study produced a result signifying that reducing environmental pollution through prevention of waste is profitable (albeit moderately) contrary to ex-post waste treatment for which no attributable positive economic effect exist.
37	Tsoutsoura (2004)		Corporate social responsibility	Financial performance	The study found out that a positive relationship exists between them.
38	Al-Tuwaijri et al. (2004)	198 firms appearing in Wall Street Journal Index, listed in IRRC's directory selected based on toxic waste criterion.	Environmental performance measured by ratio of toxic waste recycled to total toxic waste generated and Environmental Disclosure Score based on 4 indicators.	Financial performance measured by Industry-adjusted annual return; measured by change in stock price during the year (adjusted for dividends)	The study found significant and positive relationship between good environmental performance and more extensive quantifiable environmental disclosure and also a significant and positive relationship between environment performance and economic performance. It also observed a positive relation between past environmental disclosure and current environmental performance.
39	Watson, Klingenberg, Polito, and Geurts (2004)		Environmental management systems	Corporate performance using accounting and market indicators such as return on assets and return on equity.	The study offered no proof of a positive relationship between adoption of an EMS and economic-financial performance

Source: Empirical Review by this study

	Tabulated and Summarized Empirical Reviews CONTINUED				
40	Filbeck and Gorman (2004)		Environmental performance indicator such as environmental penalty	Financial performance with annual	It was revealed that a positive relationship exist between financial and environmental performance.
41	Freedman and Patten (2004)		Proxies of environmental disclosure such as voluntary positive environmental performance disclosure scores, voluntary litigation-related environmental disclosure scores (ranging from 0 to 3); and mandatory toxic releases information	Firm performance proxies such as changes in market value of firm (Firm-Specific Market Reactions)	Study found that firms with worse pollution performance (as per mandatory TRI data) suffered more negative market reactions However, companies with more extensive voluntary environmental disclosures suffered less negative market reactions. Further, litigation disclosure variable was not found to be statistically significant.
42	Wagner (2005)	British paper industry	Environmental performance with Energy and water as variables	Economic performance	Utilizing empirical methods, the results showed no significant relationship between environmental and financialvariables.
43	Elsayed and Paton (2005)		environmental performance	firm performances	The result of the study shows a neutral implication of such engagement
44	Lars and Henrik (2005).	Sweden listed companies	environmental information	Market value with residual income valuation model	The study revealed that environmental information disclosed by sample companies has value relevance since it is expected to affect the future earnings of the listed companies.
45	Gonzalez-Benito and Gonzalez-Benito (2005)	Spanish firms having more than 100 employees.	Environmental responsibility using return on assets.	Financial Performance	Though no evidence was found to support that environmental proactivity ends in higher profitability, at least in short term, the study found no single, precise or significant association between environmental proactivity and business performance. It argued therefore that environmental proactivity and environmental management practices can provide competitive opportunities to firm, but some environmental practices have negative impact on business performance.
46	Salama (2005)		environmental performance	Financial performance.	Study utilized regression analysis. The findings showed that a positive relationship existed between environmental performance

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

					and firm financial performance and revealed a positive relationship between environmental responsibility and financial performance of a company.
47	Hassel, Nilsson and Nyquist(2005)	Sweden listed companies	Environmental information	market value using residual income valuation model	The study revealed that environmental information disclosed by sample companies has value relevance since it is expected to affect the future earnings of the listed companies with effect tended towards the negative direction.
48	Bansal and Gao, (2006)		environmental performance	Financial performance	The result of the study confirms existence of positive relationship
49	Brammer, Brooks and Pavelin (2006)	British companies.	Corporate social performance	Stock Returns	The study revealed negative correlation between environmental and financial performance (as measured by stock returns) and asserted that negative relation between aggregate social performance and stock returns can be largely attributed to environmental dimension due to large amount of expenditures involved in it.
50	Telle (2006)		Environmental performance	Financial performance	The study found out that there is a positive relationship between environmental performance and financial performance but no relationship was found using a random effects estimator
51	Nakao et al. (2007a)	Listed corporations in Japan	Environmental Scores and 4 dummy variables: Recycling, Pollutant Release and Transfer Register (PRTR), Environmental Accounting, and CO2 emissions	Tobin's Q minus 1 and return on assets	Using data from 1999-2003, study showed that positive effect of corporate environmental activities on financial performance was verified more clearly when information about firms' responses to environmental policies were included with information about environmental management activities.
52	Nakao et al. (2007b)	Listed corporations in Japan	Performance Score	Tobin's q minus 1 , and earnings per share	The study revealed that firm's environmental performance has positive impact on its financial performance and vice versa. They also observed that this trend is not limited to top-scoring firms in terms of both financial and environmental performance.

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

53	Montabou, Sroufe and Narasimhan (2007)		Corporate reporting and environmental management practices	Firm performances	The result of the study lends credence to the predictions that environmental performances portend positive impact on firm performance.
54	Cormier and Magnan (2007)	237 French firms, 308 German firms and 580 Canadian firms.	Environmental performance disclosures	Stock market value	The study affirmed that interaction between firm's environmental performance disclosure and stock market value depends on reporting context that firms face and that results suggested that additional voluntary environmental reporting potentially reduces cost of equity of German firms; but it has neutral effect for French and Canadian firms.
55	Clause and Pall, (2008)	British listed firms	Environmental investment	Investment decision	It was revealed that environmental information disclosure influences investment allocation decisions.
56	Horvathova (2010)		Environmental performance	Financial performance	Study applied correlation, panel data techniques and multiple regression analyses. The results of her study showed that the probability of obtaining a negative association between environmental management practices and financial performance drastically increases when using correlation coefficients while the use of panel data techniques and multiple regressions had a neutral effect on the outcomes
57	Earnhart and Lizal (2010)	Companies in Czech Republic	corporate environmental performance	financial outcomes – profits, revenues and costs	The study conclusively asserted that better environmental performance improves profitability by driving down costs more than its drives down revenue.
58	Rennings and Rammer (2010)	Companies in German	Environmental innovation	Innovation success and firm performance.	The study revealed that both product and process innovations driven by environmental regulation generate similar success in terms of sales with new products and cost savings as other innovations do and observed different effects when examining innovations reacting to environmental regulation.

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED					
59	Delmas and Nairn-Birch(2010)	South African listed firms	Green house emission	Financial performances using accounting based proxies and market proxies.	Result revealed mixed result. Whereas a positive impact was revealed in accounting based proxies, the market based proxies showed a negative impact.
60	Iwata and Okada (2011)	Japan manufacturing firms	Environmental performance with carbon emissions as proxy	Financial performance using return on equity as proxy	The study discovered that carbon emission reductions increase long run firm financial performance. The study also provided scientific evidence demonstrating how different effects on economic-financial performance correspond with different environmental indicators, in both sign and value
61	Guenster, Bauer, Derwall and Koedijk (2011)	USA listed firms.	Eco-efficiency indicators	Firm performance indicators like return on equity, Tobin's Q	The study confirmed that eco-efficient firms have higher returns on equity thereby proving research existence of a positive relationship between eco-efficiency and firm performances, although not linear, between Tobin's Q and environmental performance.
62	Yang, Hong, and Modi (2011)	Indonesian firms	Lean Manufacturing and environmental management practices	Financial and market performances	The study discovered that a negative relationship existed between the two variables.
63	Vijfvinkel and Bouman (2011)	SMEs of Dutch and Chinese firms	Environmental sustainability	Financial performance both on profit and revenue development.	The results suggested a significant positive association between environmental sustainability and firm performance and also a varied relationship from different indicators of environmental sustainability. It was further revealed that when firms have a policy on the re-usage of materials they perform significantly better in terms of profit development and when firms have a policy on the reduction of pollution they perform significantly better in terms of revenue development.
64	Arafat, Warokka and Dewi(2012)	Indonesian manufacturing firms	Environmental performance proxy	Return on assets as proxy for firm performance.	The empirical results reveal that environmental performance has significantly influenced financial performance of the Indonesian manufacturing firm.
65	Makori and Jagongo (2013)	Selected Indian Firms	Environmental accounting	Firm Profitability	Study applied descriptive and multiple regression analyses. The study revealed a

Source: Empirical Review by this study

Tabulated and Summarized Empirical Reviews CONTINUED

					significant negative relationship between environmental accounting and Return on Capital Employed.
66	Delmas,Nairn-Birch, and Lim(2015)	Listed corporations in United States of America	Environmental performance using green house emission	Corporate performance indicators such as , return on assets and Tobin's *q*.	The study revealed that improving corporate environmental performance causes a decline in an indicator of short-term financial performance such as return on assets. Nonetheless, investors see the potential long-term value of improved environmental performance, manifested by an increase in Tobin's *q*.
67	Gallego-Alvarez,Segura and Martínez-Ferrero(2015)	Sample of international firms from countries not limited to USA, France, Japan, Italy, Portugal etc	Carbon emission reduction using carbon dioxide emissions as indicator	Financial and Operational performance using return on equity and return on assets as proxies.	The study revealed that companies promote greater environmental behaviour in order to obtain higher financial performance. Nonetheless, the findings do not show evidence for operational performance.
68	Bartolacci, Paolini, Soverchia and Zigiotti(2016)	Italian listed companies.	Solid waste management	Financial management using return on assets, return on investment, working capital turnover ratio as indicators	The results of the analysis performed did not show a clear and evident relationship, positive or negative, between the profitability of companies operating in the sector of collection, treatment and disposal of municipal solid waste(MSW) and separate collection (SC)

Source: Empirical Review by this study

2.5 Summary of Literature

The study examined the effect of environmental costs on performances of quoted firms in Sub Saharan Africa. In doing this, chapter two provided the conceptual and theoretical foundation as well as empirical evidence for the study. In this endeavour various classes of theories were discussed and stakeholders' theory was adopted under the theoretical framework and finally several local and international research works of notable authors were reviewed.

From the literatures reviewed, over 75% of the studies concentrated on single country including those in Sub Saharan Africa while 25% covered expanded studies of more than a country. None of the expanded studies that covered more than a single country focused on Sub Saharan Africa rather on European countries. The dependent variables used in most of the studies were only those of financial performance measurements such as net profit margin, return on assets, return on capital employed(Huckle,1995; Wingard,2001; Wingard and Vorster, 2001; Ngwakwe,2008; Oti, Effiong and Tiesieh ,2012; Oba, et al,2012; Delmas,Nairn-Birch, and Lim, 2015; Appiah, Du and Boamah , 2017). In few cases, measures of shareholders returns and market performances were used as single indicators or combination of indicators.Studies by Al-Tuwaijri et al.(2004); Iwata and Okada (2011); Nyirenda, Ngwakwe and Ambe (2013) used single variables of market performance while Lars and Henrik (2005); Hassel, Nilsson and Nyquist(2005); Nakao et al. (2007b); Cormier and Magnan (2007); Yang, Hong, and Modi (2011); Adediran and Alade (2013)used combination of financial and market performance indicators in their studies. From the literatures reviewed, a combination of indicators of shareholders' returns, financial and market performances was not used.

With the exception of studies by Ngwakwe (2008) and Ifurueze, et al (2013) which disaggregated environmental costs into employee health and safety, community development and waste management costs and proximate to the predictor variables of this study, other studies reviewed either used single proxy for environmental costs, applied environmental costs as an aggregate ordisaggregated environmental costs into other variables different from the ones mentioned above. In their studies,Delmas and Nairn-Birch (2010) used only greenhouse gas emissions (ghg); Iwata and Okada (2011)appliedonly carbon emission; Wagner,VanPhu, Azomahou, and Wehrmeyer (2002)used energy and water usage asa single variable; Wagner (2005) used energy and water usage also as a single variable;Oberholzer and Prinsloo (2011) used ghg emission, water usage, and energy usage whileAppiah, Du and Boamah (2017) used energy consumption, water consumption and carbon emission as multiple proxiesof environmental costs.

From the findings of the empirical reviews, a consensus is still lacking on the effect of environmental cost on firm performances, indicating that no clear and distinct direction has been established on the effect of environmental costs on totality of firm performances (shareholders returns, financial and market performances). Whereas studies byKing and Lenox (2001);Al-Tuwaijri et al.(2004); Freedman and Patten (2004);Nakao et al.(2007a); Nakao et al. (2007b);Guenster, et al.(2011); Oba, et al.(2012) have found positive relationship, studies byHassel, et al.(2005); Brammer, et al.(2006); Nyirenda, et al.(2013); Adediran and Alade (2013) have revealed negative relationship.Gonzalez-Benito and Gonzalez-Benito(2005); Cormier and Magnan(2007)have demonstrated neutral relationship while studies by Lankoski (2000); Appiah, et al.(2017)confirmed mixed relationship.

2.6 Gap in Literature

From the reviewed literatures, most of the studies done to examine the effect of environmental costs on firm performance revealed the following gaps:

1. Majority of the studies reviewed concentrated on single country analysis and to the best of our knowledge, no study was found on Sub Saharan Africa on regional analysis. Expanded studies that covered more than a single country were only found outside Sub Saharan Africa.
2. The variables used by most of the studies reviewed were mainly financial performance indicators. In few cases, combination of indicators of either financial and market performances or financial performance and shareholders returns were used. This study did not find studies that have a combination of indicators of shareholders returns, financial and market performances.
3. Majority of the studies reviewed,used either single proxy for environmental costs, applied environmental costs as an aggregate ordisaggregated environmental costs into other variables different from the ones used by this study. The few exceptions of studiesthat used the same predictor variablesas used by this study (employee health and safety, community development and waste management costs) as observed in the studies by Ngwakwe (2008) and Ifurueze et al (2013), however sufferedsome shortcomings on the scope having been restricted to Nigeria only.
4. There are clear inconsistencies and disagreements in the results obtained by various researchers. King and Lenox (2001); Al-Tuwaijri et al.(2004); Freedman and Patten (2004); Nakao et al. (2007b); Oba, et al.(2012) have found positive relationship while studies by Brammer, et al.(2006); Nyirenda, et al.(2013); Adediran and Alade (2013) have revealed negative relationship. Gonzalez-Benito and Gonzalez-Benito(2005); Cormier and Magnan(2007) demonstrated neutral relationship while studies by Lankoski (2000); Appiah, et al (2017) confirmed mixed relationship.

Based on the observed gaps listed above, this study covered the following:

1. Present an expanded scope on the subject matter beyond a single country to Sub Sahara African regional level.
2. Use a combination of firms' performance measurementvariables of shareholders return, financial and market performances.
3. Use disaggregated environmental costs variables instead of aggregated environmental costs.
4. Validate existing findings of researchers from studies on the effect of environmental costs on firm performances.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

A longitudinal/panel ex-post facto research design was adopted to examine the effect of environmental cost on performance of quoted firms in Sub-Saharan Africa. This type of research design allows features of various non-financial firms at more than one fiscal period. Panel data is a preferred method of longitudinal data analysis because it allows for a number of regression analyses in both spatial (units) and temporal (time) dimensions. Owing to the fact that the financial statements of these firms are available, the researcher is incapacitated from manipulating the data used in the analysis. Following Gujarati(2004), the combination of time series with cross-section data made possible by the use of panel data regression technique, usually improves the degree of freedom and quantity of data which may not be possible when using only one of them.

3.2 Nature and Sources of Data

The study relied on secondary data obtained from annual reports, integrated annual reports and sustainability reports of the firms quoted in the Stock Exchanges of the selected four Sub Saharan Africa countries. Nigerian currencies, naira and kobo, were the presentation currencies for the study. Data from South Africa, Ghana and Tanzania denominated in their respective functional currencies (Rand and cent for South Africa; Ghana Cedi and Peswas, for Ghana; and Shillings and Senti, for Tanzania) were translated to the presentation currency usinghistorical exchange rates prevailing as at December 31 for each year covered in this study. This is in line with International Financial Reporting Standard on foreign exchange conversion, IAS 21, *the effects of changes in foreign exchange rates.* The study used historical exchange rates between one country and another at prior dates determined through on line historical exchange rates wizard called OANDA currency converter (http://www.oanda.com/currency/converter). However, exchange rates obtained through this wizard were confirmed using cross rates.

For multinational group firms whose consolidated annual reports are predominantly reported in dollars or pounds, relevant data for the study reported in the home functional currencies of the parent firms are first apportioned using bases considered fair by the study such as confirmed mineral deposits, percentage global expenditure and number of employee per country to ascertain the attributable data for the affected firms in their study countries and subsequently translated to the functional currency of the affected country before translation to presentation currency (naira and kobo).Accounting years of companies are not usually the same. Whereas most firms studied have 31st December as year-end, few other firms have 30th June as year-end. However, the proportion of firms with latter as year-end is not material and the study deemed it inappropriate to apply exchange rates as at 30th June on data for those firms instead closing rates as at 31st December was uniformly used for all the firms. The effect of not applying closing rates as at June 30, for the few firms is considered insignificant to affect the result of the study.

3.3 Population of Study

The population of the study is drawn from four countries randomly selected from the pool of forty-six countries in Sub Saharan Africa as follows: Nigeria, Ghana, South Africa and Tanzania. The list of the forty-six countries in Sub Saharan Africa which clearly classified according to the sub-regional groupings is in the appendices. The selected countries are justified by the 2015 World Bank US dollar GDP global rating which ranked superior the four randomly selected Anglophone countries in addition to a francophone country, Angola above the rest of Sub Saharan African countries (World Bank, 2017) above. On the basis of sub-regional grouping, two of the countries selected are from West Africa and one each from Southern and East African sub-regions of Sub Saharan Africa. Sub Saharan Africa is sub regionally divided into four groups: West Africa, Southern Africa,East Africa and Central Africa with seventeen (17), ten (10), eleven (11) and eight(8) countries respectively.

As at the end of December 2016, the Stock Exchanges of South Africa, Nigeria, Ghana and Tanzania had four hundred (400), one hundred and seventy-five (175), forty-two (42) and twenty-five (25) quoted firms respectively. This gives a totalof six hundred and forty (642) quoted firms in the four selected countries in Sub Saharan Africa. This study considered this population as too large for research. To bring the study to a targeted and researchable scope, the firms were purposively identified and classified into two groups: high environmentally sensitive and less environmentally sensitive firms. For the targeted scope, a total of one hundred and twelve (112) high environmentally sensitive quoted firms were identified and these comprised of firms in oil and gas exploration, natural resources and mining, general industrial and basic and industrial metals. Country composition of the one hundred and twelve(112) environmentally sensitive firms is as follows:South Africa, seventy(70), Nigeria, thirty-one(31), five(5) in Ghana and six(6) in Tanzania. Therefore the researchable population of the study is 112 high environmentally sensitive firms.

3.4 Sample Size and Sampling Techniques

Through random sampling, Nigeria, Ghana, South Africa and Tanzania were selected for the study and the selection is coincidentally justified by 2015 World Bank global GDP rating which ranked superior the selected countries and Angola above other countries in Sub Saharan Africa (World Bank, 2017).

Using Taro Yamane formula for sample determination, a sample size is derived from the 112 high environmentally sensitive firms as follows:

$$n = \frac{N}{1 + N(e)^2}$$

(Yamane, 1967 in Israel (2012);
Where:
n = sample size
N = Population size
e = Level of precision or margin of error
Given a population of 112, the researcher assumes a margin of error of 8.2%.

Therefore;

$$n = \frac{112}{1 + 112(.082)^2}$$

$$n = \frac{112}{1.753088}$$

$$n = 64$$

Sample size for the study is sixty-four (64) environmentally sensitive firms. Using random sampling, the study selected forty (40), eighteen (18), four (4) and two (2) firms from South Africa, Nigeria, Ghana and Tanzania respectively.The list of the sixty-four selected firms used in the study is inappendices.

Summarily, the study adopted random sampling technique in selecting four(4) countries from a pool of forty-six countries in Sub Saharan Africa and also in selecting forty (40), eighteen(18), four(4) and two(2) from the individual country pools of high environmentally sensitive firms in South Africa, Nigeria, Ghana and Tanzania respectively. Taro Yamane sample determination formula was used to determine and reduce the population to researchable size of sixty-four (64) environmentally sensitive firms. Table 1 shows the constituents of the initial population, targeted high environmentally sensitive firms and the sample size.

Table 1: Summary of Quoted Firms in Population and Sample

S/N	Countries	Number of firms in initial population per country	Number of firms in high environmentally sensitive areas per country.	Number of firms selected to constitute the sample per country
1	South Africa	400	70	40
2	Nigeria	175	31	18
3	Ghana	42	5	4
4	Tanzania	25	6	2
	Total	642	112	64

Source: Observed and derived by this study.

3.5 Model Specification

The study adopted the model used in studies by Ifurueze, Etale and Bingilar (2013), Oti, Effiong and Tiesieh (2012) and Ngwakwe (2008) but modified to incorporate multiple firm performance measures as against single measurement used by theadopted aforementioned studies. To achieve the objectives of the study, three generic models relating proxies of the independent variable (environmental costs) to the proxies of dependent variable (firm performance measurement) are presented below for regional level analysis (that is, all the selected firms in Sub Sahara African pooled together for analysis). To aid comparative analysis of the effect of environmental costs on firm performances in each of the four selected countries, the aforementioned three models are replicated at specific country levels. Therefore the models are formulated at two levels: (1) cross national level,which pooled together the selected firms in Sub Sahara Africa for observation of how the variables play out at the regional level, otherwise termed, Sub Sahara African entity level analysis. (2) national analysis, which formulated models for each of the selected countries, otherwise termed, country specific level analysis.

The generic models of the study described above are as follows:

ROCE=f(EHSC+CDC+WMC) 1

EPS=f(EHSC+CDC+WMC) 2

ROE=f(EHSC+CDC+WMC) 3

Representing the above in matrix form,

$$Y=\beta X_1$$

And in Econometric format:

$$ROCE_{ssa}= \beta_0+\beta_1 EHSC_{ssa}+\beta_2 CDC_{ssa}+ \beta_2 WMC_{ssa} +\mu \quad 4$$

$$EPS_{ssa}= \beta_0+\beta_1 EHSC_{ssa}+\beta_2 CDC_{ssa}+ \beta_3 WMc_{ssa} +\mu 5$$

$$ROE_{ssa}= \beta_0+\beta_1 EHSc_{ssa}+\beta_2 CDc_{ssa}+ \beta_3 WMc_{ssa} +\mu 6$$

Three separate models each for the four selected countries are presented below and are derived from the general model stated above to aid the study to carry out a specific comparison of how disaggregated environmental costs affect firms' performances in the selected countries in Sub Saharan Africa:

South Africa

$$ROCE_{sa}=\beta_0+\beta_1 EHSc_{sa}+\beta_2 CDc_{sa}+\beta_3 WMc_{sa}+\mu \quad 7$$

$$EPS_{sa}= \beta_0+\beta_1 EHSc_{sa}+\beta_2 CDc_{sa}+\beta_3 WMc_{sa}+\mu \quad 8$$

$$ROE_{sa}=\beta_0+\beta_1 EHSc_{sa}+\beta_2 CDc_{sa}+\beta_3 WMc_{sa}+\mu \quad 9$$

Nigeria

$$ROCE_{ng}=\beta_0+\beta_1 EHSc_{ng}+\beta_2 CDc_{ng}+\beta_3 WMc_{ng}+\mu \ 10$$

$$EPS_{ng}= \beta_0+\beta_1 EHSc_{ng}+\beta_2 CDc_{ng}+\beta_3 WMc_{ng}+\mu \quad 11$$

$$ROE_{ng}= \beta_0+\beta_1 EHSc_{ng}+\beta_2 CDc_{ng}+\beta_3 WMc_{ng}+\mu \ 12$$

Ghana

$$ROCE_{gh}=\beta_0+\beta_1 EHSc_{gh}+\beta_2 CDc_{gh}+\beta_3 WMc_{gh}+\mu 13$$

$$EPS_{gh}= \beta_0+\beta_1 EHSc_{gh}+\beta_2 CDc_{gh}+\beta_3 WMc_{gh}+\mu 14$$

$$ROE_{gh}= \beta_0+\beta_1 EHSc_{gh}+\beta_2 CDc_{gh}+\beta_3 WMc_{gh}+\mu 15$$

Tanzania

$$ROCE_{tz}=\beta_0+\beta_1 EHSc_{tz}+\beta_2 CDc_{tz}+\beta_3 WMc_{tz}+\mu 16$$

$$EPS_{tz}= \beta_0+\beta_1 EHSc_{tz}+\beta_2 CDc_{tz}+\beta_3 WMc_{tz}+\mu 17$$

$$ROE_{tz}= \beta_0+\beta_1 EHSc_{tz}+\beta_2 CDc_{tz}+\beta_3 WMc_{tz}+\mu \ 18$$

Where:

ROCE, EPS, ROE, EHS, WM and CD represent return on capital employed, earnings per share, return on equity, employee, health and safety, waste management, community development respectively. ssa, sa ng, gh and tz are used as subscripts to differentiate models of Sub Saharan Africa, South African, Nigeria, Ghana and Tanzania respectively.

β_0 represents the constant term or intercept of the relationship in the model while β_1, β_2, β_3, represent the intercept for Employees, Health and Safety, Waste Management, Community Development respectively and μ represents the stochastic or error term.

3.6 Method of Data Analysis

3.6.1 Panel Data Ordinary Least Square

The Ordinary Least Square (OLS) technique built in panel data analysis was used to estimate the models.Regression analysis is basically concerned with the study of the dependence of one variable (dependent variable) on one or more other explanatory or independent variables (regressors) with the view to finding out or estimating/predicting the mean or average value of the former in terms of known or repeated values of the latter(Gujarati and Porter, 2009).Before estimating the models, diagnostic tests of heteroscedasticity, serial correlation, Ramsey RESET Test, Multi-collinearity and normality test were conducted. This is to ensure that the models are in line with basic econometric assumptions. The panel regression model took the form of the fixed effects model, random effects model and the pooled ordinary least square model in order to establish the most appropriate regression with the highest explanatory power that is better suited to the data set employed in the study, that is, a balanced panel but the pooled ordinary least square in the first instance.

However, in view of the weaknesses associated with it, the fixed effects model and random effect model were conducted to capture the performance of the firms considered in the study. In order to choose the most appropriate model of interpretation, the Hausman specification test was conducted. The Hausman specification test is the conventional test of whether the fixed or random effects model should be used. The question is whether there is significant correlation between the unobserved unit of observation specific random effects and the independent variables. If no such correlation exists, then the random effects model may be more appropriate. But when such a correlation exists, the fixed effects model would be more suitable because the model would be inconsistently estimated.

3.6.1.1 Test of Autocorrelation

When pooled form of data is used, the serial test of correlation is performed to detect the presence of autocorrelation. Autocorrelation in any estimated model may cast dent to the reliability of the regression output.

3.6.1.2 White Test of Heteroskedasticity

This is Language Multiplier (LM) test for autoregressive conditional heteroskedasticity in the residuals. The rationale behind choosing this heteroskedasticity specification was based on the fact that in many financial time series, the magnitude of residuals appears to be related to the magnitude of recent residuals.

3.6.1.3 Ramsey RESET Test

The Ramsey RESET test determine the how well the model was fitted. This is because if non-linear combinations of the independent variables have any power in explaining the dependent variable, the model is not well specified.

3.6.1.4 Test of Multicollinearity

The correlation matrix estimation is a way of detecting multi-collinearity in any model. The presence of multi-collinearity between the independent variable results in a biased regression output.

3.6.2Panel Unit Root Test

In an attempt to estimate the relationship between environmental cost and performance of quoted firms in Sub-Saharan Africa, the first task is to test for the presence of unit root. This is necessary in order to ensure that the parameters are estimated using stationary time series data. Thus, this study seeks to avert the occurrence of spurious results. To do this, both the Levin, Lin and Chu (LLC) Testand Breitung panel unit root tests were employed. The null hypothesis of the LLC test is that the variable is stationary. The null hypothesis of stationarity is accepted only when the p-value is less than 0.05. On the other hand, the Breitung panel unit root test method differs from LLC in two distinct ways. First, only the autoregressive portion (and not the exogenous components) is removed when constructing the standardized proxies. Second, the proxies are transformed and detrended.

3.6.3Granger Causality Test

The Granger Causality test was used to examine the effect of environmental cost on performance of quoted firms in Sub-Saharan Africa. Granger Causality approach ascertains the extent to which current performance of quoted firms can be explained by past values of environmental cost. Whenenvironmental cost helps in the prediction of performance of quoted firms, then performance of quoted firms is said to be Granger caused by environmental cost. Alternatively, environmental cost is said to be Granger caused by performance of quoted firms when the coefficients on the lagged of financial reporting quality of performance of quoted firms are statistically significant.

3.6.4Kao Residual Co-integration Test

Kao panel Co-integration test is an Engle-Granger based co-integration for panel data. Kao (1999) noted that the null hypothesis of no co-integration for panel data exists in two test. The first is a Dickey-Fuller types test while the other is an Argumented Dickey-Fuller type test.

3.6.5Vector Error Correction Mechanism

The essence of the VECM is to ascertain if or not all the variations in dependent variable were as a result of the co-integrating vectors trying to return to equilibrium and the error correction term that captures this variation.

3.6.6 Pedroni Residual Co-integration

The Pedroni Residual co-integration is a panel co-integration test for heterogeneous panels with multiple regressors. The null hypothesis of Pedroni's test is no co-integration, and the test allows for unbalanced panels, including heterogeneity in both the long-term co-integration vectors. There are seven panel co-integration statistics, first part is based on the within dimension approach, including the panel *v* statistic, the panel *rho* Statistic, the panel *PP* statistic and the panel *ADF* statistic; the second part is based on the between-dimension approach, including the group *rho* statistic, the group *PP* statistic and the group *ADF* statistic

3.7 Criteria for Result Interpretation

The criteria for judging interpretation of result and discussion of findings for this research were all based on three global statistics criteria namely, Adjusted R-Squared, F-Statistic and Durbin Watson test of autocorrelation. The satisfaction by a model of these three global statistics as well as relative use of model, inferences from such estimated model cannot be statistically relied upon.

3.7.1 Coefficient of Determination (R^2): It measures the proportion of the total variation in the dependent variable that is jointly explained by the linear influence of the explanatory variable. The value of R^2 lies between zero and one, that is, $0<R^2<1$ with values close to 1 indicating a good degree of fit.

3.7.2 FStatistic: The F-statistic is used to test whether or not there is a significant relationship between the dependent and independent variable in the regression equation. If the probability at which the F- values significant is less than the chosen level of significance, then we accept that there is a significant relationship between the dependent and independent variables in the regression equation.

3.7.3 Durbin Watson Statistic: The Durbin-Watson test for autocorrelation compare the calculated d value from the regression residuals with the dL and du in the Durbin Watson tables and with their transforms (4-dL) and (4-du). The result of the serial correlation LM test overrides the Durbin Watson test of autocorrelation. The serial correlation LM test is superior and preferred to Durbin Watson in testing autocorrelation.

3.8 Level of Significance

The significance level for the study is 5%. It is provided to accommodate likely errors, inconsistencies and estimation errors associated with the data generated for the study, the process of generating the data and subsequent analysis. This translates to a 95% level of reliability for the study.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Presentation of Data

The mean data of the selected firm as computed by E-views 9.0 software via the criteria of *Mean Plus SD Bound* are detailed in this sub-section. The data used for the analysis were drawn from annual reports ofselectedfirms spanning from 2007 to 2016. The average data on return on capital employed, earnings per share, return on equity, waste management cost, community development cost and employee and health safety cost are presented in Table 2.

Table 2:Average Data on Return on Capital Employed, Earnings per Share, Return on Equity, Waste Management Cost, Community Development Cost and Employee and Health Safety Cost from 2007 to 2016

Year	Return on Capital Employed (%)	Earnings per Share	Return on Equity (%)	Waste Management Cost	Community Development Cost	Employee and Health Safety Cost
2007	2.60	2597	4.60	109.00	90.00	105.00
2008	3.10	4200	6.50	78.00	119.00	109.00
2009	16.60	5404	3.70	172.00	177.00	165.00
2010	-5.60	2723	-8.90	169.00	230.00	175.00
2011	0.90	2447	-3.00	125.00	202.00	143.00
2012	5.80	2317	9.50	96.00	261.00	143.00
2013	0.20	1670	0.80	98.00	275.00	154.00
2014	0.70	1720	1.80	110.00	257.00	139.00
2015	-4.50	-371	-10.90	121.00	229.00	141.00
2016	-1.70	1093	-2.90	112.00	235.00	122.00

Source: Annual Reports of selected quoted firms from 2007 to 2016; and output data from e-views 9.0.

4.1.1 Trend in Environmental Cost

Waste Management Cost

Waste management cost was 109.00 in 2007, and reduced to96.00 by the end of 2012.The waste management cost of quoted firms in Sub-Saharan Africa continued to decline from 2013 to 2016. From 2007 to 2016, as shown in Table 2, Fig. 1 and 2,waste management cost of quoted firms in Sub-Saharan Africa gradually rose, though with marginal fluctuation from 109.00 in 2007 to 112.00 in 2016.

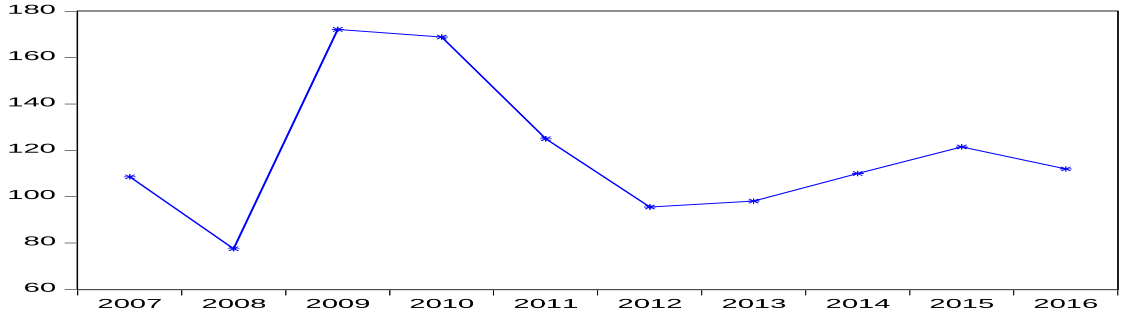

Fig. 1: Graphical Trend in Waste Management Cost from 2007 to 2016

Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

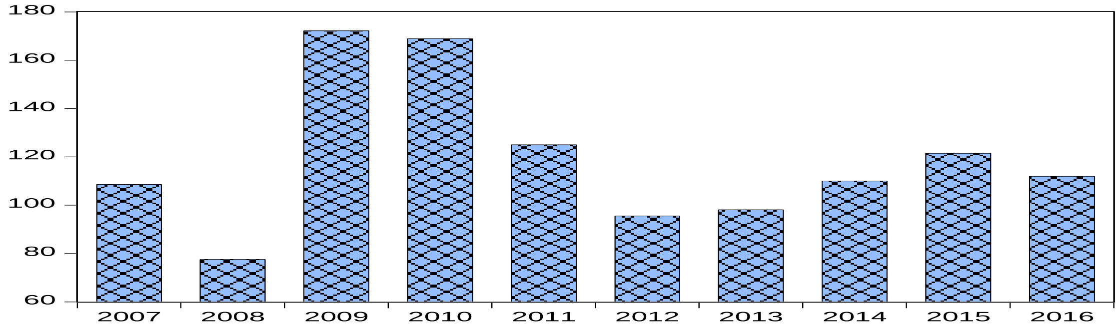

Fig. 2: Bar Chart Trend in Waste Management Cost from 2007 to 2016

Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

Community Development Cost

Community development cost was approximated to 90.0 in 2007but increased to 202.00 in 2011. From 2007 to 2011, community development cost ranged from 90.00 to 202.00. It increased to 261.00 in 2012 but reduced to 235.00 in 2016. The trend in community development cost of listed firms in Sub-Saharan Africa is shown in fig. 3 and 4.

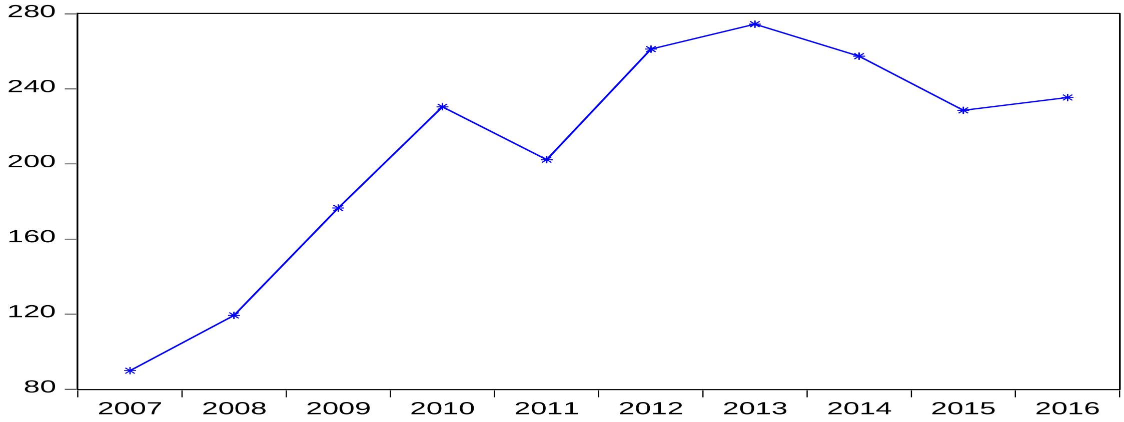

Fig. 3: Graphical Trend in Community Development Cost from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

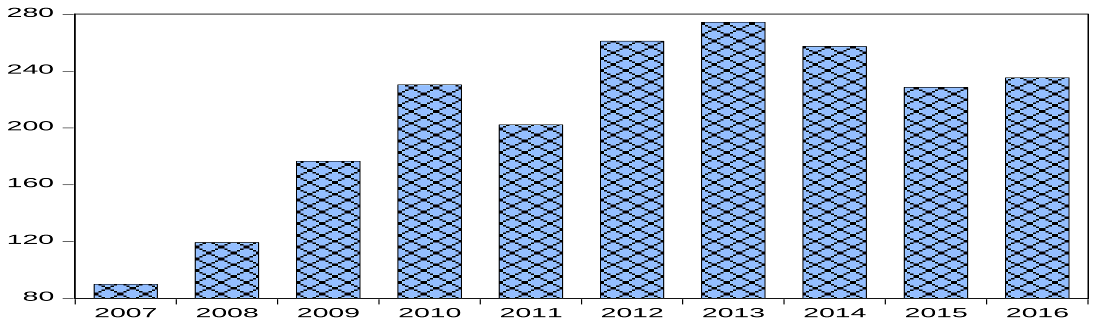

Fig. 4: Bar Chart Trend in Community Development Cost from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

Employees Health and Safety Cost

Employees health and safety cost was approximated to 105.00 in 2007 which appreciated to 261.00 in 2012. From 2007 to 2011, employees' health and safety cost ranged from 105.00 to 143.00. However, there was a reduction in 2016 as employees' health and safety cost was valued at 122.00. The trend in employees' health and safety cost of selected quoted firms in Sub-Saharan Africa is shown in fig. 5 and 6.

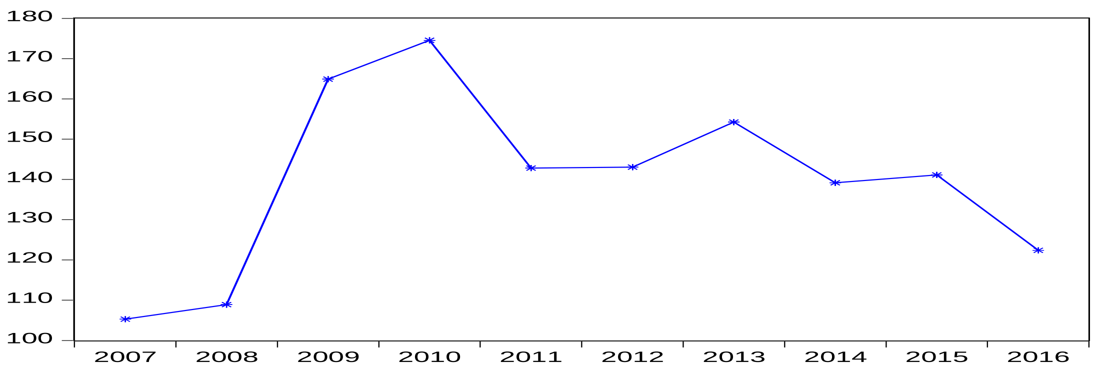

Fig. 5: Graphical Trend in Employees Health and Safety Cost from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

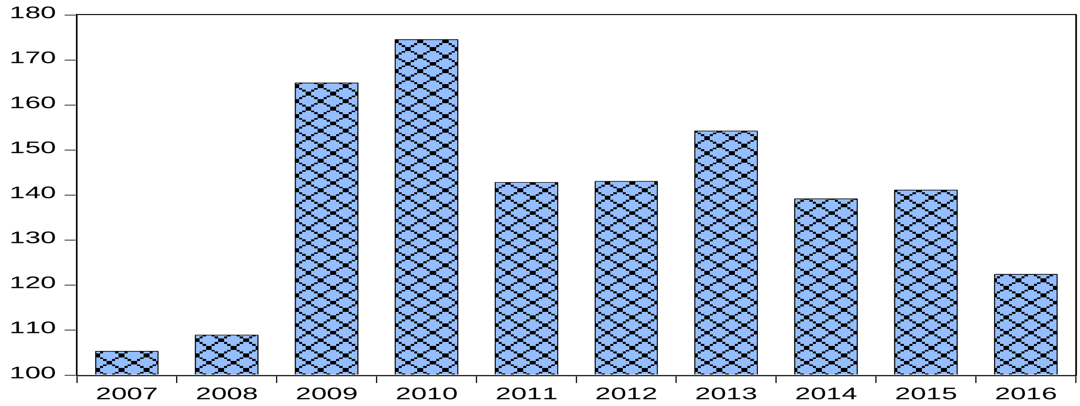

Fig. 6: Bar Chart Trend in Employees Health and Safety Cost from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

Return on Capital Employed

In 2007, return on capital employed of selected quoted firms in Sub-Saharan Africawas 2.60%. It rose to 16.60% in 2009 but later declined to -5.90 in 2010. It appreciated marginally from 2011 to 2014 before declining to -4.50 and -170 in 2015 and 2016 respectively as revealed in Fig. 7 and 8.

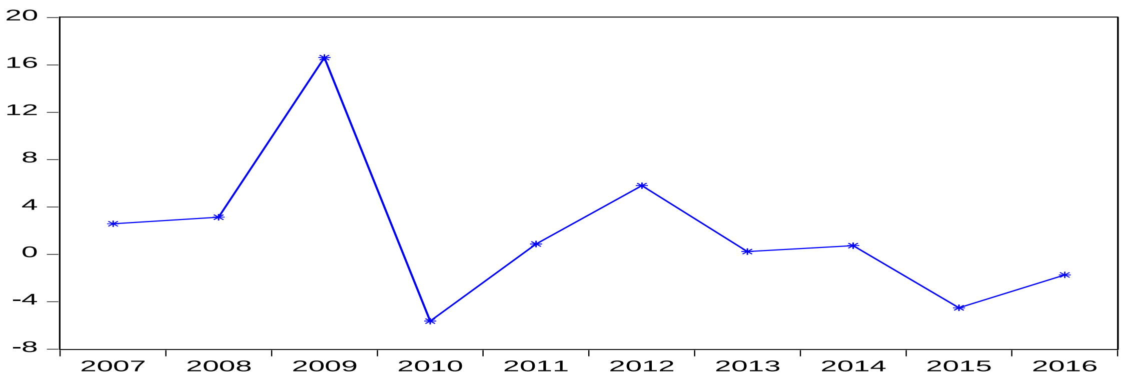

Fig. 7: Graphical Trend in Return on Capital Employed from 2007 to 2016*Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0*

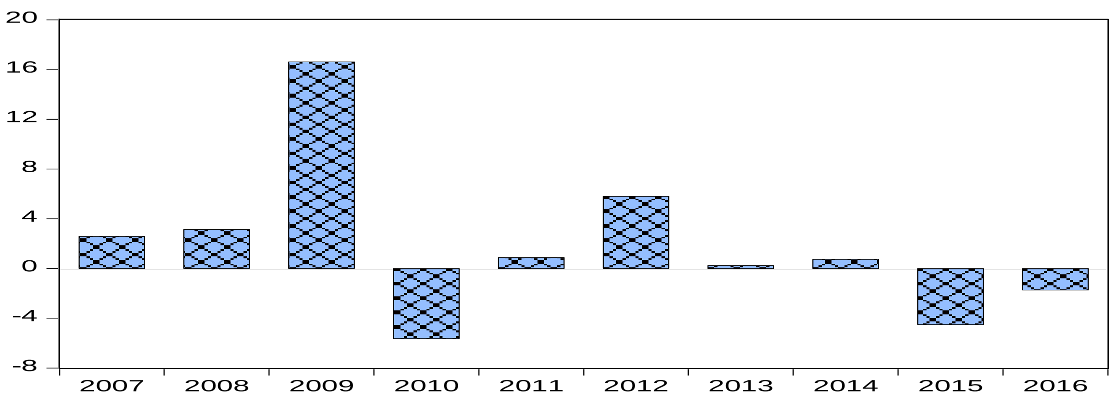

Fig. 8: Bar Chart Trend in Return on Capital Employed from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

Earnings per Share

Table 2, Fig.9 and Fig. 10 show that the trend in earnings per share of selected quoted firms in Sub-Saharan Africa. During this period 2007 to 2016, it decreased considerably from 2597 to 1093, a depreciation of over 100%. The earnings per share of selected quoted firms in Sub-Saharan Africa at the end of 2016 appreciated to 1093 compared to -371 in 2015.

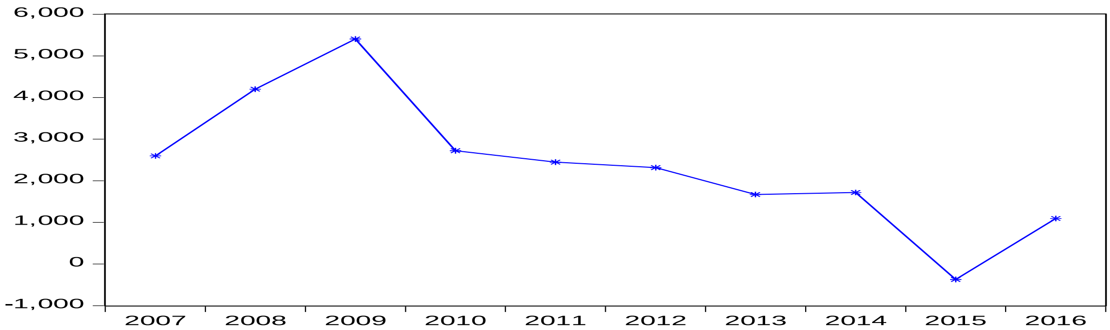

Fig. 9: Graphical Trend in Earnings per Share from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

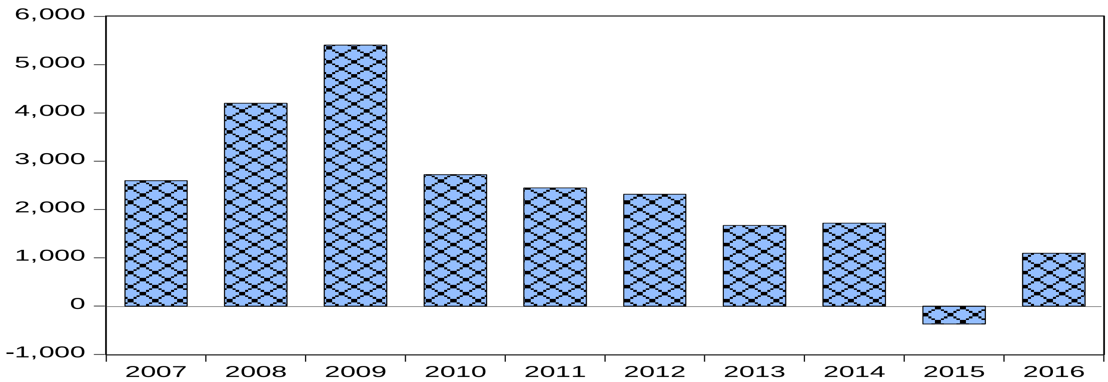

Fig. 10: Bar Chart Trend in Earnings per Share from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

Return on Equity

The average return on firms' shareholder wealth has experienced volatility over the years. From 2.60% in 2007, it depreciated to -1.70% in 2016. Between 2010 and 2014average return on equity rose from -5.60% to 0.70%. Fig. 11 and 12 illustrate the trend in return on equity over the period reviewed.

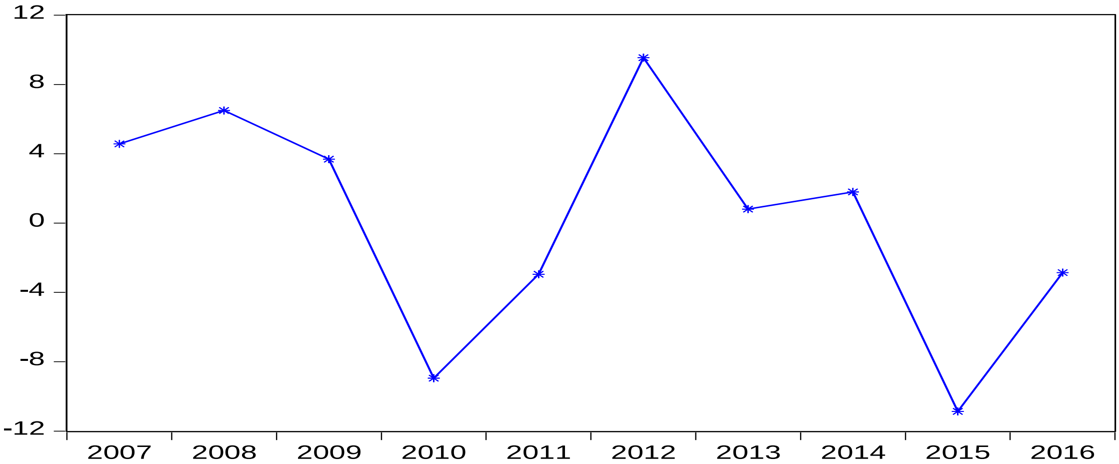

Fig. 11: Graphical Trend in Return on Equity from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

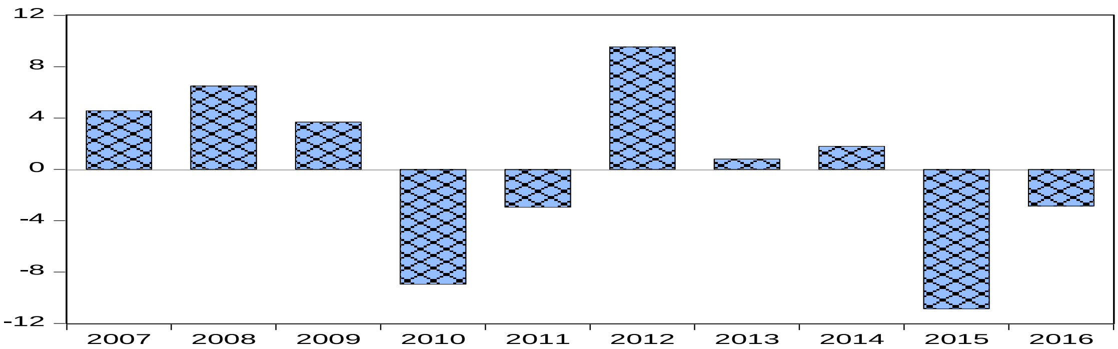

Fig. 12: Bar Chart Trend in Return on Equity from 2007 to 2016
Source: Annual Reports of selected quoted firms in Sub Saharan Africa from 2007 – 2016; and output data from e-views 9.0

4.2 Descriptive Properties of the Data

Table 3 details the descriptive properties of the data used in the analysis. The mean values of the dependent and independent variables: ROCE, EPS, ROE, WMC, CDC and EHSC are 1.83, 2387.51, 0.15, 118.98, 208.01 and 139.86 respectively, while the median of the study variables are 1.10, 0.00, 2.00, 7.30, 34.45 and 2778.60. The maximum values of the series are 1000 for ROCE, 275026.8 for EPS, 173.20 for ROE, 1419.50 for WMC, 5072.00 for CDC and 2778.60 for EHSC, whereas the minimum values are -466.20, -60518.40, -728.40, 0.00. 0.00 and 0.00 respectively for ROCE, EPS, ROE, WMC, CDC and EHSC. The standard deviations of the variables are 47.43, 14875.50, 48.35, 210.42, 506.98 and 318.43 for ROCE, EPS, ROE, WMC, CDC and EHSC respectively. The skewness, which is a measure of asymmetry of the distribution of the series around its mean, shows that all the variables were positively skewed towards normality except ROE. The Kurtosis that measures the peakedness of the distribution for all the variables are more than 3.0 which evidences that variables are leptokurtic in nature except WMC.

Table 3: Descriptive Properties of Data

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P-value	Obs
ROCE	1.834295	1.100000	1000.000	-466.2000	47.42872	12.91289	324.1527	2759511	0.000000	638
EPS	2387.512	0.000000	275026.8	-60518.40	14875.50	12.30539	202.9958	1079390	0.000000	638
ROE	0.149091	2.000000	173.2000	-728.4000	48.35039	-8.498283	107.3576	297185.6	0.000000	638
WMC	118.9832	7.300000	1419.500	0.000000	210.4224	2.676527	11.45394	2661.636	0.000000	638
CDC	208.0122	34.45000	5072.000	0.000000	506.9780	5.117662	36.13380	31969.40	0.000000	638
EHSC	139.8621	27.95000	2778.600	0.000000	318.4482	4.297693	26.27646	16366.67	0.000000	638

Source: Output data from E-views 9.0

The p-values of the Jarque-Bera for all the variables are significant at 5% level which implies that all the variables are normally distributed and free from any outlier that may affect the regression output.

4.3 Panel Unit Root Test

4.3.1 Levin, Lin and Chu (LLC) Test

At level and first difference at individual intercept and trend the LLC test was performed. The null hypothesis of the LLC test is that the variable is stationary. The null hypothesis of stationarity is accepted only when the p-value is less than 0.05. The result of the LLC test in Tables 4 and 5 performed in level form at individual intercept and individual intercept and trend disclose that all the variables have unit root.

Table 4: LLC Test Result at Level: Individual Intercept

Variables	LLC Test Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	-243.034 (0.00)*	-0.92020	-224.245	Stationary
EPS	-11.4980 (0.00)*	-0.77675	-18.173	Stationary
ROE	-50.2008 (0.00)*	-0.90695	-47.787	Stationary
WMC	-8.15793 (0.00)*	-0.94636	-17.573	Stationary
CDC	-8.14018 (0.00)*	-0.71928	-16.312	Stationary
EHSC	-12.6854 (0.00)*	-0.96611	-21.067	Stationary

Source: Computer Output using E-view 9.0.

Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

Table 5: LLC Test Result at Level: Individual Intercept and Trend

Variables	LLC Test Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	-167.805 (0.00)*	-0.91584	-169.859	Stationary
EPS	-24.1305 (0.00)*	-1.30234	-34.300	Stationary
ROE	-28.2826 (0.00)*	-0.96575	-31.097	Stationary
WMC	-12.4967 (0.00)*	-1.37019	-25.924	Stationary
CDC	-11.4379 (0.00)*	-1.42352	-26.186	Stationary
EHSC	-16.2856 (0.00)*	-1.13041	-26.010	Stationary

Source: Computer Output using E-view 9.0.
Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

The LLC unit root result in Tables 6 and 7 at individual intercept and trend of first difference show that the p-values of LLC test statistic for all the variables are significant at 5% level of significance. The null hypothesis that the variables have unit root at first difference is accepted. Hence, all the variables are stationary at first difference at the 5% level of significance and integrated of order zero 1(0) and order one 1(1).

Table 6: LLC Test Result at First Difference: Individual Intercept

Variables	LLC Test Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	-90.9229 (0.00)*	-0.92504	-86.577	Stationary
EPS	-20.1866 (0.00)*	-1.52761	-29.758	Stationary
ROE	-18.0266 (0.00)*	-1.12368	-21.783	Stationary
WMC	-14.7183 (0.00)*	-1.66528	-25.808	Stationary
CDC	-13.5313 (0.00)*	-1.71714	-25.279	Stationary
EHSC	-14.9117 (0.00)*	-1.35229	-23.477	Stationary

Source: Computer Output using E-view 9.0.
Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

Table 7: LLC Test Result at First Difference: Individual Intercept and Trend

Variables	LLC Test Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	-37.1831 (0.00)*	-0.96413	-42.950	Stationary
EPS	-16.6267 (0.00)*	-1.72760	-30.570	Stationary
ROE	-8.71517 (0.00)*	-1.58035	-19.786	Stationary
WMC	-18.3777 (0.00)*	-1.69601	-31.130	Stationary
CDC	-18.5483 (0.00)*	-1.63793	-29.450	Stationary
EHSC	-12.6218 (0.00)*	-1.57473	-26.262	Stationary

Source: Computer Output using E-view 9.0.
Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

4.3.2 Breitung Unit Root Test

The Breitung method differs from LLC in two distinct ways. First, only the autoregressive portion (and not the exogenous components) is removed when constructing the standardized proxies. Second, the proxies are transformed and detrended. Consequently, the test was only performed level and first difference at individual intercept and trend only. The null hypothesis of the Breitung unit root test is that the variable is stationary which must be accepted if the p-value is less than a specified level of significance but not more than 10% level of significance. However, 5% level of significance was utilized for the environmental cost and firm performance of selected quoted firms in Sub-Saharan Africa. Table 8 depicts the result of the level form test at individual intercept and trend while Table 9 that of first difference at individual intercept and trend.

Table 8: Breitung Unit Root Testat Level: Individual Intercept and Trend

Variables	Breitung t- Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	3.57297 (0.99)	0.12964	3.573	Not Stationary
EPS	0.51427 (0.70)	0.02344	0.514	Not Stationary
ROE	4.34843 (1.00)	0.14879	4.348	Not Stationary
WMC	0.94098 (0.83)	0.04656	0.941	Not Stationary
CDC	-0.14065 (0.44)	-0.00668	-0.141	Not Stationary
EHSC	6.52365 (1.00)	0.22805	6.524	Stationary

Source: Computer Output using E-view 9.0.

Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), No spectral estimation method for Breitung unit root test, p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

Table 9: Breitung Testat First Difference: Individual Intercept and Trend

Variables	Breitung t- Statistic	Pooled Coefficient	Pooled t-Stat.	Remark
ROCE	-4.53334 (0.00)*	-0.34876	-4.533	Stationary
EPS	-0.01767 (0.42)	-0.00141	-7.018	Stationary
ROE	-9.08996 (0.00)*	-0.00640	-9.090	Stationary
WMC	-3.30691 (0.00)*	-0.22984	-3.307	Stationary
CDC	-2.69899 (0.00)*	-0.17058	-2.699	Stationary
EHSC	-4.15167 (0.00)*	-0.28378	-4.152	Stationary

Source: Computer Output using E-view 9.0.

Note: The optimal lag for LLC test is selected based on the Schwarz Info Criteria (SIC), No spectral estimation method for Breitung unit root test, p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

The panel unit root test in Tables 5, 6 and 8reveal that all the variable are stationary at first difference. The result of the panel unit root test through LLC and Breitung show that all the variables are stationary at first difference and free from stationarity defect associated with most time series data, hence permitting for the testing of the long run co-integration relationship between the variables.

4.4 Model Diagnostic Test

4.4.1 Test of Autocorrelation

Using the pooled form of the data, the serial correlation test was performed in a bid to detect the presence of autocorrelation. Autocorrelation in any estimated model may cast a dent to the reliability of the regression output. The serial correlation test in Table 10 dispels that the p-value of the f-statistic is insignificant at 5% level of significance which is an indication the variables are serial uncorrelated.

Table 10: Serial Correlation LM Test

Regression Estimates	T-statistic	P-value
ROCE →WMC+CDC+EHSC	1.066605	0.3810
EPS →WMC+CDC+EHSC	0.279184	0.8120
ROE →WMC+CDC+EHSC	0.490410	0.1060

Source: Output data from Gretl

4.4.2 White Test of Heteroskedasticity

This is Language Multiplier (LM) test for autoregressive conditional heteroskedasticity in the residuals. The rationale behind choosing this heteroskedasticity specification was based on the fact that in many financial time series, the magnitude of residuals appears to be related to the magnitude of recent residuals. The p-value of the Chq. statistic Table 11is insignificant at 5% level of significance, suggesting that the model has no heteroskedasticity issue.

Table 11: White Heteroskedasticity test

Regression Estimates	T-statistic	P-value
ROCE →WMC+CDC+EHSC	0.834212	0.9997
EPS →WMC+CDC+EHSC	0.077955	0.4427
ROE →WMC+CDC+EHSC	0.941401	0.7320

Source: Output data from Gretl

4.4.3. Ramsey RESET Test

The Ramsey RESET test determine the how well the model was fitted. This is because if non-linear combinations of the independent variables have any power in explaining the dependent variable, the model is not well specified. The p-valueof the t-statistic in Table 12 is insignificant at 5% level of significance. The alternate hypothesis that the model is well specified could not be rejected.

Table 12: Ramsey Reset Specification

Estimates	T-statistic	P-value
ROCE →WMC+CDC+EHSC	0.125112	0.8820
EPS →WMC+CDC+EHSC	1.070572	0.3430
ROE →WMC+CDC+EHSC	0.119324	0.8880

Source: Output data from Gretl

4.4.4 Test for Multicollinearity

The correlation matrix estimation is a way of detecting multi-collinearity in any model. The presence of multi-collinearity between the independent variable results in a biased regression output. The correlation matrix in Table 13 indicates that the highest correlation between the environmental cost variables is 0.39 for WMC and EHSC. The correlation of 0.39 between waste management cost and employee health and safety cost is within the acceptable range of no high correlation. In this regard, this study concludes that there is no multi-collinearity issue between the environmental cost variablesused in the analysis.

Table 13: Correlation Matrix

	ROCE	EPS	ROE	WMC	CDC	EHSC
ROCE	1.000000	0.051189	0.537875	-0.017518	0.008256	0.006077
EPS	0.051189	1.000000	0.099880	0.097992	0.102060	0.099558
ROE	0.537875	0.099880	1.000000	-0.002611	0.038974	0.027608
WMC	-0.017518	0.097992	-0.002611	1.000000	0.294807	0.398807
CDC	0.008256	0.102060	0.038974	0.294807	1.000000	0.387858
EHSC	0.006077	0.099558	0.027608	0.398807	0.387858	1.000000

Source: Output data from E-views 9.0

4.5 Panel Co-integration Test

The result of LLC and Breitung unit root test in Tables 6, 7 and 9have shown that all the variables were integrated of order zero 1(0) and order one i.e. 1(1) for LLC and order one 1(1) for Breitung. Thus, no stationarity defect that affect the regression result thus ascertaining the presence of log run relationship becomes permissible. The co-integration relationship between the variables were estimated using the Kao's and Pedroni residual co-integration tests as it applies to panel data.

4.5.1 Kao Residual Co-integration Test

The structural criteria for estimation of the Kao panel Co-integration test is based on Engle-Granger. Kao (1999) noted that the null hypothesis of no co-integration for panel data exists in two test. The first is a Dickey-Fuller types test while the other is an Argumented Dickey-

Fuller type test. Table 14 depicts the Kao's co-integration test for environmental cost and firm performance of selected quoted firms in Sub Saharan Africa.

Table 14: Kao Residual Co-integration Test

Models Estimated	Argumented Dickey-Fuller	
	t-Statistic	**Prob.**
ROCE →WMC+CDC+EHSC	4.241378	0.0000
EPS →WMC+CDC+EHSC	-6.789672	0.0000
ROE →WMC+CDC+EHSC	-5.794769	0.0000

Source: Computer output data using E-views 9.0

Notes: The ADF is the residual-based ADF statistic. The null hypothesis is no co-integration. (*) and (**) indicate that the estimated parameters are significant at the 1% and 5% level respectively.

The p-value of the t-statistics is significant at 5% level of significance, which is the rejection of the null hypothesis of no co-integration for financial reporting quality and corporate governance. This is to say that firm performance of selected quoted firms in Sub Saharan Africa is related in long run with environmental cost: waste management cost, community development cost and employees' health and safety cost.

4.5.2 Pedroni Residual Co-integration

The Pedroni Residual co-integration is a panel co-integration test for heterogeneous panels with multiple regressors. The null hypothesis of Pedroni's test is no co-integration, and the test allows for unbalanced panels, including heterogeneity in both the long-term co-integration vectors. There are seven panel co-integration statistics, first part is based on the within dimension approach, including the panel *v* statistic, the panel *rho* Statistic, the panel *PP* statistic and the panel *ADF* statistic; the second part is based on the between-dimension approach, including the group *rho* statistic, the group *PP* statistic and the group *ADF* statistic.

Table 15: Pedroni Co-integration Result for ROCE →WMC+CDC+EHSC

	T-Statistic	Prob.**
Within Group		
Panel *v*-Statistic	-4.282385	1.0000
Panel *rho*-Statistic	3.361945	0.9996
Panel *PP*-Statistic	-11.97633	0.0000
Panel *ADF*-Statistic	-7.502010	0.0000
Between Group		
Group *rho*-Statistic	6.126524	1.0000
Group *PP*-Statistic	-10.11742	0.0000
Group *ADF*-Statistic	-6.286922	0.0000

Source: Computer output data using E-views 9.0

Note: The variance ratio test is right-sided, while the others are left-sided. (*) and (**) indicate that the estimated parameters are significant at the 5% and 1% levels respectively.

Table 16: Pedroni Co-integration Result for EPS →WMC+CDC+EHSC

	T-Statistic	Prob.**
Within Group		
Panel *v*-Statistic	-1.272140	0.8983
Panel *rho*-Statistic	2.458708	0.9930
Panel *PP*-Statistic	-3.548457	0.0002
Panel *ADF*-Statistic	-3.537361	0.0002
Between Group		
Group *rho*-Statistic	6.728081	1.0000
Group *PP*-Statistic	-6.941415	0.0000
Group *ADF*-Statistic	-2.426828	0.0076

Source: Computer output data using E-views 9.0

Table 17: Pedroni Co-integration Result for ROE →WMC+CDC+EHSC

	T-Statistic	Prob.**
Within Group		
Panel *v*-Statistic	-5.277725	1.0000
Panel *rho*-Statistic	4.437679	1.0000
Panel *PP*-Statistic	-3.658575	0.0001
Panel *ADF*-Statistic	-2.973704	0.0015
Between Group		
Group *rho*-Statistic	5.903696	1.0000
Group *PP*-Statistic	-9.431685	0.0000
Group *ADF*-Statistic	-6.040596	0.0000

Source: Computer output data using E-views 9.0

In Tables 15 - 17, most of the estimate results of the Pedroni's Residual panel co-integration tests are significant which indicates that the null of no co-integration can be rejected at the 5% significant level. This is an indication that performances of selected quoted firms in Sub Saharan Africa are related with environmental cost: waste management, community development and employees health and safety costs.

4.6 Vector Error Correction Mechanism

Having established the presence of a log run relationship between firm performances of selected quoted in Sub Saharan Africaandenvironmental cost, the determination of the speed of adjustment to equilibrium becomes imperative. The essence of the VECM is to ascertain if or not all the variations in dependent variable were as a result of the co-integrating vectors trying to return to equilibrium and the error correction term that captures this variation. On the long run linkage between return on capital employed and environmental cost, the error correction coefficient in Table 18 showed the expected negative sign and statistical significant at 5% level of significance. This suggests that there is tendency by the model to correct and move towards the equilibrium path following disequilibrium in each period. About 81.66% of the error generated in the previous year is corrected in the current year. Similarly, on the long run nexus between earnings per share and environmental costs, Table 18 dispels that the ECM reveals the supposed negative sign which shows that there is tendency for the model to shift towards equilibrium owing to disequilibrium in each period. As shown in Table 18, 54.39% of error from previous period is addressed in current period. There was no tendency of the model on the long run linkage between return on equity and environmental cost to move towards equilibrium owing to inconsistencies in past periods. This is on the argument that the error correction model though showed the expected negative sign is not significant at 5% level of significance.

Table 18: VECM Result: ROCE →WMC+CDC+EHSC

Variables	Coefficient	Standard Error	T-Statistic
C	-2.612057	1.39517	-1.87221
D(ROCE(-1))	-0.055223	0.03419	-1.61495
D(ROCE (-2))	-0.036664	0.02552	-1.43664
D(WMC(-1))	-0.021670	0.00859	-2.52248
D(WMC(-2))	-0.011332	0.00852	-1.33043
D(CDC(-1))	-0.000879	0.00457	-0.19231
D(CDC(-2))	-0.001473	0.00483	-0.30525
D(EHSC(-1))	0.020956	0.01036	2.02304
D(EHSC (-2))	-0.000473	0.01021	-0.04635
ECM (-1)	-0.816624	0.04028	-20.2745

Source: Computer analysis using E-views 9.0.

Table 19: VECM Result: EPS →WMC+CDC+EHSC

Variables	Coefficient	Standard Error	T-Statistic
C	-849.4374	283.892	-2.99212
D(EPS(-1))	-0.286391	0.02321	-12.3385
D(EPS (-2))	-0.238404	0.02147	-11.1064
D(WMC(-1))	-0.827035	1.76612	-0.46828
D(WMC(-2))	-2.444083	1.73634	-1.40760
D(CDC(-1))	0.427950	0.93435	0.45802
D(CDC(-2))	0.064831	0.98415	0.06588
D(EHSC(-1))	0.048727	2.12005	0.02298
D(EHSC (-2))	1.528817	2.08493	0.73327
ECM (-1)	-0.577988	0.02109	-27.4067

Source: Computer analysis using E-views 9.0.

Table 20: VECM Result: ROE →WMC+CDC+EHSC

Variables	Coefficient	Standard Error	T-Statistic
C	-1.718094	2.32495	-0.73898
D(ROE(-1))	-0.256966	0.04455	-5.76804
D(ROE (-2))	-0.503160	0.04609	-10.9164
D(WMC(-1))	-0.033101	0.01653	-2.00232
D(WMC(-2))	-0.017581	0.01490	-1.18012
D(CDC(-1))	0.003691	0.00793	0.46554
D(CDC(-2))	-0.000148	0.00826	-0.01795
D(EHSC(-1))	0.030183	0.01728	1.74666
D(EHSC (-2))	-0.007693	0.01709	-0.45011
ECM (-1)	-0.004477	0.00451	-0.99304

Source: Computer analysis using E-views 9.0.

4.7 Panel OLS Analysis of Firm Performance and Environmental Cost

The panel OLS was used to analysis the short run relationship between firm performance and environmental cost. The pooled OLS, fixed and random effect were the estimation approach used. The cross sectional estimation was performed andis based on the fact that the selected quoted firms operate in different environment in Sub Saharan Africa. The global and relative utility of the models were adopted in interpreting the output of the regression estimates.

Return on Capital Employed and Environmental Cost

Thehausman specification test in Table 21 shows the preference of the random effect estimation owing to the insignificant p-value of the Chi-square. Community development; and employees' health and safety costs have insignificant positive relationship with return on capital employed, while waste management cost has insignificant negative relationship with return on capital employed. Holding waste management, community development and employees' health and safety costs constant, return on capital employed would be 2.43. A percentage increase in community development; and employees' health and safety cost lead to 0.08 and 0.20 appreciations in return on capital employed respectively, whereas a unit rise in waste management cost lead to 0.069 reduction in return on capital employed. The adjusted R-square value of -0.004043 shows that the explanatory variables jointly accounted for -0.4% variations in return on capital employed of selected quoted firms in Sub Saharan Africa within the period of the study. The F-statistic which determine the overall significance of the joint influence of the independent variables shows that environmental cost proxied by waste management, community development and employees' health and safetycosts insignificantly explained the variations in return on capital employed as the p-value is insignificant at 5% level (0.99 > 0.05). The Durbin Watson statistic of 2.12 which is the traditional test of autocorrelation is within the acceptable range of no autocorrelation in a model.

Table 21: Panel OLS of Return on Capital Employed and Environmental Cost

Variables	**Pooled OLS**		**Fixed Effect**		**Random Effect**	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	2.054074	0.3586	2.427598	0.3514	2.186881	0.4663
WMC	-0.005764	0.5604	-0.008693	0.4877	-0.006965	0.5177
CDC	0.001044	0.7984	0.000373	0.9497	0.000826	0.8598
EHSC	0.001779	0.7930	0.002599	0.8391	0.002111	0.8001
R-squared	0.000613		0.189400		0.000686	
Adjusted R-squared	-0.004116		0.095705		-0.004043	
S.E. of regression	47.52624		45.10206		44.99570	
Sum squared resid	1432043.		1161526.		1283604.	
Log likelihood	-3366.774		-3299.986			
F-statistic	0.129570		2.021460		0.145087	
Prob(F-statistic)	0.942527		0.000011		0.932825	
Durbin-Watson stat	1.902693		2.345788		2.122677	
Hausman Specification Test						
	Chi-Sq. Statistic		0.105670			
	P-value		0.991100			

Source: Computer output data using E-views 9.0

Note: Periods included: 10, Cross-sections included: 64, Total Number of Observations: 638

Earnings per Share and Environmental Cost

From the hausman specification test in Table 22, the random effect estimation reveals that there is positive insignificant relationship between environmental costs: waste management, community development and employees' health and safety costs, and earnings per share of selected quoted firms in Sub Saharan Africa. If waste management, community development cost and employees' health and safety are held constant, earning per share would be valued 1247.49. A unit rise in waste management, community development and employees' health and safety costs result in 353.14, 93.58 and 372.57 respectively in earnings per share. The F-statistic values of 0.064216 with a p-value of 1.540235 showed that environmental costs: waste management, community development and employees' health and safety costsjointly and insignificant explained the changes in earnings per share. Going by the adjusted R-squared of 0.011368, it is crystal clear that the explanatory variables accounted for only 1.14% changes in earnings per share. It is also observe from the Durbin Watson statistic that the variables in the model are free from autocorrelation problem and inference deduced is reliable in statistical terms.

Table 22: Panel OLS of Earnings per Share and Environmental Cost

Variables	**Pooled OLS**		**Fixed Effect**		**Random Effect**	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	1165.437	0.0942	1252.152	0.0521	1247.487	0.3704
WMC	4.133778	0.1797	3.367390	0.2769	3.531437	0.2343
CDC	1.908232	0.1337	0.643438	0.6595	0.935861	0.4926
EHSC	2.382984	0.2587	4.296043	0.1747	3.725701	0.1732
R-squared	0.017446		0.496553		0.011368	
Adjusted R-squared	0.012797		0.438361		0.006690	
S.E. of regression	14780.01		11148.08		11123.57	
Sum squared resid	1.38E+11		7.10E+10		7.84E+10	
Log likelihood	-7028.734		-6815.426			
F-statistic	3.752480		8.533043		2.430106	
Prob(F-statistic)	0.010854		0.000000		0.064216	
Durbin-Watson stat	0.873530		1.702232		1.540235	
	Hausman Specification Test					
	Chi-Sq. Statistic		0.386438			
	P-value		0.943000			

Source: Computer output data using E-views 9.0

Note: Periods included: 10, Cross-sections included: 64, Total Number of Observations: 638

Return on Equity and Environmental Cost

As can be seen in Table 23, the random effect estimation is preferred to the fixed effect estimation. There is a positive insignificant relationship between community development and employees' health and safety costs and return on equity, whereas there is a negative but insignificant relationship between waste management cost and return on equity. When waste management, community development and employees' health and safety costs are kept constant, return on equity would amount to -0.55.83. A unit rise in waste management cost leads to 0.86 depreciation in return on equity of selected quoted firms in Sub Saharan Africa, while a percentage rise in community development and employees' health and safety costs result in 0.19 and 0.39 increase in return on equity respectively.

Table 23: Panel OLS of Return on Equity and Environmental Cost

Variables	**Pooled OLS**		**Fixed Effect**		**Random Effect**	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	-0.558295	0.7973	0.568495	0.8179	-0.558295	0.7730
WMC	-0.008633	0.3663	-0.018062	0.1163	-0.008633	0.3103
CDC	0.001970	0.6037	0.000536	0.9235	0.001970	0.5599
EHSC	0.003942	0.5352	0.007518	0.5546	0.003942	0.4862
R-squared	0.266240		0.482730		0.266240	
Adjusted R-squared	0.261081		0.414238		0.261081	
S.E. of regression	43.65131		38.86510		43.65131	
Sum squared resid	1084194.		764310.9		1084194.	
Log likelihood	-2979.518		-2879.178			
F-statistic	51.61440		7.047946		51.61440	
Prob(F-statistic)	0.000000		0.000000		0.000000	
Durbin-Watson stat	2.079961		2.185426		2.079961	
Hausman Specification Test						
	Chi-Sq. Statistic		1.109635			
	P-value		0.774700			

Source: Computer output data using E-views 9.0

Note: Periods included: 10, Cross-sections included: 64, Total Number of Observations: 638

The adjusted R-square value of 0.261081shows that the explanatory variables jointly accounted for 26.11% variations inreturn on equity of selected quoted firms in Sub Saharan Africa within the period of the study. The F-statistic coefficient shows that environmental cost variables significantly explained the variations in return on equityas the p-value of the F-statistic is significant at 5% level. It could be deduced from the Durbin Watson statistic there the model is free from autocorrelation problem as revealed by the Durbin Watson value of 2.0 which is the benchmark of no autocorrelation in an estimated regression model.

4.8 Granger Causality Effect Result

To examine the effect of environmental cost measured by waste management, community development and employees' health and safety costs on firmperformance of selected listed firms in Sub Saharan Africa, the granger causality test was utilized. The idea of using granger causality over the panel ordinary least square regression is on the premises that the granger causality test is structured to ravel the ability of one variable to predict another. This is unlike the OLS that only reveals relationship but cannot unveil the predicting power of one variable on the other.

Sub Saharan Africa

In the analysis of the Sub Saharan Africa, the granger causality result in Table 24 shows that there is no unidirectional or bidirectional relationship between environmental costs: waste management, community development and employees' health and safety costs, and return on capital employed and return on equity. Causality do not flow from waste management, community development and employees' health and safety costs to return on capital employed and return on equity at 5% level of significance. However, the unidirectional causal relationship was observed for earnings per share and waste management cost. The implication of the result in Table 24 is that environmental cost expressed by waste management, community development and employees' health and safety costs has no significant effect on return on capital employed, earnings per share and return on equity. On the other hand, it was observed that it is earnings per share that has significant effect on waste management cost of selected quoted firms in Sub Saharan Africa.

Table 24: Granger Causality Test for Firm Performance and Environmental Cost

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
WMC does not Granger Cause ROCE	575	0.12809	0.7206	No Causality
ROCE does not Granger Cause WMC		0.07868	0.7792	No Causality
CDC does not Granger Cause ROCE	576	0.01684	0.8968	No Causality
ROCE does not Granger Cause CDC		0.05939	0.8075	No Causality
EHSC does not Granger Cause ROCE	574	0.05325	0.8176	No Causality
ROCE does not Granger Cause EHSC		0.09983	0.7521	No Causality
WMC does not Granger Cause EPS	511	0.66723	0.5136	No Causality
EPS does not Granger Cause WMC		3.82062	0.0225	Causality
CDC does not Granger Cause EPS	512	0.33091	0.7184	No Causality
EPS does not Granger Cause CDC		2.27228	0.1041	No Causality
EHSC does not Granger Cause EPS	510	0.18730	0.8293	No Causality
EPS does not Granger Cause EHSC		0.17160	0.8424	No Causality
WMC does not Granger Cause ROE	511	0.70149	0.4963	No Causality
ROE does not Granger Cause WMC		0.66745	0.5135	No Causality
CDC does not Granger Cause ROE	512	0.29694	0.7432	No Causality
ROE does not Granger Cause CDC		0.17346	0.8408	No Causality
EHSC does not Granger Cause ROE	510	1.46220	0.2327	No Causality
ROE does not Granger Cause EHSC		0.35591	0.7007	No Causality

Source: Computer analysis using E-views 9.0.

South Africa

In South Africa analysis, Table 25 reveals that there is no causal relationship between environmental costs as measured by waste management, community development and employees' health and safety costs and firm performance proxied by return on capital employed, earnings per share and return on equity. There is no causality at 5% significance level running from environmental cost to firm performance of selected quotedfirms in South Africa. In effect, environmental costs as measured by waste management, community development and employees' health and safety costs has no significant effect on firm performance of selected quotedfirms in South Africa.

Table 25: Granger Causality Test for Firm Performance and Environmental Cost in South Africa

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
WMC does not Granger Cause ROCE	320	0.68326	0.5057	No Causality
ROCE does not Granger Cause WMC		0.96448	0.3823	No Causality
CDC does not Granger Cause ROCE	320	0.34309	0.7098	No Causality
ROCE does not Granger Cause CDC		0.39469	0.6742	No Causality
EHSC does not Granger Cause ROCE	318	0.94563	0.3895	No Causality
ROCE does not Granger Cause EHSC		0.11928	0.8876	No Causality
WMC does not Granger Cause EPS	320	0.62521	0.5358	No Causality
EPS does not Granger Cause WMC		2.44098	0.0887	No Causality
CDC does not Granger Cause EPS	320	0.21089	0.8100	No Causality
EPS does not Granger Cause CDC		1.33053	0.2658	No Causality
EHSC does not Granger Cause EPS	318	0.07071	0.9318	No Causality
EPS does not Granger Cause EHSC		0.24499	0.7829	No Causality
WMC does not Granger Cause ROE	320	0.63053	0.5330	No Causality
ROE does not Granger Cause WMC		1.15937	0.3150	No Causality
CDC does not Granger Cause ROE	320	0.35878	0.6988	No Causality
ROE does not Granger Cause CDC		0.29272	0.7464	No Causality
EHSC does not Granger Cause ROE	318	1.33928	0.2635	No Causality
ROE does not Granger Cause EHSC		0.26481	0.7675	No Causality

Source: Computer analysis using E-views 9.0.

Nigeria

The Nigerian analysis depicted in Table 26 reveals also that environmental cost surrogates: waste management, community development and employees' health and safety costs have no significant effect onfirm performance of selected quoted firms in Sub Saharan Africa. This is on the argument that causality do not flow from environmental cost as proxied by waste management, community development and employees' health and safety costs to return on capital employed, earnings per share and return on equity of firms quoted on stock exchanges in Saharan Africa. Nevertheless, it was evident that it is still earnings per share that exerts significant influence on waste management costs of selected quoted firm in Sub Saharan Africa.

Table 26: Granger Causality Test for Firm Performance and Environmental Cost in Nigeria

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
WMC does not Granger Cause ROCE	144	0.45407	0.6360	No Causality
ROCE does not Granger Cause WMC		0.17574	0.8390	No Causality
CDC does not Granger Cause ROCE	144	0.07142	0.9311	No Causality
ROCE does not Granger Cause CDC		0.00942	0.9906	No Causality
EHSC does not Granger Cause ROCE	144	0.04059	0.9602	No Causality
ROCE does not Granger Cause EHSC		0.01527	0.9848	No Causality
WMC does not Granger Cause EPS	144	0.73937	0.4793	No Causality
EPS does not Granger Cause WMC		3.36680	0.0373	Causality
CDC does not Granger Cause EPS	144	2.77829	0.0656	No Causality
EPS does not Granger Cause CDC		1.78388	0.1718	No Causality
EHSC does not Granger Cause EPS	144	0.72604	0.4856	No Causality
EPS does not Granger Cause EHSC		0.06043	0.9414	No Causality
WMC does not Granger Cause ROE	144	0.94187	0.3924	No Causality
ROE does not Granger Cause WMC		0.32588	0.7224	No Causality
CDC does not Granger Cause ROE	144	0.12208	0.8852	No Causality
ROE does not Granger Cause CDC		1.21357	0.3003	No Causality
EHSC does not Granger Cause ROE	144	2.05906	0.1314	No Causality
ROE does not Granger Cause EHSC		3.55908	0.0311	No Causality

Source: Computer analysis using E-views 9.0.

Ghana

Regarding the Ghana analysis, Table 27 unveils and revealed a surprising result. It was found that environmental cost measured by waste management, community development cost and employees' health and safety costs have significant effect on return on capital employed and return on equity of selected quoted firms in Sub Saharan Africa. This is on the basis that there is a unidirectional causal relationship between environmental costs: waste management, community development cost and employees' health and safety costs and firm performance via return on capital employed and return on equity. Causality flows from waste management, community development cost and employees' health and safety costs to return on capital employed and return on equity at 5% level of significance. Furthermore, it was clear that waste management, community development cost and employees' health and safety costs have no significant effect on earnings per share of selected quoted firms in Sub Saharan Africa.

Table 27: Granger Causality Test for Firm Performance and Environmental Cost in Ghana

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
WMC does not Granger Cause ROCE	32	4.00224	0.0300	Causality
ROCE does not Granger Cause WMC		1.34354	0.2778	No Causality
CDC does not Granger Cause ROCE	32	5.93207	0.0073	Causality
ROCE does not Granger Cause CDC		0.62289	0.5439	No Causality
EHSC does not Granger Cause ROCE	32	4.36301	0.0228	Causality
ROCE does not Granger Cause EHSC		0.70403	0.5034	No Causality
WMC does not Granger Cause EPS	32	2.02190	0.1520	No Causality
EPS does not Granger Cause WMC		0.23409	0.7929	No Causality
CDC does not Granger Cause EPS	32	0.13881	0.8710	No Causality
EPS does not Granger Cause CDC		0.67251	0.5188	No Causality
EHSC does not Granger Cause EPS	32	0.09847	0.9065	No Causality
EPS does not Granger Cause EHSC		2.58145	0.0942	No Causality
WMC does not Granger Cause ROE	32	6.74926	0.0042	Causality
ROE does not Granger Cause WMC		1.77905	0.1188	No Causality
CDC does not Granger Cause ROE	32	7.00187	0.0036	Causality
ROE does not Granger Cause CDC		0.67033	0.5198	No Causality
EHSC does not Granger Cause ROE	32	5.41290	0.0106	Causality
ROE does not Granger Cause EHSC		0.80510	0.4575	No Causality

Source: Computer analysis using E-views 9.0.

Tanzania

The Tanzania causality output in Table 28 reveals that it is only waste management cost that has significant effect on return on capital employed and return on equity of selected quoted firms in Tanzania within the period reviewed. This is evidence of causality flowing from waste management cost to return on capital employed and return on equity at 5% level of significance. Other variables of environmental cost via community development cost and employees health and safety cost have no significant influence on firm performance of firms quoted in Tanzanian stock exchange.

Table 28: Granger Causality Test for Firm Performance and Environmental Cost in Tanzania

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
WMC does not Granger Cause ROCE	15	5.05230	0.0304	Causality
ROCE does not Granger Cause WMC		0.42665	0.6640	No Causality
CDC does not Granger Cause ROCE	16	2.46366	0.1306	No Causality
ROCE does not Granger Cause CDC		1.08871	0.3703	No Causality
EHSC does not Granger Cause ROCE	16	0.08450	0.9196	No Causality
ROCE does not Granger Cause EHSC		0.18763	0.8315	No Causality
WMC does not Granger Cause EPS	15	0.17723	0.8402	No Causality
EPS does not Granger Cause WMC		1.22457	0.3344	No Causality
CDC does not Granger Cause EPS	16	0.19784	0.8234	No Causality
EPS does not Granger Cause CDC		0.81191	0.4689	No Causality
EHSC does not Granger Cause EPS	16	0.04263	0.9584	No Causality
EPS does not Granger Cause EHSC		0.12326	0.8852	No Causality
WMC does not Granger Cause ROE	15	4.66267	0.0371	Causality
ROE does not Granger Cause WMC		0.31442	0.7372	No Causality
CDC does not Granger Cause ROE	16	3.49750	0.0667	No Causality
ROE does not Granger Cause CDC		1.13298	0.3569	No Causality
EHSC does not Granger Cause ROE	16	0.21911	0.8067	No Causality
ROE does not Granger Cause EHSC		0.18242	0.8357	No Causality

Source: Computer analysis using E-views 9.0.

4.9 Test of Hypothesis

Hypothesis Decision Criteria: If the p-value of F-statistic in granger causality test is less than 0.05, the null hypothesis is rejected. On the other hand, if the p-value of F-statistic in granger causality test is greater than 0.05, the null hypothesis is accepted.

Restatement of Hypotheses

1. H_0: Waste management, community development and employees' health and safety cost have no significant effect on return on capital employed of quoted firms in Sub Saharan Africa.
2. H_0: Waste management, community development and employees' health and safety cost have no significant effect on earnings per share of quoted firms in Sub Saharan Africa.
3. H_0: Waste management, community development and employees' health and safety cost have no significant effect on return on equity of quoted firms in Sub Saharan Africa.
4. H_0: In each of the four countries studied, waste management, community development and employee health and safety costs have no significant effect on Return on Capital Employed, Earnings per Share and Return on Equity of quoted firms in Sub Saharan Africa.

Table 29: Result of Test of Hypotheses

Hypothesis	Variables	P-Value	F-Stat.	Decision
Hypothesis 1	ROCE → WMC, CDC, EHSC			
	WMC	0.12809	0.7206	Accept H_0
	CDC	0.01684	0.8968	Accept H_0
	EHSC	0.05325	0.8176	Accept H_0
Hypothesis 2	EPS → WMC, CDC, EHSC			
	WMC	0.66723	0.5136	Accept H_0
	CDC	0.33091	0.7184	Accept H_0
	EHSC	0.18730	0.8293	Accept H_0
Hypothesis 3	ROE → WMC, CDC, EHSC			
	WMC	0.70149	0.4963	Accept H_0
	CDC	0.29694	0.7436	Accept H_0
	EHSC	1.46220	0.2327	Accept H_0

Source: Granger Causality Analysis Output from Table 24

Table 29 shows the acceptance of the three null hypotheses as the p-vales of the f-statistics are greater than 0.05 (insignificant at 5% significance level).

Table 30: Result of Test of Hypotheses

Hypothesis 4

Hypothesis	Variables	P-Value	F-Stat.	Decision
South Africa				
Hypothesis4(1)	ROCE → WMC, CDC, EHSC			
	WMC	0.68326	0.5057	Accept H_0
	CDC	0.34309	0.7098	Accept H_0
	EHSC	0.94563	0.3995	Accept H_0
Hypothesis4(2)	EPS → WMC, CDC, EHSC			
	WMC	0.62521	0.5358	Accept H_0
	CDC	0.21089	0.8100	Accept H_0
	EHSC	0.07071	0.9318	Accept H_0
Hypothesis4(3)	ROE → WMC, CDC, EHSC			
	WMC	0.63053	0.5330	Accept H_0
	CDC	0.35878	0.6988	Accept H_0
	EHSC	1.33928	0.2635	Accept H_0
Nigeria				
Hypothesis 4(1)	ROCE → WMC, CDC, EHSC			
	WMC	0.45407	0.6360	Accept H_0
	CDC	0.07142	0.9311	Accept H_0
	EHSC	0.04059	0.9602	AcceptH_0
Hypothesis 4(2)	EPS → WMC, CDC, EHSC			
	WMC	0.73937	0.4793	Accept H_0
	CDC	2.77829	0.0656	Accept H_0
	EHSC	0.72604	0.4856	Accept H_0
Hypothesis 4(3)	ROE → WMC, CDC, EHSC			
	WMC	0.94187	0.3924	Accept H_0
	CDC	0.12208	0.8852	Accept H_0
	EHSC	2.05906	0.1314	Accept H_0

Ghana

Hypothesis 4(1)	ROCE → WMC, CDC, EHSC			

	WMC	4.00224	0.0300	RejectH_0
	CDC	5.93207	0.0073	RejectH_0
	EHSC	4.36301	0.0228	RejectH_0
Hypothesis 4(2)	EPS → WMC, CDC, EHSC			
	WMC	2.02190	0.1520	Accept H_0
	CDC	0.13881	0.8710	Accept H_0
	EHSC	0.09847	0.9065	Accept H_0
Hypothesis 4(3)	ROE → WMC, CDC, EHSC			
	WMC	6.74926	0.0042	RejectH_0
	CDC	7.00187	0.0036	RejectH_0
	EHSC	5.41290	0.0106	Reject H_0

Tanzania

Hypothesis 4(1)	ROCE → WMC, CDC, EHSC			
	WMC	5.05230	0.0304	RejectH_0
	CDC	2.46366	0.1306	Accept H_0
	EHSC	0.08450	0.9196	Accept H_0
Hypothesis 4(2)	EPS → WMC, CDC, EHSC			
	WMC	0.17723	0.8402	Accept H_0
	CDC	0.19748	0.8234	Accept H_0
	EHSC	0.04263	0.9584	AcceptH_0
Hypothesis 4(3)	ROE → WMC, CDC, EHSC			
	WMC	4.66267	0.0371	RejectH_0
	CDC	3.49750	0.0667	Accept H_0
	EHSC	0.18242	0.8357	Accept H_0

Source: Granger Causality Analysis Output from Tables 25 to28

Hypotheses Decisions

1. Waste management, community development and employees’ health and safety cost have no significant effect on return on capital employed of quoted firms in Sub Saharan Africa. However, there is a positive insignificant relationship between community development, employees’ health and safety cost and return on capital employed, while a negative relationship exists between return on capital employed and waste management cost.
2. Waste management, community development and employees’ health and safety cost have no significant effect on earnings per share of quoted firms in Sub Saharan Africa. However, Environmental cost is positively but insignificantly related with earnings per share.

3. Waste management, community development and employees' health and safety cost have no significant effect on return on equity of quoted firms in Sub Saharan Africa. Return on equity is positively and insignificantly related with community development, employees' health and safety cost but negatively and insignificantly associated with waste management cost.
4. In South Africa and Nigeria, waste management, community development and employee health and safety costs have insignificant effect on return on capital employed, earnings per share and return on equity. For Ghana, waste management, community development and employee health and safety costs have significant effect on return on capital employed and return on equity while the predictors demonstrated insignificant effect on earnings per share. Only waste management costs in Tanzania has significant effects on return on capital employed and return on equity.

4.10 Discussion of Findings

This study examined the effect of environmental costs on performance of quoted firms in Sub Saharan Africa for a period spanning from 2007 to 2016 with a view to affirming or refuting the nexus between environmental responsibility and performances of firms using evidences from Sub Saharan Africa. After a detailed theoretical review and empirical analyses, the findings were made in line with the research objectives and the hypotheses set and tested. The findings are hereby discussed in line with the objectives of the study.

Objective One

To determine the effect of waste management, community development and employee health and safety costs on Return on Capital Employed of quoted firms in Sub Saharan Africa.

From the analysis carried out, it was discovered that waste management, community development and employee health and safety costs have no significant effect on return on capital employed. This implies that the amounts of these costs incurred by the firms under study are insignificant to cause a swing on firms' performance measurements. However, researches are anchored on volume of data reported by selected firms and consequently, this may be related to both the amount of costsincurred by the firms and the extent of reporting of costs incurred.

Objective Two

To explore the effect of waste management, community development and employee health and safety cost on Earnings per share of quoted firms in Sub Saharan Africa.

The study found out that waste management, community development and employee health and safety costs have no significant effect on earnings per share. This suggests that the quoted firms in Sub Saharan Africa have not reasonably engaged in waste management, community development and employee health and safety activities that can result to significant effect on earnings per share.Conversely and contrary to the objective of the study, it was revealed that earnings per share has significant effect on waste management cost of selected firms in Sub Saharan Africa, implying that earnings per shares of selected firms are responsible for changes in waste management costs. The result suggests that selected firms are motivated by improvement in their earnings per share to engage in waste management activities.

Objective Three

To ascertain the effect of waste management, community development and employee health and safety costs on Return on Equity of quoted firms in Sub Saharan Africa.

The analysis conducted by this study revealed that waste management; community development and employee health and safety costs have no significant effect on return in equity.Again this shows that the amounts of these costs incurred by firms are insignificant to cause a movement on return on equity. Cost classification and volume of data reported in the annual reports of the firms may contribute to lack of significant effect by the predictor variables on return on equity and research will always rely on data reported for analysis.

Objective Four

In each of the four countries studied, to evaluate the respective effect of waste management, community development and employee health and safety costs on Return on Capital Employed, Earnings per Share and Return on Equity of quoted firms in Sub Saharan Africa.

This objective consolidates objectives one, two and three for each of the countries.

For South Africa and Nigeria, the study revealed that waste management, community development and employee health and safety costs have no significant effect on return on capital employed, earnings per share and return on equity. This shows that the environmental costs incurred in each of the two countries are not able to cause any movement on the proxies of firm performance. This may be a function of inadequate engagement by firms in these areas of environmental responsibility or inappropriate classification and reporting of data in the reports. Conversely, the study revealed that earnings per share cause movements in waste management costs suggesting that increase in waste management responsibility activities by selected quoted firms in Nigeria is a function of increase in their earnings per share. The result of the study has remained emphatic about the causality on waste management costs by earnings per shareboth at regional analysis and in Nigeria, thereby a pointer to the selfish behavioural patterns of firms whose decision to engage in environmental remediation, especially waste management activities is influenced by the outcomes of their earnings per share. This is more critical and curious as it affects waste management activities with the endemic health hazards this trend may expose to the entire populace of Sub Saharan Africa and Nigeria in particular. In Ghana, the study revealed that waste management, community development and employee health and safety costs have significant effect on return on capital employed and return on equity but demonstrated insignificant effect on earnings per share. For Tanzania, the result singled out waste management costs and demonstrated significant effects on return on capital employed and return on equity.

Expectedly, the analysis revealed varied outcomes in the four countries covered by the study. Comparatively, better results were revealed in Ghana where waste management,community development and employee health and safety costs showed significant effect on return on capital employed and return on equity. Next to Ghana in terms of better result is Tanzania where waste management costs showed significant effects on return on capital employed and return on equity.These results may suggest comparative improvement in environmental responsibilities, compliances, disclosures and effectiveness of extant enactments applicable in the Ghana and Tanzania on environmental activities (for example, the AKOBEN in Ghana and Environmental Management Actin Tanzania).

Though to the best of the knowledge of this study no similar prior work exists at regional Sub Saharan African level, the outcomes of the study which revealed that environmental costs represented by waste management, community development and employee health and safety costs have no significant effect on firm performance has substantially contradicted some expanded studies from other regions outside Sub Saharan Africa. For example, Vijfvinkel and Bouman (2011) that studied Dutch and Chinese SMEs with results that indicated significant positive effect; Gallego-Alvarez et al (2015) that studied sample of firms from USA, France, Japan, Italy, Portugal etc and found out firms promote greater environmental behaviour in order to obtain higher financial performance.

On specific country perspective, the outcomes of the study have confirmed in some cases and contradicted in others, the results of prior studies in this regard. Findings of the study in South Africa which revealed that environmental costs measured by waste management, community development and employee health and safety costs has no significant effect on firm performance, confirmed studies by Huckle(1995); Oberholzer and Prinsloo (2011) while contradicting studies by Wingard(2001); Wingard and Vorster(2001); Delmas and Nairn-Birch(2010). In Nigeria, this study which revealed that environmental cost surrogates(waste management, community development and employee health and safety costs) have no significant effect on firm performance confirmed studies by Adediran and Alade(2013), Okoye and Adeniyi(2017); while it contradicted studies by Ngekwe(2008); Oti et al(2012); Peter et al(2012).

In Ghana, where the study revealed a mixed result to the effectthat environmental cost measured by waste management, community development and employee health and safety has significant effect on return on capital employed and return on equity but insignificant effect on earnings per share, concurred with study by Appiah, Du and Boamah (2017). For Tanzania, where waste management costs singly demonstrated significant effect on return on capital employed and return on equity while the rest predictors revealed insignificant effect partly validates Daniel(2013); Isanzu and Fengju (2016) in one way or the other.

However, the findings of the study in one way or the other confirmed or contradicted the findings of other single country studies carried out outside the Sub Saharan Africa. The findings of studies by Walley and Whitehead(1994); Palmer, Oates and Portey(1995);

Wagner, VanPhu, Azomahou and Wehrmeyer (2002) towed the line of the results of South Africa and Nigeria in this study. The mixed results revealed in this study in Ghana and Tanzania validated the studies by Klassen and Mclaughlin(1996); Elsayed and Paton(2005) in terms of mixed result but contradicted studies outside Sub Saharan Africa that revealed outright significant effect such as King and Lenox(2001); Konar and Cohen(2001).

CHAPTER FIVE

SUMMARYOF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The findings from the specific objectives of the study are as follows:

1. Environmental costs represented by waste management,community development andemployees health and safety costs have no significant effect on return on capital employed in Sub Saharan Africa.
2. Environmental costs measured by waste management,community development andemployees health and safety costs have no significant effect onearnings per share in Sub Saharan Africa.
3. Environmental costs expressed by waste management,community development andemployees health and safety costs have no significant effect onreturn on equity in Sub Saharan Africa.
4. Environmental costs represented by waste management, community development and employees health and safety costs have no significant effect on return on capital employed, earnings per share and return on equity in South Africa and Nigeria.In Ghana, proxies of environmental costs: waste management, community development and employee health and safety costs have significant effect on return on capital employed and return on equity but demonstrated insignificant effect on earnings per share. For Tanzania, single environmental costs proxy: waste management costs have significant effects on only return on capital employed and return on equity save earnings per share while the rest of the predictors have no significant effect on return on capital, earnings per share and return on equity.
5. Curiously, earnings per share granger caused waste management cost in Sub-Saharan African regional analysis and in Nigeria country-level analysis.

5.2Conclusion

This study was carried out to empirically find out the effect of environmental costs on performances of quoted firms in Sub Saharan Africa. Environmental engagements that result to environmental costs are not recent in the region. On the one side, it has been argued and posited that environmental responsibility do not engender performances of firms. Contrarily, it is believed that environmental responsibility can stimulate performances of firms.From the study, is has been revealed that environmental costs have no significant effects on performances of quoted firms in regional Sub Saharan Africa, South Africa and Nigeria. The implication is that adequate engagements and disclosure of environmental activities have not taken place in the region.Further, the study revealed that environmental costs have substantial significant effects on performances of quoted firms in Ghana and that waste management costs have substantial significant effects on performances of Tanzania quoted firms. At the regional Sub-Saharan Africa and Nigeria analyses, the study unusually revealed that earnings per share granger cause waste management cost. This is an ugly and selfish trend suggesting that firms in the affected areas will only engage in waste management practices in the current year if their prior years' earnings per share improved.

Given that outcomes of researches are related to available data obtained and used in analysis, improvements are expected iffirms progress in engagement in environmental activities, costs recognition, recording and reporting in the annual reports.

5.3 Recommendations

In line with the objectives of this study, findings and conclusions were made which facilitate for the following recommendations:

1. As a result of weak links revealed by this study between the predictors and dependent variables in Sub Saharan Africa, South Africa and Nigeria suggestinginadequateenvironmental costs and indulgences by firms on environmental activities in the region and aforementioned countries, there is need for firms in the region, South Africa and Nigeria to do more in this regard.
2. Following the strong link demonstrated by the predictors on return on capital employed and return on equity in Ghana and by waste management costs on return on capital employed and return on equity in Tanzania, quoted firms in the aforementioned two countries should improve their engagements in environmental activities to provoke greater effects on the explainable variables.
3. As a result of the importance of appropriate cost recognition, classification and reporting and disclosure to data for researches, it is hereby recommended that firms in Sub Saharan Africa should design and implement sound cost recognition, classification and reporting framework to ensure appropriate disclosures that will make more data available for research in this regard.
4. Since costs recognition, classification and disclosure have effects on the available data for researches which in turn affect the result of studies, coupled with the fact that environmental reporting has been largely voluntary in Sub Saharan Africa, it is recommended that governments and professional bodies at regional level should drive firms towards full disclosures by instituting effective and necessary regional enactments and standards that can make recognition and disclosures of environmental activities more compelling or compulsorywhile civil society organisations can help in sensitization.

5.3.1Contribution to Knowledge

This study has empirically proved that environmental costs represented by waste management, community development and employees health and safety costs have no significant effect on performance of quoted firms in South Africa, Nigeria and in Sub Saharan Africa at regional analysis and further demonstrated that in Ghana and Tanzania, contrary situation exist.

1. This study contributes to current literature on the subject by extending the scope of study to regional level of Sub Saharan Africa unlike other studies that are restricted to specific countries.
2. The study has contradicted the results of some other expanded studies outside Sub Saharan Africa such asVijfvinkel and Bouman (2011) that studied Dutch and Chinese SMEs; Gallego-Alvarez et al (2015) that studied sample of firms from USA, France, Japan, Italy, Portugal. On specific country perspective, this study confirm South African studies such as Huckle(1995); Oberholzer and Prinsloo (2011) and contradicted studies by Wingard(2001); Wingard and Vorster(2001); Delmas and Nairn-Birch(2010). In Nigeria, while the study confirmed studies by Adediran and Alade(2013); Okoye and Adeniyi (2017) it contradicted studies by Ngekwe (2008); Oti et al(2012); Peter et al(2012) and in Ghana, the study concurredwith Appiah, Du and Boamah (2017) and partly validated the studies by Daniel(2013); Isanzu and Fengju (2016).
3. This work has succeeded in using variables of shareholders returns, financial and market performance measures and by so doing advanced above prior studies that use indicators of one or two performance measurements.
4. The study also has succeeded in using disaggregated environmental costs components for an expanded study, contrary to prior studies that either aggregated environmental costs or used disaggregatesfor single country studies only.

5. Irrespective of the weak links observed between environmental cost and firm performances in Sub-Saharan Africa, Nigeria and South Africa, the study contradicted prior or traditional belief that all costs reduce firm bottom line and invariably performances and proved that environmental cost can spur revenue and proactively reduce future cost, both of which improve firm performances. This was demonstrated in Ghana and Tanzania.
6. From the hypotheses of the study, causality is supposed to flow from environmental cost (the independent variable) to firm performance (the dependent variable). Curiously, in Sub-Saharan African level and in Nigeria, the study observed that causality rather moved from earnings per share to waste management cost. This ugly and selfish trend implies that firms in Sub Saharan Africa(in general) and Nigeria(in particular) will need to see improvements in their earnings per share before they can engage in waste management practices. This trend is dangerous given the pronounced state of environmental degradation in Sub Saharan Africa.

5.3.2 Recommendations for Further Studies

Effect of environmental costs on performances of firms will continue to attract the attention of researchers.

1. Further studies should use other proxies of environmental costs such as emission reduction, carbon capture and storage, product innovation and packaging, employee training and development as independent variables.
2. Indicators of firm performances are numerous and two or more indicators can be taken from each class of firm performance measurement.
3. The entire Africa continent is both good and large to study. The population and sample sizes can be increased to cover the continent of Africa.

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APPENDICES

Appendix 1: List of High Environmentally Sensitive Firms Quoted on Johannesburg Stock Exchange as at 31st December 2016.

S/N	Firms	Ticker	Sector
1	African Eagle Resources Plc	AEA	Industrial Metals & Mining
2	African Rainbow Minerals Limited	ARI	Industrial Metals & Mining
3	Andulela Investment Holdings Limited	AND	Industrial Metals & Mining
4	Anglo American Platinium Limited	AMS	Mining
5	Anglo American Plc	AGL	Mining
6	Anglogold Ashanti Limited	ANG	Mining
7	Arcelormittal South Africa Limited	ACL	Industrial Metals & Mining
8	Argent Industrial Limited	ART	Support Services
9	Assore Limited	ASR	Industrial Metals & Mining
10	Atlatsa Resources Corporation	ATL	Mining
11	Bauba Platinum Limited	BAU	Mining
12	BHP Billiton Plc	BIL	Industrial Metals & Mining
13	BSI Steel Limited	BSS	Industrial Metals & Mining
14	Buffalo Coal Corp	BUC	Mining
15	Central Rand Gold Limited	CRD	Mining
16	Chrometco Limited	CMO	Industrial Metals & Mining
17	Coal Of Africa Limited	CZA	Oil & Gas Producers
18	Delrand Resources Limited	DRN	Industrial Metals & Mining
19	Diamondcorp Plc	DMC	Industrial Metals & Mining
20	DRDGOLD Limited	DRD	Mining
21	Eastern Platinum Limited	EPS	Industrial Metals & Mining
22	Erin Energy Corporation	ERN	Oil & Gas Producers
23	Evraz Highveld Steel & Vanadium Ltd	EHS	Industrial Metals & Mining
24	Exxaro Resources Limited	EXX	Oil & Gas Producers
25	Ferrum Crescent Limited	FCR	Industrial Metals & Mining
26	Firestone Energy Limited	FSE	Mining
27	Giyani Gold Corporation	GIY	Industrial Metals & Mining
28	Glencore Plc	GLN	Mining
29	Gold Fields Limited	GFI	Mining
30	Great Basin Gold Limited	GBG	Mining
31	Harmony Gold Mining Company Limited	HAR	Mining
32	Hulamin Limited	HLM	Industrial Metals & Mining
33	Impala Platinum Holdings Limited	IMP	Mining
34	Jubilee Platinum Plc	JBL	Industrial Metals & Mining
35	Keaton Energy Holdings Limited	KEH	Oil & Gas Producers
36	Kibo Mining Plc	KBO	Mining
37	Kumba Iron Ore Limited	KIO	Industrial Metals & Mining
38	Lonmin Plc	LON	Industrial Metals & Mining
39	Master Drilling Group Ltd	MDI	Industrial Metals & Mining
40	Merafe Resources Limited	MRF	Industrial Metals & Mining
41	Middle East Diamond Resources Limited	MED	Industrial Metals & Mining
42	Miranda Mineral Holdings Limited	MMH	Industrial Metals & Mining
43	Mpact Limited	MPT	General Industrials

44	Nampak Limited	NPK	General Industrials
45	Northam Platinum Limited	NHM	Mining
46	Oakbay Resources And Energy Limited	ORL	Mining
47	Oando Plc	OAO	Oil & Gas Producers
48	Orion Minerals NL	ORN	Mining
49	Pan African Resources Plc	PAN	Industrial Metals & Mining
50	Petmin Limited	PET	Industrial Metals & Mining
51	Platfields Limited	PLL	Mining
52	Randgold & Exploration Company Ltd	RNG	Mining
53	Reunert Limited	RLO	General Industrials
54	Rex Trueform Clothing Company Ltd	RTO	General Retailers
55	Rockwell Diamonds Incorporated	RDI	Industrial Metals & Mining
56	Royal Bafokeng Platinum Limited	RBP	Mining
57	Sacoil Holdings Limited	SCL	Oil & Gas Producers
58	Sasol Limited	SOL	Oil & Gas Producers
59	Sentula Mining Limited	SNU	Oil & Gas Producers
60	Sephaku Holdings Limited	SEP	Construction & Materials
61	Shoprite Holdings Limited	SHP	Food & Drug Retailers
62	Sibanye Gold Limited	SGL	Mining
63	South African Coal Mining Holdings Ltd	SAH	Oil & Gas Producers
64	South32 Limited	S32	Industrial Metals & Mining
65	Tawana Resources NL	TAW	Industrial Metals & Mining
66	Tharisa Plc	THA	Mining
67	The Waterberg Coal Company Limited	WCC	Mining
68	Trans Hex Group Limited	TSX	Mining
69	Wesizwe Platinum Limited	WEZ	Mining
70	ZCI Limited	ZCI	Industrial Metals & Mining

Source: Extract from Johannesburg Stock Exchange.

Appendix 2: List if High Environmentally Sensitive Firms Quoted on the Nigerian Stock Exchange as at 31st December, 2016.

S/N	Firms	Ticker	Sector
1	11 plc	Mobil	Oil and gas
2	African Paints (Nigeria) plc.[dip]	Afrpaints	Industrial goods
3	Aluminium Extrusion Ind. Plc.	Alex	Natural resources
4	Anino International Plc.[mrs]	Anino	Oil and gas
5	Austin Laz & Company Plc[mrf]	Austinlaz	Industrial goods
6	B.O.C. Gases Plc.	Bocgas	Natural resources
7	Berger Paints Plc	Berger	Industrial goods
8	Beta Glass Plc.	Betaglas	Industrial goods
9	Cap Plc	Cap	Industrial goods
10	Capital Oil Plc[rst]	Capoil	Oil and gas
11	Cement Co. Of North.Nig. Plc	CCNN	Industrial goods
12	Conoil Plc	Conoil	Oil and gas
13	Cutix Plc.	Cutix	Industrial goods
14	Dangote Cement Plc	Dangcem	Industrial goods
15	Eterna Plc.	Eterna	Oil and gas
16	First Aluminium Nigeria Plc	Firstalum	Industrial goods
17	Forte Oil Plc.	Fo	Oil and gas
18	Greif Nigeria Plc	Vanleer	Industrial goods
19	Japaul Oil & Maritime Services Plc	Japauloil	Oil and gas
20	Lafarge Africa Plc.	Wapco	Industrial goods
21	Meyer Plc.	Meyer	Industrial goods
22	Mrs Oil Nigeria Plc.	Mrs	Oil and gas
23	Multiverse Mining And Exploration Plc	Multiverse	Natural resources
24	Oando Plc	Oando	Oil and gas
25	Paints And Coatings Manufactures Plc[dip]	Paintcom	Industrial goods
26	Portland Paints & Products Nigeria Plc	Portpaint	Industrial goods
27	Premier Paints Plc.[mrf]	Prempaints	Industrial goods
28	Rak Unity Pet. Comp. Plc.	Rakunity	Oil and gas
29	Seplat Petroleum Development Company Ltd	Seplat	Oil and gas
30	Thomas Wyatt Nig. Plc.[mrs]	Thomaswy	Natural resources
31	Total Nigeria Plc	Total	Oil and gas

Source: Extract from Nigerian Stock Exchange

Appendix 3: List of High Environmentally Sensitive Firms Quoted on the Ghanaian Stock Exchange as at 31st December, 2016.

S/N	Firms	Ticker	Sector
1	Camelot Ghana	Cmlt	Industrials
2	Ghana Oil Company	Goil	Oil & Gas
3	Total Petroleum Ghana	Total	Oil & Gas
4	Transol Solutions (Ghana)	Transol	Industrials
5	Tullow Oil	TLW	Oil & Gas

Source: Extract from Ghanaian Stock Exchange

Appendix 4: List of High Environmentally Sensitive Firms Quoted on Tanzanian Stock Exchange as at 31st December, 2016.

S/N	Firms	Ticker	Sector
1	Acacia Mining	ACA	Basic Materials
2	Swala Oil and Gas	SWALA	Oil & Gas
3	Swissport Tanzania	SWIS	Industrials
4	Tanga Cement Company	TCCL	Industrials
5	Tanzania Portland Cement Company	TPCC	Industrials
6	TOL Gases	TOL	Basic Materials

Source: Extract from Tanzanian Stock Exchange

Appendix 5: Waste management costs for selected firms in Sub Saharan Africa converted to presentation currency (Naira)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	0.0	0.0	401.4	570.8	313.4	0.0	516.5	451.8	524.8	842.1
2	Andulela Investment Holdings	0.0	0.0	201.7	410.9	156.7	257.5	197.5	311.6	179.2	487.5
3	Anglo American Platinum	0.0	183.4	523.2	99.5	0.0	63.6	137.9	44.1	92.2	130.7
4	Anglogold Ashanti	377.3	384.9	177.3	61.6	111.7	342.6	1354.9	741.6	1419.5	514.1
5	Arcelormittal South Africa	727.6	408.2	1078.4	1004.5	587.7	404.6	0.0	0.0	358.4	221.6
6	Assore Limited	0.0	0.0	579.1	456.6	0.0	0.0	41.0	85.7	89.6	113.0
7	Atlatsa Resources	148.9	0.0	635.0	0.0	556.4	0.0	0.0	506.4	256.3	817.7
8	Bauba Platinum	177.7	128.3	183.7	397.2	207.7	161.8	139.7	254.0	259.8	0.0
9	BHP Billiton	64.3	30.6	35.9	0.0	23.5	20.2	30.4	29.6	0.0	0.0
10	Buffalo Coal Corp	0.0	26.2	0.0	52.5	66.6	11.0	13.7	18.7	0.0	0.0
11	Central Rand Gold limited	0.0	8.3	66.5	303.6	317.4	202.3	319.0	0.0	0.0	0.0
12	Chrometco Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Delrand Resources limited	18.6	20.4	26.0	38.8	0.0	49.7	44.1	56.1	56.3	0.0
14	Eastern Platinum limited	0.0	13.7	161.8	0.0	31.3	77.2	95.7	46.9	0.0	0.0
15	Ferrum Crescent Limited	0.0	0.0	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
16	Glencore Plc	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
17	Gold Fields limited	0.0	0.0	30.0	182.6	350.7	389.9	171.6	126.2	39.7	0.0
18	Great Basin Gold limited	33.8	275.6	30.0	121.0	270.3	358.6	1195.5	380.2	631.0	0.0
19	Hulamin limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	0.0
20	Jubilee Platinum Plc	0.0	0.0	179.7	228.3	0.0	0.0	71.4	101.3	89.6	0.0
21	Keaton Energy Holdings limited	294.4	0.0	201.7	0.0	233.1	0.0	0.0	361.5	0.0	0.0

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	0.0	0.0	401.4	570.8	313.4	0.0	516.5	451.8	524.8	842.1
2	Andulela Investment Holdings	0.0	0.0	201.7	410.9	156.7	257.5	197.5	311.6	179.2	487.5
3	Anglo American Platinum	0.0	183.4	523.2	99.5	0.0	63.6	137.9	44.1	92.2	130.7
4	Anglogold Ashanti	377.3	384.9	177.3	61.6	111.7	342.6	1354.9	741.6	1419.5	514.1
5	Arcelormittal South Africa	727.6	408.2	1078.4	1004.5	587.7	404.6	0.0	0.0	358.4	221.6
6	Assore Limited	0.0	0.0	579.1	456.6	0.0	0.0	41.0	85.7	89.6	113.0
7	Atlatsa Resources	148.9	0.0	635.0	0.0	556.4	0.0	0.0	506.4	256.3	817.7
8	Bauba Platinum	177.7	128.3	183.7	397.2	207.7	161.8	139.7	254.0	259.8	0.0
9	BHP Billiton	64.3	30.6	35.9	0.0	23.5	20.2	30.4	29.6	0.0	0.0
10	Buffalo Coal Corp	0.0	26.2	0.0	52.5	66.6	11.0	13.7	18.7	0.0	0.0
11	Central Rand Gold limited	0.0	8.3	66.5	303.6	317.4	202.3	319.0	0.0	0.0	0.0
12	Chrometco Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Delrand Resources limited	18.6	20.4	26.0	38.8	0.0	49.7	44.1	56.1	56.3	0.0
14	Eastern Platinum limited	0.0	13.7	161.8	0.0	31.3	77.2	95.7	46.9	0.0	0.0
15	Ferrum Crescent Limited	0.0	0.0	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
16	Glencore Plc	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
17	Gold Fields limited	0.0	0.0	30.0	182.6	350.7	389.9	171.6	126.2	39.7	0.0
18	Great Basin Gold limited	33.8	275.6	30.0	121.0	270.3	358.6	1195.5	380.2	631.0	0.0
19	Hulamin limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	0.0
20	Jubilee Platinum Plc	0.0	0.0	179.7	228.3	0.0	0.0	71.4	101.3	89.6	0.0

Source: Secondary data extracted by this study from annual reports

Waste management costs for selected firms in Sub Saharan Africa converted to presentation currency (Naira) Continued

21	Keaton Energy Holdings limited	294.4	0.0	201.7	0.0	233.1	0.0	0.0	361.5	0.0	0.0
22	Kumba Iron Ore limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
23	Lonmin Plc	38.9	91.9	95.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited	0.0	0.0	601.1	570.8	509.3	0.0	60.8	327.2	140.8	133.0
25	Middle East Diamond Resources	0.0	0.0	321.5	274.0	352.6	73.6	45.6	31.2	89.6	177.3
26	Merafe Ressources limited	0.0	320.8	523.2	274.0	242.9	0.0	137.9	0.0	92.2	181.7
27	Northam Platinum limited	104.9	80.2	41.9	123.3	139.1	58.8	118.5	157.4	105.0	0.0
28	Oakbay Resources and Energy limited	50.8	116.6	878.7	958.9	607.3	386.2	0.0	249.3	358.4	731.3
29	Pan African Reources plc	0.0	0.0	197.7	274.0	156.7	55.2	42.5	101.3	89.6	199.4
30	Platfields limited	182.7	0.0	93.9	0.0	70.5	0.0	0.0	44.2	0.0	39.9
31	Randgold and Exploration company limited	346.9	126.8	189.7	625.5	211.6	161.8	150.4	260.2	266.2	270.4
32	Royal Bafokeng Platinum Limited	55.8	40.8	24.0	9.1	13.7	40.5	129.1	63.9	92.2	0.0
33	Sibanye Gold Limited	558.4	408.2	679.0	547.9	391.8	441.4	273.4	342.8	102.4	0.0
34	South African Coal Mining Holdings limited	0.0	0.0	179.7	502.3	0.0	0.0	147.3	163.6	217.6	0.0
35	Tawana Resources limited	81.2	56.9	71.9	41.1	70.5	55.2	42.5	45.2	38.4	0.0
36	Tharisa plc	216.6	113.7	205.7	168.9	129.3	180.2	109.4	99.7	234.2	265.9
37	The Waterberg Coal Company Limited	157.4	37.9	37.9	18.3	170.4	22.1	68.4	67.0	99.8	201.7
38	Trans Hex Group limited	710.6	116.6	479.3	410.9	626.9	772.4	0.0	0.0	102.4	332.4
39	Wesizwe Platinum Limited	0.0	43.7	179.7	228.3	166.5	242.7	192.9	116.9	89.6	177.3
40	ZCI limited	216.6	5.8	51.9	73.1	31.3	38.6	54.7	28.0	0.0	59.8
41	African Paint Plc	0.5	0.8	1.2	1.4	0.6	0.8	1.2	1.3	0.3	0.0
42	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	BergerPaints	0.3	0.7	0.0	0.0	0.0	0.8	0.5	0.7	0.3	0.4
44	Beta Glass	0.9	0.9	0.8	0.1	0.3	0.8	0.7	0.3	0.7	0.7
45	Cap plc	0.5	0.8	0.2	1.4	0.6	0.8	0.2	1.3	0.3	0.0
46	Cement Company of North Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	Dangote Cement	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
48	Oando	1.9	0.9	0.4	3.2	0.4	0.9	2.1	1.1	1.8	2.4
49	First Alluminium Nig	0.5	0.8	0.9	0.7	0.5	1.8	1.2	0.3	0.8	0.0
50	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	Lafarge Africa	0.0	0.0	0.0	0.0	0.0	1.6	2.3	2.7	2.3	2.4
52	Meyer Plc	0.9	0.9	0.8	0.1	0.3	0.1	0.7	0.3	0.7	0.2
53	Multi verse mining and Exploration	0.5	0.8	0.2	0.4	1.6	0.8	1.2	0.6	0.3	0.0
54	Port Land Paints and Products	1.1	0.3	0.8	0.3	0.8	0.4	1.2	0.9	0.8	0.4
55	Premier Paints	0.3	0.7	0.2	0.2	0.2	0.8	0.5	0.7	0.3	0.4
56	Seplat Petroleum Dev Company limited	0.2	0.4	0.3	3.2	2.9	1.5	2.4	2.5	3.9	3.3
57	Thomas Wyatt Nig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Total Nigeria	1.7	0.9	1.8	0.6	2.3	0.0	0.8	0.0	1.1	1.5
59	Ghana Oil	279.1	160.2	233.3	30.7	326.7	0.0	81.6	0.0	167.2	284.6
60	Total Petroleum Ghana	36.4	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
61	Golden Star Resources	12.1	73.9	40.6	10.2	29.7	32.8	13.6	5.7	10.4	28.5
62	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
63	Tanga Cement company	0.0	0.0	0.0	0.2	0.1	0.1	0.3	0.0	0.0	0.0
64	Tanzania Portland Cement Company	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1

Source: Secondary data extracted by this study from annual reports

Appendix 6: Community development costs for selected firms in Sub Saharan Africa converted to presentation currency (Naira)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	126.9	49.6	107.8	123.3	105.8	2322.7	2832.9	4401.4	2163.2	2349.0
2	Andulela Investment Holdings	238.6	21.9	333.5	310.5	338.9	281.4	347.9	802.4	311.0	547.4
3	Anglo American Platinum	497.4	469.5	695.0	646.1	707.2	584.8	724.6	655.9	647.7	746.8
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	0.0	397.2	1450.6	687.1	1222.4	545.1
5	Arcelormittal South Africa	575.3	0.0	978.5	913.2	0.0	0.0	0.0	0.0	0.0	0.0
6	Assore Limited	0.0	0.0	639.0	433.8	0.0	0.0	44.1	76.3	83.2	117.4
7	Atlatsa Resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Bauba Platinum	20.3	16.0	16.0	32.0	19.8	16.6	10.3	26.5	24.3	53.2
9	BHP Billiton	67.7	74.4	111.8	75.3	66.6	71.7	27.3	45.2	0.0	106.4
10	Buffalo Coal Corp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.0	0.0
11	Central Rand Gold limited	69.4	675.1	73.9	61.6	127.3	15.6	142.8	36.1	138.2	31.0
12	Chrometco Limited	0.0	0.0	0.0	0.0	16.8	9.2	34.9	28.0	26.9	42.1
13	Delrand Resources limited	35.5	39.4	65.9	59.4	0.0	88.3	33.4	39.0	28.2	0.0
14	Eastern Platinum limited	0.0	0.0	59.9	50.2	31.3	62.5	31.9	42.1	177.9	332.4
15	Ferrum Crescent Limited	57.5	11.7	43.9	6.8	33.3	88.3	129.1	65.4	47.4	59.8
16	Glencore Plc	50.8	116.6	79.9	91.3	254.7	386.2	349.4	0.0	486.4	443.2
17	Gold Fields limited	45.7	68.5	117.8	150.7	123.4	125.1	148.9	149.6	236.8	392.2
18	Great Basin Gold limited	294.4	0.0	383.4	91.3	254.7	327.3	557.5	433.1	256.0	664.8
19	Hulamin limited	59.2	113.7	83.9	625.5	395.7	180.2	124.6	98.2	131.8	0.0
20	Jubilee Platinum Plc	0.0	0.0	185.7	260.3	0.0	0.0	215.7	261.7	126.7	0.0
21	Keaton Energy Holdings limited	45.7	27.7	531.2	121.0	62.7	93.8	255.2	252.4	216.3	392.2
22	Kumba Iron Ore limited	0.0	1778.8	0.0	3077.5	3622.2	5072.0	3884.1	3151.8	2240.0	1737.3
23	Lonmin Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited	38.9	16.0	16.0	0.0	49.0	86.4	51.6	35.8	15.4	17.7
25	Middle East Diamond Resources	0.0	0.0	0.0	0.0	23.5	27.6	9.1	4.1	28.2	64.3
26	Merafe Resources limited	0.0	0.0	147.8	440.6	436.9	233.6	164.1	229.0	248.3	383.4
27	Northam Platinum limited	54.1	77.3	191.7	276.2	80.3	0.0	0.0	0.0	87.0	117.4
28	Oakbay Resources and Energy limited	0.0	11.7	14.4	19.9	0.8	23.9	21.3	17.1	24.3	31.0
29	Pan African Reources plc	0.0	0.0	7.6	10.5	4.3	22.1	16.7	22.3	15.4	22.2
30	Platfields limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	161.8
31	Randgold and Exploration company limited	304.6	422.8	838.7	1415.5	1155.8	1563.2	1200.0	1043.9	742.4	952.9
32	Royal Bafokeng Platinum Limited	106.6	97.7	163.8	173.5	703.3	2333.7	1598.0	2073.7	966.4	819.9
33	Sibanye Gold Limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
34	South African Coal Mining Holdings limited	35.5	40.8	69.9	41.1	86.2	62.5	71.4	0.0	65.3	115.2
35	Tawana Resources limited	0.0	0.0	601.1	570.8	509.3	0.0	60.8	327.2	140.8	133.0
36	Tharisa plc	0.0	0.0	321.5	274.0	352.6	73.6	45.6	31.2	89.6	177.3
37	The Waterberg Coal Company Limited	0.0	320.8	523.2	274.0	242.9	0.0	137.9	0.0	92.2	181.7
38	Trans Hex Group limited	104.9	80.2	41.9	123.3	139.1	58.8	118.5	157.4	105.0	0.0
39	Wesizwe Platinum Limited	0.0	150.2	387.4	374.4	360.5	402.7	416.2	134.0	1438.7	1085.8

Source: Secondary data extracted by this study from annual reports

Community development costs for selected firms in Sub Saharan Africa converted to presentation currency (Naira) Continued

40	ZCI limited	0.0	0.0	179.7	274.0	156.7	55.2	42.5	101.3	89.6	199.4
41	African Paint Plc	0.9	0.8	1.4	1.3	1.6	1.8	1.2	1.3	2.3	0.0
42	AluminiumExtrusion Ind Plc	0.0	0.2	0.8	0.5	0.9	0.7	1.1	1.7	3.4	0.0
43	BergerPaints	0.9	0.6	0.0	1.1	1.3	1.8	1.5	1.7	1.3	1.4
44	Beta Glass	0.0	1.9	0.9	1.1	1.2	1.4	1.7	1.0	1.1	2.1
45	Cap plc	0.8	0.7	1.2	1.1	1.4	0.9	1.3	1.1	0.9	1.8
46	Cement Company of North Nigeria	3.4	6.2	7.7	8.7	12.3	19.6	18.1	18.7	46.6	54.3
47	Dangote Cement	34.0	27.5	38.7	40.4	43.5	68.4	78.3	80.4	88.4	93.9
48	Oando	22.7	0.0	48.2	52.1	39.8	60.3	77.6	63.2	93.4	88.3
49	First Alluminium Nig	0.8	1.8	1.6	1.5	1.9	2.1	1.9	1.3	1.8	0.0
50	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	Lafarge Africa	0.0	0.0	7.4	142.2	173.2	211.0	257.0	243.0	531.0	621.0
52	Meyer Plc	1.9	0.9	2.8	3.1	0.3	12.8	7.7	3.3	9.7	2.7
53	Multi verse mining and Exploration	1.5	1.8	1.2	7.4	1.6	1.8	1.2	6.3	0.3	0.0
54	Port Land Paints and Products	3.1	2.3	1.8	2.3	1.8	7.4	2.2	8.9	10.8	2.4
55	Premier Paints	0.0	18.9	27.4	23.6	29.3	33.4	30.2	39.0	50.0	37.0
56	Seplat Petroleum Dev Company limited	0.2	0.4	0.3	3.2	2.9	1.5	2.4	2.5	3.9	3.3
57	Thomas Wyatt Nig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Total Nigeria	48.0	47.0	18.0	45.0	23.0	0.0	26.0	28.0	32.0	45.0
59	Ghana Oil	279.1	406.7	841.8	747.7	326.7	0.0	81.6	0.0	167.2	284.6
60	Total Petroleum Ghana	36.4	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
61	Golden Star Resources	861.4	813.4	750.5	727.2	425.7	196.7	557.5	119.5	167.2	284.6
62	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
63	Tanga Cement company	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.0	0.0	0.0
64	Tanzania Portland Cement Company	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.0	0.2

Source: Secondary data extracted by this study from annual reports.

Appendix 7: Employee health and safety costs for selected firms in Sub Saharan Africa converted to presentation currency(Naira)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	138.7	242.0	998.5	1141.5	979.5	1250.5	987.4	1168.5	921.6	1639.8
2	Andulela Invstment Holdings	0.0	12.5	74.9	41.1	73.5	71.7	0.0	39.0	34.6	42.1
3	Anglo American Platinum	0.0	0.0	67.9	63.9	56.8	55.4	100.3	59.2	83.2	53.2
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	19.6	77.2	127.6	76.3	19.2	150.7
5	Arcelormittal South Africa	710.6	0.0	898.7	821.9	0.0	0.0	334.2	233.7	320.0	0.0
6	Assore Limited	255.5	259.5	469.3	0.0	64.6	53.3	66.8	79.5	64.0	119.7
7	Atlatsa Resources	536.4	1127.0	1803.3	1618.6	1653.4	1603.6	1784.8	2368.2	2778.9	2752.3
8	Bauba Platinum	0.0	0.0	42.3	41.1	153.0	81.3	123.0	23.4	0.0	0.0
9	BHP Billiton	0.0	0.0	27.0	35.2	34.9	33.5	19.6	21.3	24.6	53.2
10	Buffalo Coal Corp	0.0	11.7	12.0	9.1	15.7	12.9	9.1	20.3	0.0	0.0
11	Central Rand Gold limited	22.8	83.1	117.8	166.7	143.0	99.3	121.5	138.7	143.4	55.4
12	Chrometco Limited	59.2	113.7	83.9	625.5	395.7	180.2	124.6	98.2	131.8	0.0
13	Delrand Resources limited	1.7	7.3	43.9	50.2	54.9	31.3	0.0	23.4	24.3	0.0
14	Eastern Platinum limited	0.0	55.4	103.8	91.3	50.9	86.4	31.9	54.5	65.3	0.0
15	Ferrum Crescent Limited	50.8	320.8	179.7	228.3	431.0	386.2	258.2	39.0	64.0	68.7
16	Glencore Plc	43.7	0.0	51.9	13.7	31.3	38.6	53.2	37.4	16.6	48.8
17	Gold Fields limited	0.0	27.7	43.9	29.7	37.2	108.5	95.7	144.9	153.6	0.0
18	Great Basin Gold limited	33.8	275.6	30.0	121.0	270.3	358.6	1195.5	380.2	631.0	0.0
19	Hulamin limited	6.8	105.0	71.9	132.4	66.6	106.7	54.7	21.8	24.3	46.5
20	Jubilee Platinum Plc	37.2	49.6	24.0	1.8	7.8	79.1	31.9	35.8	42.2	62.0
21	Keaton Energy Holdings limited	148.9	151.6	59.9	75.3	80.3	108.5	127.6	306.9	256.0	573.9
22	Kumba Iron Ore limited	441.6	555.5	860.7	1164.3	1163.6	1320.4	837.0	942.6	0.0	0.0
23	Lonmin Plc	0.0	26.2	22.0	47.9	23.5	27.6	24.3	24.9	0.0	0.0
24	Master Drilling Groups limited	0.0	0.0	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
25	Middle East Diamond Resources	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
26	Merafe Ressources limited	0.0	0.0	129.8	123.3	43.1	119.5	137.9	42.1	28.2	0.0
27	Northam Platinum limited	66.0	41.8	52.5	167.3	126.2	110.5	107.8	35.8	46.1	93.1
28	Oakbay Resources and Energy limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	0.0
29	Pan African Reources plc	135.4	0.0	179.7	228.3	41.1	44.1	71.4	101.3	89.6	0.0
30	Platfields limited	44.0	29.2	32.0	68.5	31.3	36.8	45.6	31.2	89.6	0.0
31	Randgold and Exploration company limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
32	Royal Bafokeng Platinum Limited	38.9	16.0	16.0	0.0	49.0	86.4	51.6	35.8	15.4	17.7
33	Sibanye Gold Limited	45.7	55.4	41.9	25.1	23.5	27.6	24.3	19.6	17.5	41.4
34	South African Coal Mining Holdings limited	35.5	129.8	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
35	Tawana Resources limited	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
36	Tharisa plc	54.1	84.6	123.8	73.1	43.1	119.5	137.9	26.5	28.2	0.0
37	The Waterberg Coal Company Limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	155.1
38	Trans Hex Group limited	66.0	119.6	179.7	228.3	0.0	0.0	0.0	101.3	89.6	133.0
39	Wesizwe Platinum Limited	43.7	42.3	27.2	111.9	28.6	97.5	97.2	43.6	0.0	161.8

Employee health and safety costs for selected firms in Sub Saharan Africa converted to presentation currency(Naira) Continued

Source: Secondary data extracted by this study from annual reports.

40	ZCI limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
41	African Paint Plc	10.5	8.8	9.2	17.4	10.6	8.8	9.2	16.3	20.3	0.0
42	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	BergerPaints	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
44	Beta Glass	10.9	20.9	2.8	23.1	2.3	10.8	8.7	2.3	8.7	3.7
45	Cap plc	10.5	8.8	9.2	17.4	10.6	8.8	9.2	16.3	20.3	0.0
46	Cement Company of North Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
47	Dangote Cement	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
48	Oando	10.9	1.9	2.4	3.2	3.4	5.9	2.1	9.1	2.8	2.4
49	First Alluminium Nig	12.5	18.0	19.4	17.6	12.5	7.8	8.2	6.3	20.8	0.0
50	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	Lafarge Africa	12.3	11.7	0.0	0.0	0.0	1.6	2.3	2.7	2.3	2.4
52	Meyer Plc	1.9	0.9	2.8	3.1	0.3	12.8	7.7	3.3	9.7	2.7
53	Multi verse mining and Exploration	1.5	1.8	1.2	7.4	1.6	1.8	1.2	6.3	0.3	0.0
54	Port Land Paints and Products	3.1	2.3	1.8	2.3	1.8	7.4	2.2	8.9	10.8	2.4
55	Premier Paints	1.3	2.7	3.2	1.2	2.2	3.8	5.5	4.7	4.4	5.9
56	Seplat Petroleum Dev Company limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	Thomas Wyatt Nig	4.8	4.7	1.8	4.5	2.3	0.0	2.6	2.8	3.2	4.5
58	Total Nigeria	2.3	3.3	8.3	7.3	3.3	3.3	1.2	0.0	3.2	4.0
59	Ghana Oil	861.4	813.4	750.5	727.2	425.7	196.7	557.5	119.5	167.2	284.6
60	Total Petroleum Ghana	351.9	342.6	375.3	399.4	613.7	475.3	441.9	142.3	475.4	626.1
61	Golden Star Resources	157.7	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
62	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
63	Tanga Cement company	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.4	0.5
64	Tanzania Portland Cement Company	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.0	0.0	0.8

Source: Secondary data extracted by this study from annual reports.

Appendix 8: Earnings per share for selected firms in Sub Saharan Africa in presentation currency (kobo)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	9813.6	27789.5	21847.2	18423.8	31050.2	29699.9	26369.8	29602.0	10278.4	10947.0
2	Andulela Invstment Holdings	-37.2	-51.0	-1701.4	-171.2	-21.5	85.1	107.4	-354.3	-234.2	89.1
3	Anglo American Platinum	50252.4	0.0	29835.2	62508.5	44371.4	33194.0	26157.2	825.7	-60518.4	13938.6
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	0.0	0.0	-8627.9	-218.1	-256.0	332.4
5	Arcelormittal South Africa	21793.0	31026.2	-2076.9	7830.7	2664.2	3163.1	2779.8	3100.4	0.0	0.0
6	Assore Limited	46022.4	165658.0	275026.8	28514.7	52697.1	64714.4	50430.8	60466.0	19084.8	30137.6
7	Atlatsa Resources	0.0	61.2	1.4	47.9	0.0	0.0	0.0	53.0	61.4	82.0
8	Bauba Platinum	28.8	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
9	BHP Billiton	18.6	27.7	39.9	-11.4	0.0	-18.0	21.9	23.1	22.9	0.0
10	Buffalo Coal Corp	-3.4	-11.7	0.0	0.0	-4.3	-5.1	-20.8	-32.7	0.0	37.7
11	Central Rand Gold limited	-416.9	-236.3	-374.8	-103.0	-19.8	-259.1	-728.1	-24.6	-224.1	-67.8
12	Chrometco Limited	0.0	0.0	0.0	-66.0	54.7	979.1	-89.9	6.9	-105.0	238.7
13	Delrand Resources limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Eastern Platinum limited	-0.3	0.3	0.2	0.0	-1.6	-2.0	-25.7	-21.0	-2.7	0.0
15	Ferrum Crescent Limited	55.8	-49.3	-315.9	-133.8	-65.0	28.1	-9.1	-11.7	-6.4	-4.9
16	Glencore Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Gold Fields limited (Cent)	7157.2	9958.1	4573.1	11757.5	19002.3	809.2	-1200.0	31.2	-396.8	443.2
18	Great Basin Gold limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Hulamin limited(Cent)	1387.4	1603.8	798.8	593.6	489.8	165.5	-6410.2	1869.6	2099.2	2637.0
20	Jubilee Platinum Plc(pence)	-36.0	-51.0	-73.5	-30.8	-52.3	-48.0	-36.6	-12.8	-5.8	0.0
21	Keaton Energy Holdings limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Kumba Iron Ore limited(Rand)	170.9	332.4	436.9	1019.6	1040.2	714.1	730.5	534.7	151.3	605.0
23	Lonmin Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited (Dollar)	64.3	112.3	137.8	198.6	182.2	172.9	154.9	177.6	172.8	316.9
25	Middle East Diamond Resources	52.5	56.9	63.9	111.9	90.1	172.9	154.9	177.6	172.8	316.9
26	Merafe Resources limited(Cent)	169.2	612.4	-119.8	251.1	117.5	92.0	167.1	124.6	175.4	469.8
27	Northam Platinum limited(cent)	9476.9	9144.6	3438.8	4059.2	1753.3	1487.8	2073.4	34.3	-2597.1	0.0
28	Oakbay Resources and Energy limited (Cent)	18.6	27.7	39.9	-11.4	0.0	0.0	0.0	0.0	-348.2	-14.2
29	Pan African Reources plc(Mixed currency)	79.5	103.5	199.7	305.9	321.3	456.6	524.2	385.4	185.3	669.2
30	Platfields limited	-10.2	58.6	179.9	183.1	-142.6	-149.9	-262.2	-179.6	-131.7	0.0
31	Randgold and Exploration company limited(Cent)	0.0	0.0	0.0	23560.6	1292.9	239.1	151.9	0.0	0.0	0.0
32	Royal Bafokeng Platinum Limited(Cent)	0.0	2609.8	2140.8	4360.5	3271.5	1912.6	2627.9	3723.6	-1065.0	1921.3
33	Sibanye Gold Limited	13.5	39.4	-126.6	-392.7	-315.4	-233.6	-174.2	0.0	42.8	-150.7
34	South African Coal Mining Holdings limited	-10.5	58.6	179.9	183.1	-142.6	-149.9	-262.2	-179.6	-131.7	0.0
35	Tawana Resources limited	30.5	5.8	-100.6	-175.8	-180.2	-46.0	-27.2	0.0	4.4	-86.2
36	Tharisa plc	38.9	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
37	The Waterberg Coal Company Limited	38.9	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
38	Trans Hex Group limited	27.1	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
39	Wesizwe Platinum Limited	-333.3	-71.3	132.8	-933.1	-520.7	11.0	-8.4	-251.9	-437.8	412.0
40	ZCI limited	-3.4	3.9	60.5	93.4	-59.9	-75.8	-116.7	-52.5	-41.2	0.0

Source: Secondary data extracted by this study from annual reports.

Earnings per share for selected firms in Sub Saharan Africa in presentation currency (kobo) Continued

41	African Paint Plc	0.0	17.0	12.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
42	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	14.0	23.0	21.0	62.0	77.0	38.0	38.0
43	BergerPaints	0.0	0.0	0.0	0.0	27.0	36.0	44.0	51.0	114.0	118.0
44	Beta Glass	0.0	0.0	0.0	0.0	187.0	199.0	202.0	237.0	249.0	264.0
45	Cap plc	2.0	7.0	19.0	31.0	-12.9	60.0	54.0	48.0	36.0	40.0
46	Cement Company of North Nigeria	0.0	134.0	184.0	101.0	104.0	86.0	124.0	153.0	96.0	102.0
47	Dangote Cement	0.0	0.0	0.0	0.0	1086.0	942.0	1234.0	857.0	713.0	828.0
48	Oando	0.0	0.0	0.0	0.0	829.0	126.0	23.0	-2076.0	-423.0	0.0
49	First Alluminium Nig	1.0	-2.0	2.0	15.9	-13.2	-47.6	4.6	1.4	0.0	0.0
50	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	Lafarge Africa	356.0	375.0	168.0	163.0	288.0	487.0	0.0	767.0	629.0	0.0
52	Meyer Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	Multi verse mining and Exploration	4.2	3.9	2.2	1.0	1.0	0.7	-6.9	-13.0	-10.4	-13.7
54	Port Land Paints and Products	22.0	31.0	46.0	33.0	43.0	-72.0	14.0	37.0	-58.0	-36.0
55	Premier Paints	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	Seplat Petroleum Dev Company limited	0.5	0.7	0.3	-2.1	1.7	2.9	9.1	4.3	5.3	8.8
57	Thomas Wyatt Nig	-1.2	-2.2	-3.9	-2.6	0.2	0.8	1.1	1.8	0.0	0.0
58	Total Nigeria	0.0	0.0	0.0	0.0	46.0	59.0	62.0	44.0	78.0	84.0
59	Ghana Oil	3275.9	1478.9	0.0	1741.1	890.9	901.5	0.0	0.0	0.0	0.0
60	Total Petroleum Ghana	3154.6	3327.5	3346.9	2867.8	2177.8	2376.6	2379.7	3073.7	1828.4	0.0
61	Golden Star Resources	4610.5	6901.4	2738.3	1741.1	-10888.9	2294.6	4895.3	3984.4	4231.4	0.0
62	Tullow Oil	8978.4	7764.1	5172.4	5940.4	5246.5	4097.5	3535.5	3130.6	2925.4	4695.9
63	Tanga Cement company	31.5	28.2	24.4	20.6	29.2	26.3	16.4	9.9	8.5	0.0
64	Tanzania Portland Cement Company	19.0	22.2	42.6	20.9	18.7	34.2	20.9	30.3	28.1	31.0

Appendix 9: Return on capital employed for selected firms in Sub Saharan Africa(converted from presentation currency to percentage)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	6.4	16.3	8.2	6..0	9.8	7.7	10.1	5	3.9	2.4
2	Andulela Invstment Holdings	-0.8	-1.9	-13.8	-48.4	-26.3	-1.2	-13	-5	1.8	2.1
3	Anglo American Platinum	0	0	5.3	3.7	3.2	4	-3.8	1.2	2.5	3
4	Anglogold Ashanti	0	0	0	0	0	0	0	0	0	0
5	Arcelormittal South Africa	10	26	0.8	2	0	0	0	0	0	0
6	Assore Limited	15.1	31.58	29.5	12.2	21.7	23.2	20.3	18.2	5.6	0
7	Atlatsa Resources	2	4.2	15.1	10.5	12	22	5	10	0	0
8	Bauba Platinum	1.3	2.9	3.9	12.6	10	12.2	2.3	8	2.86	-2.8
9	BHP Billiton	3.1	3.5	3.8	13.8	7.9	6.9	13	9	0	0
10	Buffalo Coal Corp	0	0	0	0	0	0	0	-14.1	-100.63	-9.03
11	Central Rand Gold limited	-17.6	-30.8	-61.6	-128.8	-49	-15.6	-63.2	6.7	-98.9	-31.7
12	Chrometco Limited	0	0	0	-6.4	5.1	44	-5.4	-0.14	-9.2	-10.8
13	Delrand Resources limited	0	0	0	0	0	0	0	0	0	0
14	Eastern Platinum limited	-1.1	1.88	0.13	0.87	-13.3	-7.5	-30.5	-49.4	-10.7	0
15	Ferrum Crescent Limited	19.1	-25.3	-82.7	-466.2	-94.4	114.5	-87.4	-133	-170.2	-133.5
16	Glencore Plc	0	0	0	0	0	0	0	0	0	0
17	Gold Fields limited	14.4	14.4	17.6	18.4	9.4	6.3	-8.2	0.3	-4.1	2.7
18	Great Basin Gold limited	0	0	0	0	0	0	0	0	0	0
19	Hulamin limited	0	0	0	1.8	1.7	1.7	4.5	9.9	3.1	9.3
20	Jubilee Platinum Plc	-17.6	-12.9	-9.9	-2.2	-6.9	-8.7	-8.9	-9.3	-11.8	-10.2
21	Keaton Energy Holdings limited	0	0	0	0	0	0	0	0	0	0
22	Kumba Iron Ore limited	4	5.4	4.9	1.4	14.4	8.2	4.6	3.1	1.2	1.9
23	Lonmin Plc	0	0	0	0	0	0	0	0	0	0
24	Master Drilling Groups limited	0	0	0	0	0	0	0	0	0	0
25	Middle East Diamond Resources	0	0	0	0	0	0.6	2	5.7	1.5	13.6
26	Merafe Resources limited	9.3	27.4	-4.5	7.3	-0.2	1.1	4.2	4	6.4	8.9
27	Northam Platinum limited	39.8	36.2	36.2	6.7	6.4	2.9	3.6	0.12	-5.4	-1.8
28	Oakbay Resources and Energy limited	0	0	0	0	0	0	0	0	-0.7	-0.2
29	Pan African Reources plc	11.1	11.8	16.3	18.3	18.6	14.9	11.4	10.8	4.9	10.1
30	Platfields limited	0	0	0	0	0	0	0	0	0	0
31	Randgold and Exploration company limited	1.9	2.1	0	1.3	2.2	4.2	2.4	1.8	2.7	3.6
32	Royal Bafokeng Platinum Limited	6	-1.1	16.5	13.2	1.4	0.8	1.4	1.9	-15	0.9
33	Sibanye Gold Limited	0.8	0	4.9	-0.2	1.2	4.4	2.8	4.7	6.5	-0.1
34	South African Coal Mining Holdings limited	1	1.9	3.7	8.1	0.2	1.1	4	4.7	2.5	1.8
35	Tawana Resources limited	4	9.8	14.2	22.7	3.8	20.1	2.9	2.7	7.8	6.9
36	Tharisa plc	6.2	8.4	10.8	19.4	1.8	0.4	1.5	6	4.9	-
37	The Waterberg Coal Company Limited	1.1	1.6	1.8	0.9	1.3	1.5	1.8	2.1	3.7	4.9
38	Trans Hex Group limited	0.8	0.9	0.6	1.3	4.7	2.8	3.2	2.2	2.6	4.4
39	Wesizwe Platinum Limited	-3.3	-1.89	-1.8	11.6	-4.01	0.23	-0.24	-0.1	-2.6	4.3

Return on capital employed for selected firms in Sub Saharan Africa(converted from presentation currency to percentage) Continued

40	ZCI limited	0.4	0.8	3.1	0.9	1.2	1.5	0.9	0.7	3	2.1
41	African Paint Plc	0.6	1.2	2.2	0.1	1.2	1.1	2.3	0.1	0.09	0.6
42	Aluminium Extrusion Ind Plc	1.7	3.6	0.2	4.8	4.9	3.1	8	9.7	4.4	3.9
43	BergerPaints	1.2	2.3	3.6	4.7	0.4	1.7	4.8	4.1	8.5	4.1
44	Beta Glass	6.6	7.9	12.8	19.6	3.8	12.1	1.8	1.9	9.9	8.6
45	Cap plc	6.8	9.7	16.4	27.9	38.7	43.5	64.9	69.2.	62.7.	-
46	Cement Company of North Nigeria	0	1.4	1.6	11.8	10.4	7.6	10.4	12.2	7	0
47	Dangote Cement	0	0	0	0	18.7	15.4	18.6	12.3	11.3	0
48	Oando	0	0	0	0	1.1	1.5	0.39	-20.8	-38.4	0
49	First Alluminium Nig	1.4	-0.4	0.3	-2.2	-1.9	-16.5	1.3	0.2	0	0
50	Japaul Oil and Maritime Services	0.4	1.3	2.1	0.2	1.2	1.3	2.4	0.09	0.15	0.8
51	Lafarge Africa	0	21.7	6.1	4.8	4.1	5.7	9.7	10..2	8.1	0
52	Meyer Plc	0	0	0	0	0	0	0	0	0	0
53	Multi verse mining and Exploration	0	0	1.2	0.6	0.43	0.3	-5.6	-11.7	-9.4	-22.7
54	Port Land Paints and Products	0	0	10	8.1	6.7	-18.7	2.78	6.5	-12.3	0
55	Premier Paints	0	0	0	0	0	0	0	0	0	0
56	Seplat Petroleum Dev Company limited	0	0	0	0	0	0	0	0	0	0
57	Thomas Wyatt Nig	25	26.4	0.7	4.2	3.1	2.8	3.8	2.1	4.1	0
58	Total Nigeria	6.3	12.4	10.1	5.4	9.8	10.5	9.7	7.6	2.8	3.1
59	Ghana Oil	1.1	1.9	6.7	4.3	7.8	9.9	2.1	4.4	0	0
60	Total Petroleum Ghana	0.8	0.9	1.3	4.5	4.8	5.6	1.1	4.9	1.4	-1.3
61	Golden Star Resources	1.5	1.9	1,8	6.8	5.7	4.2	7.8	5.2	0	0
62	Tullow Oil	4.8	4.9	7.3	8.8	12.7	13.6	18.4	19.7	17.8	26.8
63	Tanga Cement company	-14.2	-23.8	-35.9	-19.2	-28.3	-8.6	-32.8	-4.8	-6.4	-18.9
64	Tanzania Portland Cement Company	0.7	1.1	1.9	1.4	7.2	0.8	1.9	6.5	1.3	1.6

Source: Secondary data extracted by this study from annual reports.

Appendix 10: Return on equity for selected firms in Sub Saharan Africa (converted from presentation currency to percentage)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	11.1	27	14.3	9.6	15.9	14.9	15.5	15.4	6.8	4.4
2	Andulela Invstment Holdings	-1.8	-2.9	-25.7	-75.9	-40.1	-2.4	-24	-11	2.1	3.8
3	Anglo American Platinum	0	0	10.8	8.3	7.2	8.8	-9.3	2.3	4.8	7.6
4	Anglogold Ashanti	0	0	0	0	0	0	0	0	0	0
5	Arcelormittal South Africa	26	39	2	6	0	0	0	0	0	0
6	Assore Limited	24.5	75.3	48.9	19	29.9	35.7	24.2	23.1	7.24	7.9
7	Atlatsa Resources	4.8	7.3	19.8	15.6	18	31.3	11.2	18.2	0	0
8	Bauba Platinum	2.6	4.2	5.1	14.6	17.8	17	5.3	12.5	4.5	-4
9	BHP Billiton	6.8	6.5	7.2	18.4	11.2	12.6	24.2	15.1	0	0
10	Buffalo Coal Corp	0	0	0	0	0	0	0	-44.3	-259.7	-20.5
11	Central Rand Gold limited	-29.2	-45.5	-81.7	-248.1	-137.8	-64.4	-173.3	14.1	-113.9	-38.8
12	Chrometco Limited	0	0	0	-12.4	13.3	56.7	-7	-0.2	-11.2	-13.2
13	Delrand Resources limited	0	0	0	0	0	0	0	0	0	0
14	Eastern Platinum limited	-1.4	2.4	0.19	0.94	-16.4	-10.5	-43.6	-53.2	-13.6	0
15	Ferrum Crescent Limited	20.2	-26.4	-83.5	-728.4	-428	173.2	-101.9	-263.4	-446.4	-179.8
16	Glencore Plc	0	0	0	0	0	0	0	0	0	0
17	Gold Fields limited	20.9	21.2	26.9	27.7	16.2	11.3	-14.7	0.56	-8.8	5.4
18	Great Basin Gold limited	0	0	0	0	0	0	0	0	0	0
19	Hulamin limited	0	0	0	3.8	2.8	3.2	5.9	12.3	6.2	13.1
20	Jubilee Platinum Plc	-18.6	-13.1	-12.7	-2.7	-9.3	-11.7	-11.9	-12.7	-16	-16.4
21	Keaton Energy Holdings limited	0	0	0	0	0	0	0	0	0	0
22	Kumba Iron Ore limited	11.8	10.7	9.8	1.9	15.5	8.4	7.5	5.8	2.5	3
23	Lonmin Plc	0	0	0	0	0	0	0	0	0	0
24	Master Drilling Groups limited	0	0	0	0	0	0	0	0	0	0
25	Middle East Diamond Resources	0	0	0	0	0	0.9	3	8.4	2.3	19.8
26	Merafe Resources limited	16.7	41.4	-6.5	10.8	-0.4	1.8	7.2	6.9	10	13.7
27	Northam Platinum limited	60.5	56.5	56.5	7.6	7.3	3.7	4.8	0.16	-11.3	-2.8
28	Oakbay Resources and Energy limited	0	0	0	0	0	0	0	0	-1.2	-0.3
29	Pan African Resources plc	21.8	15	20.1	23	23.1	26.4	21.8	16.2	7.7	19
30	Platfields limited	0	0	0	0	0	0	0	0	0	0
31	Randgold and Exploration company limited	2.9	3.6	0	4.2	2.8	5.2	3.7	3.1	4.8	5.5
32	Royal Bafokeng Platinum Limited	10	-1.8	28.9	18	2.9	1.8	1.8	2.8	-21	1.1
33	Sibanye Gold Limited	1.9	0	8.2	-2.4	2.8	7.3	6.7	14.4	11.1	-0.3
34	South African Coal Mining Holdings limited	2.1	4.5	6.8	10.8	0.9	2.9	10	9.6	7.5	3.9
35	Tawana Resources limited	11.4	16.3	28.2	32	9.8	27.7	4.1	5	16.9	14.4
36	Tharisa plc	12.1	14.8	23.8	48.4	6.3	1.2	3	11	12	-
37	The Waterberg Coal Company Limited	2.4	2.7	3.2	1.7	1.9	2	3.5	5.7	8	9
38	Trans Hex Group limited	1.4	1.9	2.1	2.4	13.6	4.2	4.6	4.7	5.9	7.8
39	Wesizwe Platinum Limited	-7.5	-2	-2.9	14.2	-9.9	0.31	-0.33	-7.1	-7.6	9.74

Source: Secondary data extracted by this study from annual reports.

Return on equity for selected firms in Sub Saharan Africa (converted from presentation currency to percentage) Continued

40	ZCI limited	1.1	1.58	9.5	1.2	2.7	3.2	1.3	1.3	6	4.2
41	African Paint Plc	1	3.2	5.1	0.5	2	2	5.3	0.2	0.3	1.4
42	Aluminium Extrusion Ind Pc	3.3	8.9	0.9	12	8..2	4.8	14.1	15.3	7	5.8
43	BergerPaints	2.1	4.5	6.8	10.8	0.9	2.9	10	9.6	12.8	6
44	Beta Glass	11.4	16.3	28.2	32	9.8	27.7	4.1	5	16.9	14.4
45	Cap plc	12.1	14.8	23.8	48.4	65.6	99.7	111.7	140.8	114	0
46	Cement Company of North Nigeria	0	3.8	4.3	27	21.7	16.4	18.8	20.3	11.8	0
47	Dangote Cement	0	0	0	0	38.7	35.4	36.8	26,9	28.1	0
48	Oando	0	0	0	0	2.8	5.2	0.9	-34	-97.6	0
49	First Alluminium Nig	3.6	-1.6	0.8	-5.4	-4.7	-22.3	2.1	0.6	0	0
50	Japaul Oil and Maritime Services	1	3.2	5.1	0.5	2	2	5.3	0.2	0.3	1.4
51	Lafarge Africa		34.3	11.6	10.1	15.4	21.5	35.3	19.1	15.3	
52	Meyer Plc	0	0	0	0	0	0	0	0	0	0
53	Multi verse mining and Exploration	0	0	2.5	1.2	0.67	0.8	-11.7	-34.5	-34.5	-96.8
4	Port Land Paints and Products	0	0	21.1	13.8	16.1	-39.8	7.4	16.1	-33.7	0
55	Premier Paints	0	0	0	0	0	0	0	0	22.1	17.1
56	Seplat Petroleum Dev Company limited	0	0	0	0	0	0	0	0	0	0
57	Thomas Wyatt Nig	40	56	1.9	10.1	9.9	7.2	8.2	5.8	8.7	0
58	Total Nigeria	15.1	31.58	29.5	12.2	21.7	23.2	21.3	21.3	6.6	7.2
59	Ghana Oil	2	4.2	15.1	10.5	12	22	5	10	0	0
60	Total Petroleum Ghana	1.3	2.9	3.9	12.6	10	12.2	2.3	8	2.86	-2.8
61	Golden Star Resources	3.1	3.5	3.8	13.8	7.9	6.9	13	9	0	0
62	Tullow Oil	8	8.9	10.6	14.2	27.1	24.3	39.4	44.1	37.2	42.7
63	Tanga Cement company	-27.6	-40.8	-61.6	-28.8	-49	-15.6	-63.2	6.7	-9.9	-31.7
64	Tanzania Poland Cement company	1.6	2.3	3.5	1.6	12	1.2	2.4	8	2.6	2.8

Source: Secondary data extracted by this study from annual reports.

Appendix 11: Waste management costs for selected firms per country converted to presentation currency (Naira)

1	African Rainbow Mineral Limited	0.0	0.0	401.4	570.8	313.4	0.0	516.5	451.8	524.8	842.1
2	Andulela Investment Holdings	0.0	0.0	201.7	410.9	156.7	257.5	197.5	311.6	179.2	487.5
3	Anglo American Platinum	0.0	183.4	523.2	99.5	0.0	63.6	137.9	44.1	92.2	130.7
4	Anglogold Ashanti	377.3	384.9	177.3	61.6	111.7	342.6	1354.9	741.6	1419.5	514.1
5	Arcelormittal South Africa	727.6	408.2	1078.4	1004.5	587.7	404.6	0.0	0.0	358.4	221.6
6	Assore Limited	0.0	0.0	579.1	456.6	0.0	0.0	41.0	85.7	89.6	113.0
7	Atlatsa Resources	148.9	0.0	635.0	0.0	556.4	0.0	0.0	506.4	256.3	817.7
8	Bauba Platinum	177.7	128.3	183.7	397.2	207.7	161.8	139.7	254.0	259.8	0.0
9	BHP Billiton	64.3	30.6	35.9	0.0	23.5	20.2	30.4	29.6	0.0	0.0
10	Buffalo Coal Corp	0.0	26.2	0.0	52.5	66.6	11.0	13.7	18.7	0.0	0.0
11	Central Rand Gold limited	0.0	8.3	66.5	303.6	317.4	202.3	319.0	0.0	0.0	0.0
12	Chrometco Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Delrand Resources limited	18.6	20.4	26.0	38.8	0.0	49.7	44.1	56.1	56.3	0.0
14	Eastern Platinum limited	0.0	13.7	161.8	0.0	31.3	77.2	95.7	46.9	0.0	0.0
15	Ferrum Crescent Limited	0.0	0.0	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
16	Glencore Plc	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
17	Gold Fields limited	0.0	0.0	30.0	182.6	350.7	389.9	171.6	126.2	39.7	0.0
18	Great Basin Gold limited	33.8	275.6	30.0	121.0	270.3	358.6	1195.5	380.2	631.0	0.0
19	Hulamin limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	0.0
20	Jubilee Platinum Plc	0.0	0.0	179.7	228.3	0.0	0.0	71.4	101.3	89.6	0.0
21	Keaton Energy Holdings limited	294.4	0.0	201.7	0.0	233.1	0.0	0.0	361.5	0.0	0.0
22	Kumba Iron Ore limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
23	Lonmin Plc	38.9	91.9	95.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited	0.0	0.0	601.1	570.8	509.3	0.0	60.8	327.2	140.8	133.0
25	Middle East Diamond Resources	0.0	0.0	321.5	274.0	352.6	73.6	45.6	31.2	89.6	177.3
26	Merafe Ressources limited	0.0	320.8	523.2	274.0	242.9	0.0	137.9	0.0	92.2	181.7
27	Northam Platinum limited	104.9	80.2	41.9	123.3	139.1	58.8	118.5	157.4	105.0	0.0
28	Oakbay Resources and Energy limited	50.8	116.6	878.7	958.9	607.3	386.2	0.0	249.3	358.4	731.3
29	Pan African Reources plc	0.0	0.0	197.7	274.0	156.7	55.2	42.5	101.3	89.6	199.4
30	Platfields limited	182.7	0.0	93.9	0.0	70.5	0.0	0.0	44.2	0.0	39.9
31	Randgold and Exploration company limited	346.9	126.8	189.7	625.5	211.6	161.8	150.4	260.2	266.2	270.4
32	Royal Bafokeng Platinum Limited	55.8	40.8	24.0	9.1	13.7	40.5	129.1	63.9	92.2	0.0
33	Sibanye Gold Limited	558.4	408.2	679.0	547.9	391.8	441.4	273.4	342.8	102.4	0.0
34	South African Coal Mining Holdings limited	0.0	0.0	179.7	502.3	0.0	0.0	147.3	163.6	217.6	0.0
35	Tawana Resources limited	81.2	56.9	71.9	41.1	70.5	55.2	42.5	45.2	38.4	0.0
36	Tharisa plc	216.6	113.7	205.7	168.9	129.3	180.2	109.4	99.7	234.2	265.9
37	The Waterberg Coal Company Limited	157.4	37.9	37.9	18.3	170.4	22.1	68.4	67.0	99.8	201.7
38	Trans Hex Group limited	710.6	116.6	479.3	410.9	626.9	772.4	0.0	0.0	102.4	332.4
39	Wesizwe Platinum Limited	0.0	43.7	179.7	228.3	166.5	242.7	192.9	116.9	89.6	177.3
40	ZCI limited	216.6	5.8	51.9	73.1	31.3	38.6	54.7	28.0	0.0	59.8

Source: Secondary data extracted by this study from annual reports.

Waste management costs for selected firms per country converted to presentation currency (Naira) Continued

	Nigeria										
1	African Paint Plc	0.5	0.8	1.2	1.4	0.6	0.8	1.2	1.3	0.3	0.0
2	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	BergerPaints	0.3	0.7	0.0	0.0	0.0	0.8	0.5	0.7	0.3	0.4
4	Beta Glass	0.9	0.9	0.8	0.1	0.3	0.8	0.7	0.3	0.7	0.7
5	Cap plc	0.5	0.8	0.2	1.4	0.6	0.8	0.2	1.3	0.3	0.0
6	Cement Company of North Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Dangote Cement	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
8	Oando	1.9	0.9	0.4	3.2	0.4	0.9	2.1	1.1	1.8	2.4
9	First Alluminium Nig	0.5	0.8	0.9	0.7	0.5	1.8	1.2	0.3	0.8	0.0
10	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Lafarge Africa	0.0	0.0	0.0	0.0	0.0	1.6	2.3	2.7	2.3	2.4
12	Meyer Plc	0.9	0.9	0.8	0.1	0.3	0.1	0.7	0.3	0.7	0.2
13	Multi verse mining and Exploration	0.5	0.8	0.2	0.4	1.6	0.8	1.2	0.6	0.3	0.0
14	Port Land Paints and Products	1.1	0.3	0.8	0.3	0.8	0.4	1.2	0.9	0.8	0.4
15	Premier Paints	0.3	0.7	0.2	0.2	0.2	0.8	0.5	0.7	0.3	0.4
16	Seplat Petroleum Dev Company limited	0.2	0.4	0.3	3.2	2.9	1.5	2.4	2.5	3.9	3.3
17	Thomas Wyatt Nig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	Total Nigeria	1.7	0.9	1.8	0.6	2.3	0.0	0.8	0.0	1.1	1.5
	Ghana										
1	Ghana Oil	279.1	160.2	233.3	30.7	326.7	0.0	81.6	0.0	167.2	284.6
2	Total Petroleum Ghana	36.4	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
3	Golden Star Resources	12.1	73.9	40.6	10.2	29.7	32.8	13.6	5.7	10.4	28.5
4	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
	Tanzania										
1	Tanga Cement company	0.0	0.0	0.0	0.2	0.1	0.1	0.3	0.0	0.0	0.0
2	Tanzania Portland Cement Company	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1

Source: Secondary data extracted by this study from annual reports

Appendix 12: Community development Costs for selected firms per country converted to presentation currency (Naira)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	126.9	49.6	107.8	123.3	105.8	2322.7	2832.9	4401.4	2163.2	2349.0
2	Andulela Investment Holdings	238.6	21.9	333.5	310.5	338.9	281.4	347.9	802.4	311.0	547.4
3	Anglo American Platinum	497.4	469.5	695.0	646.1	707.2	584.8	724.6	655.9	647.7	746.8
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	0.0	397.2	1450.6	687.1	1222.4	545.1
5	Arcelormittal South Africa	575.3	0.0	978.5	913.2	0.0	0.0	0.0	0.0	0.0	0.0
6	Assore Limited	0.0	0.0	639.0	433.8	0.0	0.0	44.1	76.3	83.2	117.4
7	Atlatsa Resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Bauba Platinum	20.3	16.0	16.0	32.0	19.8	16.6	10.3	26.5	24.3	53.2
9	BHP Billiton	67.7	74.4	111.8	75.3	66.6	71.7	27.3	45.2	0.0	106.4
10	Buffalo Coal Corp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.0	0.0
11	Central Rand Gold limited	69.4	675.1	73.9	61.6	127.3	15.6	142.8	36.1	138.2	31.0
12	Chrometco Limited	0.0	0.0	0.0	0.0	16.8	9.2	34.9	28.0	26.9	42.1
13	Delrand Resources limited	35.5	39.4	65.9	59.4	0.0	88.3	33.4	39.0	28.2	0.0
14	Eastern Platinum limited	0.0	0.0	59.9	50.2	31.3	62.5	31.9	42.1	177.9	332.4
15	Ferrum Crescent Limited	57.5	11.7	43.9	6.8	33.3	88.3	129.1	65.4	47.4	59.8
16	Glencore Plc	50.8	116.6	79.9	91.3	254.7	386.2	349.4	0.0	486.4	443.2
17	Gold Fields limited	45.7	68.5	117.8	150.7	123.4	125.1	148.9	149.6	236.8	392.2
18	Great Basin Gold limited	294.4	0.0	383.4	91.3	254.7	327.3	557.5	433.1	256.0	664.8
19	Hulamin limited	59.2	113.7	83.9	625.5	395.7	180.2	124.6	98.2	131.8	0.0
20	Jubilee Platinum Plc	0.0	0.0	185.7	260.3	0.0	0.0	215.7	261.7	126.7	0.0
21	Keaton Energy Holdings limited	45.7	27.7	531.2	121.0	62.7	93.8	255.2	252.4	216.3	392.2
22	Kumba Iron Ore limited	0.0	1778.8	0.0	3077.5	3622.2	5072.0	3884.1	3151.8	2240.0	1737.3
23	Lonmin Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited	38.9	16.0	16.0	0.0	49.0	86.4	51.6	35.8	15.4	17.7
25	Middle East Diamond Resources	0.0	0.0	0.0	0.0	23.5	27.6	9.1	4.1	28.2	64.3
26	Merafe Resources limited	0.0	0.0	147.8	440.6	436.9	233.6	164.1	229.0	248.3	383.4
27	Northam Platinum limited	54.1	77.3	191.7	276.2	80.3	0.0	0.0	0.0	87.0	117.4
28	Oakbay Resources and Energy limited	0.0	11.7	14.4	19.9	0.8	23.9	21.3	17.1	24.3	31.0
29	Pan African Reources plc	0.0	0.0	7.6	10.5	4.3	22.1	16.7	22.3	15.4	22.2
30	Platfields limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	161.8
31	Randgold and Exploration company limited	304.6	422.8	838.7	1415.5	1155.8	1563.2	1200.0	1043.9	742.4	952.9
32	Royal Bafokeng Platinum Limited	106.6	97.7	163.8	173.5	703.3	2333.7	1598.0	2073.7	966.4	819.9
33	Sibanye Gold Limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
34	South African Coal Mining Holdings limited	35.5	40.8	69.9	41.1	86.2	62.5	71.4	0.0	65.3	115.2
35	Tawana Resources limited	0.0	0.0	601.1	570.8	509.3	0.0	60.8	327.2	140.8	133.0
36	Tharisa plc	0.0	0.0	321.5	274.0	352.6	73.6	45.6	31.2	89.6	177.3
37	The Waterberg Coal Company Limited	0.0	320.8	523.2	274.0	242.9	0.0	137.9	0.0	92.2	181.7
38	Trans Hex Group limited	104.9	80.2	41.9	123.3	139.1	58.8	118.5	157.4	105.0	0.0
9	Wesizwe Platinum Limited	0.0	150.2	387.4	374.4	360.5	402.7	416.2	134.0	1438.7	1085.8
40	ZCI limited	0.0	0.0	179.7	274.0	156.7	55.2	42.5	101.3	89.6	199.4

Source: Secondary data extracted by this study from annual reports.

Community development Costs for selected firms per country converted to presentation currency (Naira)Continued

	Nigeria										
1	African Paint Plc	0.9	0.8	1.4	1.3	1.6	1.8	1.2	1.3	2.3	0.0
2	AluminiumExtrusion Ind Plc	0.0	0.2	0.8	0.5	0.9	0.7	1.1	1.7	3.4	0.0
3	BergerPaints	0.9	0.6	0.0	1.1	1.3	1.8	1.5	1.7	1.3	1.4
4	Beta Glass	0.0	1.9	0.9	1.1	1.2	1.4	1.7	1.0	1.1	2.1
5	Cap plc	0.8	0.7	1.2	1.1	1.4	0.9	1.3	1.1	0.9	1.8
6	Cement Company of North Nigeria	3.4	6.2	7.7	8.7	12.3	19.6	18.1	18.7	46.6	54.3
7	Dangote Cement	34.0	27.5	38.7	40.4	43.5	68.4	78.3	80.4	88.4	93.9
8	Oando	22.7	0.0	48.2	52.1	39.8	60.3	77.6	63.2	93.4	88.3
9	First Alluminium Nig	0.8	1.8	1.6	1.5	1.9	2.1	1.9	1.3	1.8	0.0
10	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Lafarge Africa	0.0	0.0	7.4	142.2	173.2	211.0	257.0	243.0	531.0	621.0
12	Meyer Plc	1.9	0.9	2.8	3.1	0.3	12.8	7.7	3.3	9.7	2.7
13	Multi verse mining and Exploration	1.5	1.8	1.2	7.4	1.6	1.8	1.2	6.3	0.3	0.0
14	Port Land Paints and Products	3.1	2.3	1.8	2.3	1.8	7.4	2.2	8.9	10.8	2.4
15	Premier Paints	0.0	18.9	27.4	23.6	29.3	33.4	30.2	39.0	50.0	37.0
16	Seplat Petroleum Dev Company limited	0.2	0.4	0.3	3.2	2.9	1.5	2.4	2.5	3.9	3.3
17	Thomas Wyatt Nig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	Total Nigeria	48.0	47.0	18.0	45.0	23.0	0.0	26.0	28.0	32.0	45.0
	Ghana										
1.	Ghana Oil	279.1	406.7	841.8	747.7	326.7	0.0	81.6	0.0	167.2	284.6
2.	Total Petroleum Ghana	36.4	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
3.	Golden Star Resources	861.4	813.4	750.5	727.2	425.7	196.7	557.5	119.5	167.2	284.6
4.	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
	Tanzania										
1.	Tanga Cement company	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.0	0.0	0.0
2.	Tanzania Portland Cement Company	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.0	0.2

Source: Secondary data extracted by this study from annual reports.

Appendix 13: Employee health and safety costs for selected firms per country converted to presentation currency (Naira)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	138.7	242.0	998.5	1141.5	979.5	1250.5	987.4	1168.5	921.6	1639.8
2	Andulela Invstment Holdings	0.0	12.5	74.9	41.1	73.5	71.7	0.0	39.0	34.6	42.1
3	Anglo American Platinum	0.0	0.0	67.9	63.9	56.8	55.4	100.3	59.2	83.2	53.2
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	19.6	77.2	127.6	76.3	19.2	150.7
5	Arcelormittal South Africa	710.6	0.0	898.7	821.9	0.0	0.0	334.2	233.7	320.0	0.0
6	Assore Limited	255.5	259.5	469.3	0.0	64.6	53.3	66.8	79.5	64.0	119.7
7	Atlatsa Resources	536.4	1127.0	1803.3	1618.6	1653.4	1603.6	1784.8	2368.2	2778.9	2752.3
8	Bauba Platinum	0.0	0.0	42.3	41.1	153.0	81.3	123.0	23.4	0.0	0.0
9	BHP Billiton	0.0	0.0	27.0	35.2	34.9	33.5	19.6	21.3	24.6	53.2
10	Buffalo Coal Corp	0.0	11.7	12.0	9.1	15.7	12.9	9.1	20.3	0.0	0.0
11	Central Rand Gold limited	22.8	83.1	117.8	166.7	143.0	99.3	121.5	138.7	143.4	55.4
12	Chrometco Limited	59.2	113.7	83.9	625.5	395.7	180.2	124.6	98.2	131.8	0.0
13	Delrand Resources limited	1.7	7.3	43.9	50.2	54.9	31.3	0.0	23.4	24.3	0.0
14	Eastern Platinum limited	0.0	55.4	103.8	91.3	50.9	86.4	31.9	54.5	65.3	0.0
15	Ferrum Crescent Limited	50.8	320.8	179.7	228.3	431.0	386.2	258.2	39.0	64.0	68.7
16	Glencore Plc	43.7	0.0	51.9	13.7	31.3	38.6	53.2	37.4	16.6	48.8
17	Gold Fields limited	0.0	27.7	43.9	29.7	37.2	108.5	95.7	144.9	153.6	0.0
18	Great Basin Gold limited	33.8	275.6	30.0	121.0	270.3	358.6	1195.5	380.2	631.0	0.0
19	Hulamin limited	6.8	105.0	71.9	132.4	66.6	106.7	54.7	21.8	24.3	46.5
20	Jubilee Platinum Plc	37.2	49.6	24.0	1.8	7.8	79.1	31.9	35.8	42.2	62.0
21	Keaton Energy Holdings limited	148.9	151.6	59.9	75.3	80.3	108.5	127.6	306.9	256.0	573.9
22	Kumba Iron Ore limited	441.6	555.5	860.7	1164.3	1163.6	1320.4	837.0	942.6	0.0	0.0
23	Lonmin Plc	0.0	26.2	22.0	47.9	23.5	27.6	24.3	24.9	0.0	0.0
24	Master Drilling Groups limited	0.0	0.0	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
25	Middle East Diamond Resources	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
26	Merafe Ressources limited	0.0	0.0	129.8	123.3	43.1	119.5	137.9	42.1	28.2	0.0
27	Northam Platinum limited	66.0	41.8	52.5	167.3	126.2	110.5	107.8	35.8	46.1	93.1
28	Oakbay Resources and Energy limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	0.0
29	Pan African Reources plc	135.4	0.0	179.7	228.3	41.1	44.1	71.4	101.3	89.6	0.0
30	Platfields limited	44.0	29.2	32.0	68.5	31.3	36.8	45.6	31.2	89.6	0.0
31	Randgold and Exploration company limited	76.1	40.8	63.9	168.9	70.5	161.8	291.6	409.8	234.2	0.0
32	Royal Bafokeng Platinum Limited	38.9	16.0	16.0	0.0	49.0	86.4	51.6	35.8	15.4	17.7
33	Sibanye Gold Limited	45.7	55.4	41.9	25.1	23.5	27.6	24.3	19.6	17.5	41.4
34	South African Coal Mining Holdings limited	35.5	129.8	203.7	114.2	19.6	0.0	60.8	140.2	179.2	0.0
35	Tawana Resources limited	0.0	0.0	205.7	182.6	78.4	183.9	45.6	342.8	281.6	0.0
36	Tharisa plc	54.1	84.6	123.8	73.1	43.1	119.5	137.9	26.5	28.2	0.0
37	The Waterberg Coal Company Limited	558.4	116.6	79.9	91.3	195.9	36.8	0.0	0.0	102.4	155.1
38	Trans Hex Group limited	66.0	119.6	179.7	228.3	0.0	0.0	0.0	101.3	89.6	133.0
39	Wesizwe Platinum Limited	43.7	42.3	27.2	111.9	28.6	97.5	97.2	43.6	0.0	161.8
							.8	291.6	409.8	234.2	0.0

Source: Secondary data extracted by this study from annual reports.

Employee health and safety costs for selected firms per country converted to presentation currency (Naira)Continued

	Nigeria										
1	African Paint Plc	10.5	8.8	9.2	17.4	10.6	8.8	9.2	16.3	20.3	0.0
2	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	BergerPaints	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
4	Beta Glass	10.9	20.9	2.8	23.1	2.3	10.8	8.7	2.3	8.7	3.7
5	Cap plc	10.5	8.8	9.2	17.4	10.6	8.8	9.2	16.3	20.3	0.0
6	Cement Company of North Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
7	Dangote Cement	2.3	1.7	0.0	0.0	0.0	1.8	1.5	2.7	6.3	2.4
8	Oando	10.9	1.9	2.4	3.2	3.4	5.9	2.1	9.1	2.8	2.4
9	First Alluminium Nig	12.5	18.0	19.4	17.6	12.5	7.8	8.2	6.3	20.8	0.0
10	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Lafarge Africa	12.3	11.7	0.0	0.0	0.0	1.6	2.3	2.7	2.3	2.4
12	Meyer Plc	1.9	0.9	2.8	3.1	0.3	12.8	7.7	3.3	9.7	2.7
13	Multi verse mining and Exploration	1.5	1.8	1.2	7.4	1.6	1.8	1.2	6.3	0.3	0.0
14	Port Land Paints and Products	3.1	2.3	1.8	2.3	1.8	7.4	2.2	8.9	10.8	2.4
15	Premier Paints	1.3	2.7	3.2	1.2	2.2	3.8	5.5	4.7	4.4	5.9
16	Seplat Petroleum Dev Company limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Thomas Wyatt Nig	4.8	4.7	1.8	4.5	2.3	0.0	2.6	2.8	3.2	4.5
18	Total Nigeria	2.3	3.3	8.3	7.3	3.3	3.3	1.2	0.0	3.2	4.0
	Ghana										
1	Ghana Oil	861.4	813.4	750.5	727.2	425.7	196.7	557.5	119.5	167.2	284.6
2	Total Petroleum Ghana	351.9	342.6	375.3	399.4	613.7	475.3	441.9	142.3	475.4	626.1
3	Golden Star Resources	157.7	394.4	537.5	450.6	207.9	0.0	0.0	0.0	203.7	334.4
4	Tullow Oil	994.9	1072.2	851.9	829.6	920.6	827.7	829.5	0.0	167.2	284.6
	Tanzania										
1	Tanga Cement company	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.4	0.5
2	Tanzania Portland Cement Company	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.0	0.0	0.8

Source: Secondary data extracted by this study from annual reports.

Appendix 14: Earnings per share for selected firmsper country in presentation currency (kobo)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	9813.6	27789.5	21847.2	18423.8	31050.2	29699.9	26369.8	29602.0	10278.4	10947.0
2	Andulela Invstment Holdings	-37.2	-51.0	-1701.4	-171.2	-21.5	85.1	107.4	-354.3	-234.2	89.1
3	Anglo American Platinum	50252.4	0.0	29835.2	62508.5	44371.4	33194.0	26157.2	825.7	-60518.4	13938.6
4	Anglogold Ashanti	0.0	0.0	0.0	0.0	0.0	0.0	-8627.9	-218.1	-256.0	332.4
5	Arcelormittal South Africa	21793.0	31026.2	-2076.9	7830.7	2664.2	3163.1	2779.8	3100.4	0.0	0.0
6	Assore Limited	46022.4	165658.0	275026.8	28514.7	52697.1	64714.4	50430.8	60466.0	19084.8	30137.6
7	Atlatsa Resources	0.0	61.2	1.4	47.9	0.0	0.0	0.0	53.0	61.4	82.0
8	Bauba Platinum	28.8	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
9	BHP Billiton	18.6	27.7	39.9	-11.4	0.0	-18.0	21.9	23.1	22.9	0.0
10	Buffalo Coal Corp	-3.4	-11.7	0.0	0.0	-4.3	-5.1	-20.8	-32.7	0.0	37.7
11	Central Rand Gold limited	-416.9	-236.3	-374.8	-103.0	-19.8	-259.1	-728.1	-24.6	-224.1	-67.8
12	Chrometco Limited	0.0	0.0	0.0	-66.0	54.7	979.1	-89.9	6.9	-105.0	238.7
13	Delrand Resources limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Eastern Platinum limited	-0.3	0.3	0.2	0.0	-1.6	-2.0	-25.7	-21.0	-2.7	0.0
15	Ferrum Crescent Limited	55.8	-49.3	-315.9	-133.8	-65.0	28.1	-9.1	-11.7	-6.4	-4.9
16	Glencore Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Gold Fields limited (Cent)	7157.2	9958.1	4573.1	11757.5	19002.3	809.2	-1200.0	31.2	-396.8	443.2
18	Great Basin Gold limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Hulamin limited(Cent)	1387.4	1603.8	798.8	593.6	489.8	165.5	-6410.2	1869.6	2099.2	2637.0
20	Jubilee Platinum Plc(pence)	-36.0	-51.0	-73.5	-30.8	-52.3	-48.0	-36.6	-12.8	-5.8	0.0
21	Keaton Energy Holdings limited	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Kumba Iron Ore limited(Rand)	170.9	332.4	436.9	1019.6	1040.2	714.1	730.5	534.7	151.3	605.0
23	Lonmin Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Master Drilling Groups limited (Dollar)	64.3	112.3	137.8	198.6	182.2	172.9	154.9	177.6	172.8	316.9
25	Middle East Diamond Resources	52.5	56.9	63.9	111.9	90.1	172.9	154.9	177.6	172.8	316.9
26	Merafe Resources limited(Cent)	169.2	612.4	-119.8	251.1	117.5	92.0	167.1	124.6	175.4	469.8
27	Northam Platinum limited(cent)	9476.9	9144.6	3438.8	4059.2	1753.3	1487.8	2073.4	34.3	-2597.1	0.0
28	Oakbay Resources and Energy limited (Cent)	18.6	27.7	39.9	-11.4	0.0	0.0	0.0	0.0	-348.2	-14.2
29	Pan African Reources plc(Mixed currency)	79.5	103.5	199.7	305.9	321.3	456.6	524.2	385.4	185.3	669.2
30	Platfields limited	-10.2	58.6	179.9	183.1	-142.6	-149.9	-262.2	-179.6	-131.7	0.0
31	Randgold and Exploration company limited(Cent)	0.0	0.0	0.0	23560.6	1292.9	239.1	151.9	0.0	0.0	0.0
32	Royal Bafokeng Platinum Limited(Cent)	0.0	2609.8	2140.8	4360.5	3271.5	1912.6	2627.9	3723.6	-1065.0	1921.3
33	Sibanye Gold Limited	13.5	39.4	-126.6	-392.7	-315.4	-233.6	-174.2	0.0	42.8	-150.7
34	South African Coal Mining Holdings limited	-10.5	58.6	179.9	183.1	-142.6	-149.9	-262.2	-179.6	-131.7	0.0
35	Tawana Resources limited	30.5	5.8	-100.6	-175.8	-180.2	-46.0	-27.2	0.0	4.4	-86.2
36	Tharisa plc	38.9	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
37	The Waterberg Coal Company Limited	38.9	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
38	Trans Hex Group limited	27.1	4.4	-0.4	-43.4	-43.1	-75.4	-27.2	0.0	4.4	-37.5
39	Wesizwe Platinum Limited	-333.3	-71.3	132.8	-933.1	-520.7	11.0	-8.4	-251.9	-437.8	412.0
40	ZCI limited	-3.4	3.9	60.5	93.4	-59.9	-75.8	-116.7	-52.5	-41.2	0.0

Source: Secondary data extracted by this study from annual reports.

Appendix 15: Return on capital employed for selected firms per country (converted from presentation currency to percentage)

Earnings per share for selected firmsper country in presentation currency (kobo)Continued

	Nigeria										
1	African Paint Plc	0.0	17.0	12.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
2	AluminiumExtrusion Ind Plc	0.0	0.0	0.0	14.0	23.0	21.0	62.0	77.0	38.0	38.0
3	BergerPaints	0.0	0.0	0.0	0.0	27.0	36.0	44.0	51.0	114.0	118.0
4	Beta Glass	0.0	0.0	0.0	0.0	187.0	199.0	202.0	237.0	249.0	264.0
5	Cap plc	2.0	7.0	19.0	31.0	-12.9	60.0	54.0	48.0	36.0	40.0
6	Cement Company of North Nigeria	0.0	134.0	184.0	101.0	104.0	86.0	124.0	153.0	96.0	102.0
7	Dangote Cement	0.0	0.0	0.0	0.0	1086.0	942.0	1234.0	857.0	713.0	828.0
8	Oando	0.0	0.0	0.0	0.0	829.0	126.0	23.0	-2076.0	-423.0	0.0
9	First Alluminium Nig	1.0	-2.0	2.0	15.9	-13.2	-47.6	4.6	1.4	0.0	0.0
10	Japaul Oil and Maritime Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Lafarge Africa	356.0	375.0	168.0	163.0	288.0	487.0	0.0	767.0	629.0	0.0
12	Meyer Plc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	Multi verse mining and Exploration	4.2	3.9	2.2	1.0	1.0	0.7	-6.9	-13.0	-10.4	-13.7
14	Port Land Paints and Products	22.0	31.0	46.0	33.0	43.0	-72.0	14.0	37.0	-58.0	-36.0
15	Premier Paints	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Seplat Petroleum Dev Company limited	0.5	0.7	0.3	-2.1	1.7	2.9	9.1	4.3	5.3	8.8
17	Thomas Wyatt Nig	-1.2	-2.2	-3.9	-2.6	0.2	0.8	1.1	1.8	0.0	0.0
18	Total Nigeria	0.0	0.0	0.0	0.0	46.0	59.0	62.0	44.0	78.0	84.0
	Ghana										
1	Ghana Oil	3275.9	1478.9	0.0	1741.1	890.9	901.5	0.0	0.0	0.0	0.0
2	Total Petroleum Ghana	3154.6	3327.5	3346.9	2867.8	2177.8	2376.6	2379.7	3073.7	1828.4	0.0
3	Golden Star Resources	4610.5	6901.4	2738.3	1741.1	-10888.9	2294.6	4895.3	3984.4	4231.4	0.0
4	Tullow Oil	8978.4	7764.1	5172.4	5940.4	5246.5	4097.5	3535.5	3130.6	2925.4	4695.9
	Tanzania										
1	Tanga Cement company	31.5	28.2	24.4	20.6	29.2	26.3	16.4	9.9	8.5	0.0
2	Tanzania Portland Cement Company	19.0	22.2	42.6	20.9	18.7	34.2	20.9	30.3	28.1	31.0

Source: Secondary data extracted by this study from annual reports.

S/N	Firm’s Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	6.4	16.3	8.2	6..0	9.8	7.7	10.1	5	3.9	2.4
2	Andulela Invstment Holdings	-0.8	-1.9	-13.8	-48.4	-26.3	-1.2	-13	-5	1.8	2.1
3	Anglo American Platinum	0	0	5.3	3.7	3.2	4	-3.8	1.2	2.5	3
4	Anglogold Ashanti	0	0	0	0	0	0	0	0	0	0
5	Arcelormittal South Africa	10	26	0.8	2	0	0	0	0	0	0
6	Assore Limited	15.1	31.58	29.5	12.2	21.7	23.2	20.3	18.2	5.6	0
7	Atlatsa Resources	2	4.2	15.1	10.5	12	22	5	10	0	0
8	Bauba Platinum	1.3	2.9	3.9	12.6	10	12.2	2.3	8	2.86	-2.8
9	BHP Billiton	3.1	3.5	3.8	13.8	7.9	6.9	13	9	0	0
10	Buffalo Coal Corp	0	0	0	0	0	0	0	-14.1	-100.63	-9.03
11	Central Rand Gold limited	-17.6	-30.8	-61.6	-128.8	-49	-15.6	-63.2	6.7	-98.9	-31.7
12	Chrometco Limited	0	0	0	-6.4	5.1	44	-5.4	-0.14	-9.2	-10.8
13	Delrand Resources limited	0	0	0	0	0	0	0	0	0	0
14	Eastern Platinum limited	-1.1	1.88	0.13	0.87	-13.3	-7.5	-30.5	-49.4	-10.7	0
15	Ferrum Crescent Limited	19.1	-25.3	-82.7	-466.2	-94.4	114.5	-87.4	-133	-170.2	-133.5
16	Glencore Plc	0	0	0	0	0	0	0	0	0	0
17	Gold Fields limited	14.4	14.4	17.6	18.4	9.4	6.3	-8.2	0.3	-4.1	2.7
18	Great Basin Gold limited	0	0	0	0	0	0	0	0	0	0
19	Hulamin limited	0	0	0	1.8	1.7	1.7	4.5	9.9	3.1	9.3
20	Jubilee Platinum Plc	-17.6	-12.9	-9.9	-2.2	-6.9	-8.7	-8.9	-9.3	-11.8	-10.2
21	Keaton Energy Holdings limited	0	0	0	0	0	0	0	0	0	0
22	Kumba Iron Ore limited	4	5.4	4.9	1.4	14.4	8.2	4.6	3.1	1.2	1.9
23	Lonmin Plc	0	0	0	0	0	0	0	0	0	0
24	Master Drilling Groups limited	0	0	0	0	0	0	0	0	0	0
25	Middle East Diamond Resources	0	0	0	0	0	0.6	2	5.7	1.5	13.6
26	Merafe Resources limited	9.3	27.4	-4.5	7.3	-0.2	1.1	4.2	4	6.4	8.9
27	Northam Platinum limited	39.8	36.2	36.2	6.7	6.4	2.9	3.6	0.12	-5.4	-1.8
28	Oakbay Resources and Energy limited	0	0	0	0	0	0	0	0	-0.7	-0.2
29	Pan African Reources plc	11.1	11.8	16.3	18.3	18.6	14.9	11.4	10.8	4.9	10.1
30	Platfields limited	0	0	0	0	0	0	0	0	0	0
31	Randgold and Exploration company limited	1.9	2.1	0	1.3	2.2	4.2	2.4	1.8	2.7	3.6
32	Royal Bafokeng Platinum Limited	6	-1.1	16.5	13.2	1.4	0.8	1.4	1.9	-15	0.9
33	Sibanye Gold Limited	0.8	0	4.9	-0.2	1.2	4.4	2.8	4.7	6.5	-0.1
34	South African Coal Mining Holdings limited	1	1.9	3.7	8.1	0.2	1.1	4	4.7	2.5	1.8
35	Tawana Resources limited	4	9.8	14.2	22.7	3.8	20.1	2.9	2.7	7.8	6.9
36	Tharisa plc	6.2	8.4	10.8	19.4	1.8	0.4	1.5	6	4.9	-
37	The Waterberg Coal Company Limited	1.1	1.6	1.8	0.9	1.3	1.5	1.8	2.1	3.7	4.9
38	Trans Hex Group limited	0.8	0.9	0.6	1.3	4.7	2.8	3.2	2.2	2.6	4.4
39	Wesizwe Platinum Limited	-3.3	-1.89	-1.8	11.6	-4.01	0.23	-0.24	-0.1	-2.6	4.3

Return on capital employed for selected firms per country (converted from presentation currency to percentage) Continued

40	ZCI limited	0.4	0.8	3.1	0.9	1.2	1.5	0.9	0.7	3	2.1
	Nigeria										
1	African Paint Plc	0.6	1.2	2.2	0.1	1.2	1.1	2.3	0.1	0.09	0.6
2	Aluminium Extrusion Ind Plc	1.7	3.6	0.2	4.8	4.9	3.1	8	9.7	4.4	3.9
3	BergerPaints	1.2	2.3	3.6	4.7	0.4	1.7	4.8	4.1	8.5	4.1
4	Beta Glass	6.6	7.9	12.8	19.6	3.8	12.1	1.8	1.9	9.9	8.6
5	Cap plc	6.8	9.7	16.4	27.9	38.7	43.5	64.9	69.2.	62.7.	-
6	Cement Company of North Nigeria	0	1.4	1.6	11.8	10.4	7.6	10.4	12.2	7	0
7	Dangote Cement	0	0	0	0	18.7	15.4	18.6	12.3	11.3	0
8	Oando	0	0	0	0	1.1	1.5	0.39	-20.8	-38.4	0
9	First Alluminium Nig	1.4	-0.4	0.3	-2.2	-1.9	-16.5	1.3	0.2	0	0
10	Japaul Oil and Maritime Services	0.4	1.3	2.1	0.2	1.2	1.3	2.4	0.09	0.15	0.8
11	Lafarge Africa	0	21.7	6.1	4.8	4.1	5.7	9.7	10..2	8.1	0
12	Meyer Plc	0	0	0	0	0	0	0	0	0	0
13	Multi verse mining and Exploration	0	0	1.2	0.6	0.43	0.3	-5.6	-11.7	-9.4	-22.7
14	Port Land Paints and Products	0	0	10	8.1	6.7	-18.7	2.78	6.5	-12.3	0
15	Premier Paints	0	0	0	0	0	0	0	0	0	0
16	Seplat Petroleum Dev Company limited	0	0	0	0	0	0	0	0	0	0
17	Thomas Wyatt Nig	25	26.4	0.7	4.2	3.1	2.8	3.8	2.1	4.1	0
18	Total Nigeria	6.3	12.4	10.1	5.4	9.8	10.5	9.7	7.6	2.8	3.1
	Ghana										
1	Ghana Oil	1.1	1.9	6.7	4.3	7.8	9.9	2.1	4.4	0	0
2	Total Petroleum Ghana	0.8	0.9	1.3	4.5	4.8	5.6	1.1	4.9	1.4	-1.3
3	Golden Star Resources	1.5	1.9	1,8	6.8	5.7	4.2	7.8	5.2	0	0
4	Tullow Oil	4.8	4.9	7.3	8.8	12.7	13.6	18.4	19.7	17.8	26.8
	Tanzania										
1	Tanga Cement company	-14.2	-23.8	-35.9	-19.2	-28.3	-8.6	-32.8	-4.8	-6.4	-18.9
2	Tanzania Portland Cement Company	0.7	1.1	1.9	1.4	7.2	0.8	1.9	6.5	1.3	1.6

Source: Secondary data extracted by this study from annual reports.

Appendix 16: Return on equity for selected firm per country (converted from presentation currency to percentage)

S/N	Firm's Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	African Rainbow Mineral Limited	11.1	27	14.3	9.6	15.9	14.9	15.5	15.4	6.8	4.4
2	Andulela Invstment Holdings	-1.8	-2.9	-25.7	-75.9	-40.1	-2.4	-24	-11	2.1	3.8
3	Anglo American Platinum	0	0	10.8	8.3	7.2	8.8	-9.3	2.3	4.8	7.6
4	Anglogold Ashanti	0	0	0	0	0	0	0	0	0	0
5	Arcelormittal South Africa	26	39	2	6	0	0	0	0	0	0
6	Assore Limited	24.5	75.3	48.9	19	29.9	35.7	24.2	23.1	7.24	7.9
7	Atlatsa Resources	4.8	7.3	19.8	15.6	18	31.3	11.2	18.2	0	0
8	Bauba Platinum	2.6	4.2	5.1	14.6	17.8	17	5.3	12.5	4.5	-4
9	BHP Billiton	6.8	6.5	7.2	18.4	11.2	12.6	24.2	15.1	0	0
10	Buffalo Coal Corp	0	0	0	0	0	0	0	-44.3	-259.7	-20.5
11	Central Rand Gold limited	-29.2	-45.5	-81.7	-248.1	-137.8	-64.4	-173.3	14.1	-113.9	-38.8
12	Chrometco Limited	0	0	0	-12.4	13.3	56.7	-7	-0.2	-11.2	-13.2
13	Delrand Resources limited	0	0	0	0	0	0	0	0	0	0
14	Eastern Platinum limited	-1.4	2.4	0.19	0.94	-16.4	-10.5	-43.6	-53.2	-13.6	0
15	Ferrum Crescent Limited	20.2	-26.4	-83.5	-728.4	-428	173.2	-101.9	-263.4	-446.4	-179.8
16	Glencore Plc	0	0	0	0	0	0	0	0	0	0
17	Gold Fields limited	20.9	21.2	26.9	27.7	16.2	11.3	-14.7	0.56	-8.8	5.4
18	Great Basin Gold limited	0	0	0	0	0	0	0	0	0	0
19	Hulamin limited	0	0	0	3.8	2.8	3.2	5.9	12.3	6.2	13.1
20	Jubilee Platinum Plc	-18.6	-13.1	-12.7	-2.7	-9.3	-11.7	-11.9	-12.7	-16	-16.4
21	Keaton Energy Holdings limited	0	0	0	0	0	0	0	0	0	0
22	Kumba Iron Ore limited	11.8	10.7	9.8	1.9	15.5	8.4	7.5	5.8	2.5	3
23	Lonmin Plc	0	0	0	0	0	0	0	0	0	0
24	Master Drilling Groups limited	0	0	0	0	0	0	0	0	0	0
25	Middle East Diamond Resources	0	0	0	0	0	0.9	3	8.4	2.3	19.8
26	Merafe Resources limited	16.7	41.4	-6.5	10.8	-0.4	1.8	7.2	6.9	10	13.7
27	Northam Platinum limited	60.5	56.5	56.5	7.6	7.3	3.7	4.8	0.16	-11.3	-2.8
28	Oakbay Resources and Energy limited	0	0	0	0	0	0	0	0	-1.2	-0.3
29	Pan African Resources plc	21.8	15	20.1	23	23.1	26.4	21.8	16.2	7.7	19
30	Platfields limited	0	0	0	0	0	0	0	0	0	0
31	Randgold and Exploration company limited	2.9	3.6	0	4.2	2.8	5.2	3.7	3.1	4.8	5.5
32	Royal Bafokeng Platinum Limited	10	-1.8	28.9	18	2.9	1.8	1.8	2.8	-21	1.1
33	Sibanye Gold Limited	1.9	0	8.2	-2.4	2.8	7.3	6.7	14.4	11.1	-0.3
34	South African Coal Mining Holdings limited	2.1	4.5	6.8	10.8	0.9	2.9	10	9.6	7.5	3.9
35	Tawana Resources limited	11.4	16.3	28.2	32	9.8	27.7	4.1	5	16.9	14.4
36	Tharisa plc	12.1	14.8	23.8	48.4	6.3	1.2	3	11	12	-
37	The Waterberg Coal Company Limited	2.4	2.7	3.2	1.7	1.9	2	3.5	5.7	8	9
38	Trans Hex Group limited	1.4	1.9	2.1	2.4	13.6	4.2	4.6	4.7	5.9	7.8
39	Wesizwe Platinum Limited	-7.5	-2	-2.9	14.2	-9.9	0.31	-0.33	-7.1	-7.6	9.74
40	ZCI limited	1.1	1.58	9.5	1.2	2.7	3.2	1.3	1.3	6	4.2

Source: Secondary data extracted by this study from annual reports.

Return on equity for selected firm per country (converted from presentation currency to percentage) Continued

	Nigeria										
1	African Paint Plc	1	3.2	5.1	0.5	2	2	5.3	0.2	0.3	1.4
2	Aluminium Extrusion Ind Pc	3.3	8.9	0.9	12	8..2	4.8	14.1	15.3	7	5.8
3	BergerPaints	2.1	4.5	6.8	10.8	0.9	2.9	10	9.6	12.8	6
4	Beta Glass	11.4	16.3	28.2	32	9.8	27.7	4.1	5	16.9	14.4
5	Cap plc	12.1	14.8	23.8	48.4	65.6	99.7	111.7	140.8	114	0
6	Cement Company of North Nigeria	0	3.8	4.3	27	21.7	16.4	18.8	20.3	11.8	0
7	Dangote Cement	0	0	0	0	38.7	35.4	36.8	26,9	28.1	0
8	Oando	0	0	0	0	2.8	5.2	0.9	-34	-97.6	0
9	First Alluminium Nig	3.6	-1.6	0.8	-5.4	-4.7	-22.3	2.1	0.6	0	0
10	Japaul Oil and Maritime Services	1	3.2	5.1	0.5	2	2	5.3	0.2	0.3	1.4
11	Lafarge Africa		34.3	11.6	10.1	15.4	21.5	35.3	19.1	15.3	
12	Meyer Plc	0	0	0	0	0	0	0	0	0	0
13	Multi verse mining and Exploration	0	0	2.5	1.2	0.67	0.8	-11.7	-34.5	-34.5	-96.8
14	Port Land Paints and Products	0	0	21.1	13.8	16.1	-39.8	7.4	16.1	-33.7	0
	Nigerian Breweries	0	0	0	0	0	0	0	0	22.1	17.1
15	Premier Paints	0	0	0	0	0	0	0	0	0	0
16	Seplat Petroleum Dev Company limited	0	0	0	0	0	0	0	0	0	0
17	Thomas Wyatt Nig	40	56	1.9	10.1	9.9	7.2	8.2	5.8	8.7	0
18	Total Nigeria	15.1	31.58	29.5	12.2	21.7	23.2	21.3	21.3	6.6	7.2
	Ghana										
1	Ghana Oil	2	4.2	15.1	10.5	12	22	5	10	0	0
2	Total Petroleum Ghana	1.3	2.9	3.9	12.6	10	12.2	2.3	8	2.86	-2.8
3	Golden Star Resources	3.1	3.5	3.8	13.8	7.9	6.9	13	9	0	0
4	Tullow Oil	8	8.9	10.6	14.2	27.1	24.3	39.4	44.1	37.2	42.7
	Tanzania										
1	Tanga Cement company	-27.6	-40.8	-61.6	-28.8	-49	-15.6	-63.2	6.7	-9.9	-31.7
2	Tanzania Portland Cement Company	1.6	2.3	3.5	1.6	12	1.2	2.4	8	2.6	2.8

Source: Secondary data extracted by this study from annual reports.

Appendix 17: Exchange Rates.

a. **Exchange Rates between Functional Currencies (Dollar to Rand, GHC and Shillings).**

S/N	Year	Main Currency(Dollar)	South Africa(Rand)	Ghana (GHS)	Tanzania(Shillings
1	2007	$1	6.75	9,22.20	1,109.70
2	2008	$1	9.43	12,615.9	1,302.33
3	2009	$1	7.40	14,168.6	1,317.94
4	2010	$1	6.63	14,801.1	1,461.70
5	2011	$1	8.12	16,175.0	1,556.73
6	2012	$1	8.47	19,040.0	1,575.00
7	2013	$1	10.49	23,594.8	1,556.71
8	2014	$1	11.60	33,025.0	1,700.97
9	2015	$1	15.40	38,057.9	2,115.92
10	2016	$1	13.65	45,203.30	2,121.75

Source: Historical exchange rate of OANDA. Https://www.oanda.com/currency/converter

b. **Exchange Rates between Functional Currencies (Pounds to Rand, GHC and Shillings).**

S/N	Year	Main Currency(Pounds)	South Africa(Rand)	Ghana (GHS)	Tanzania(Shillings)
1	2007	£1	13.48	19,208.90	2,215.31
2	2008	£1	13.65	18.258.60	1,884.83
3	2009	£1	11.79	22,564.50	2098.91
4	2010	£1	10.25	22,894.20	2,260.94
5	2011	£1	12.54	24,995.40	2,405.63
6	2012	£1	13.69	30,755.90	2,544.14
7	2013	£1	17.29	38,903.30	2,566.71
8	2014	£1	18.02	51,294.40	2,641.94
9	2015	£1	22.83	56,415.50	3,136.55
10	2016	£1	16.79	52,095.80	2,610.09

Source: Historical exchange rate of OANDA. Https://www.oanda.com/currency/converter.

c. **Exchange Rates between functional currencies (Rand, GHC and Shillings) and Presentation currency(naira)**

S/N	Year	South African Rand to Nigerian Naira	Ghana GHC to Nigerian Naira	Tanzania Shillings to Nigerian Niara
1	2007	1R N16.92	1GHS N121.33	1Shilling N0.10
2	2008	1R N14.58	1GHS N123.24	1Shilling N0.10
3	2009	1R N19.97	1GHS N101.42	1Shilling N0.11
4	2010	1R N22.83	1GHS N102.42	1Shilling N0.10
5	2011	1R N19.59	1GHS N98.99	1Shilling N0.10
6	2012	1R N18.39	1GHS N81.95	1Shilling N0.10
7	2013	1R N15.19	1GHS N067.95	1Shilling N0.10
8	2014	1R N15.58	1GHS N56.92	1Shilling N0.10
9	2015	1R N12.80	1GHS N52.24	1Shilling N0.09
10	2016	1R N22.16	1GHS N71.15	1Shilling N0.14

Source: Historical exchange rate of OANDA. Https://www.oanda.com/currency/converter.

Appendix 18: LLC Unit Root Test

Descriptive Properties of the Data

	ROCE	EPS	ROE	WMC	CDC	EHSC
Mean	1.834295	2387.512	0.149091	118.9832	208.0122	139.8621
Median	1.100000	0.000000	2.000000	7.300000	34.45000	27.95000
Maximum	1000.000	275026.8	173.2000	1419.500	5072.000	2778.600
Minimum	-466.2000	-60518.40	-728.4000	0.000000	0.000000	0.000000
Std. Dev.	47.42872	14875.50	48.35039	210.4224	506.9780	318.4482
Skewness	12.91289	12.30539	-8.498283	2.676527	5.117662	4.297693
Kurtosis	324.1527	202.9958	107.3576	11.45394	36.13380	26.27646
Jarque-Bera	2759511.	1079390.	297185.6	2661.636	31969.40	16366.67
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1170.280	1523233.	95.12000	75911.30	132711.8	89232.00
Sum Sq. Dev.	1432921.	1.41E+11	1489153.	28204828	1.64E+08	64597693
Observations	638	638	638	638	638	638

LLC Test Result at Level: Individual Intercept

Null Hypothesis: Unit root (common unit root process)
Series: ROCE
Date: 09/23/18 Time: 14:16
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 416
Cross-sections included: 52 (12 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 243.034	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on ROCE

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.65330	5.6714	2.6604	1	1	8.0	8
2	-1.03454	172.83	86.757	1	1	8.0	8
3	-1.28897	6.2669	2.0208	1	1	7.0	8
4		Dropped from Test					
5	-0.92006	0.0026	10.646	1	1	8.0	8
6	-0.54617	51.172	38.630	1	1	8.0	8
7	-0.83610	48.841	73.402	1	1	0.0	8
8	-0.69600	24.769	20.140	1	1	1.0	8
9	-1.25868	18.464	10.400	1	1	8.0	8
10	-43.3016	20.709	215.24	1	1	8.0	8
11	-1.49267	1467.2	694.78	1	1	5.0	8
12	-1.20483	266.55	66.288	1	1	8.0	8
13		Dropped from Test					
14	-0.80627	206.31	117.09	1	1	6.0	8
15	-1.53702	15070.	5744.8	1	1	8.0	8
16		Dropped from Test					
17	-0.27066	41.253	38.813	1	1	2.0	8
18		Dropped from Test					
19	-0.26689	7.0940	1.5226	1	1	8.0	8
20	-0.87600	6.1401	13.774	1	1	1.0	8
21		Dropped from Test					
22	-1.02505	16.911	4.2173	1	1	8.0	8
23		Dropped from Test					
	0.83651	3.1120	17.723	1	1	0.0	8

Unit Root Test Continued

24							
25	-1.28047	8.3354	57.775	1	1	1.0	8
26	-0.37030	56.351	53.028	1	1	2.0	8
27		Dropped from Test					
28	-0.66807	9.7974	12.404	1	1	1.0	8
29		Dropped from Test					
30	-0.93640	1.2717	0.2845	1	1	8.0	8
31	-1.24869	75.097	18.969	1	1	8.0	8
32	-1.45222	4.8309	2.6442	1	1	8.0	8
33	-1.85299	3.0630	1.7617	1	1	8.0	8
34	-1.02473	51.301	118.88	1	1	0.0	8
35	-0.88032	34.385	8.0203	1	1	8.0	8
36	0.76481	0.3556	0.5556	1	1	1.0	8
37	-0.66065	1.5687	0.2997	1	1	7.0	8
38	-1.77659	15.993	8.0651	1	1	5.0	8
39	-2.13000	0.4789	0.2000	1	1	8.0	8
40		Dropped from Test					
41	-1.50624	0.6582	0.1773	1	1	8.0	8
42	-0.80904	6.9690	1.9934	1	1	8.0	8
43	-0.91015	4.8895	1.0172	1	1	8.0	8
44	-1.04086	33.210	14.319	1	1	4.0	8
45	-0.58422	210.16	628.49	1	1	1.0	8
46	-0.84216	14.723	21.197	1	1	2.0	8
47	-0.57191	48.546	51.597	1	1	1.0	8
48	-2.62718	30.297	47.181	1	1	8.0	8
49	-1.20119	29.157	9.9670	1	1	6.0	8
50	-1.60038	0.5751	0.1986	1	1	8.0	8
51	-1.18566	8.6828	21.219	1	1	6.0	8
52		Dropped from Test					
53	0.63691	14.556	22.088	1	1	0.0	8
54	-1.30803	105172	24708.	1	1	8.0	8
55		Dropped from Test					
56		Dropped from Test					
57	-1.08774	1.1997	40.772	1	1	2.0	8
58	-0.89030	5.5012	4.1338	1	1	8.0	8
59	-0.74796	10.802	8.6709	1	1	1.0	8
60	-0.94242	5.2970	7.2089	1	1	0.0	8
61	-1.03103	5.6696	3.6428	1	1	8.0	8
62	0.01571	5.2282	2.1371	1	1	8.0	8
63	-0.96863	122.38	279.37	1	1	0.0	8
64	-1.92913	3.8259	2.0663	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.92020	-224.245	1.548	-0.554	0.919		416

Null Hypothesis: Unit root (common unit root process)
Series: EPS
Date: 09/23/18 Time: 14:17
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 440
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 11.4980	0.0000

** Probabilities are computed assuming asympotic normality

Unit Root Test Continued

Intermediate results on EPS

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.80131	5.E+07	6.E+07	1	1	5.0	8
2	-1.35659	294713	78314.	1	1	8.0	8
3	-0.94064	1.E+09	2.E+08	1	1	8.0	8
4	-1.27853	8.E+06	2.E+06	1	1	8.0	8
5	-1.08146	2.E+06	4.E+07	1	1	3.0	8
6	-0.95740	5.E+09	2.E+09	1	1	8.0	8
7	-0.18365	806.63	844.41	1	1	2.0	8
8	-0.77233	547.46	873.38	1	1	0.0	8
9	-1.01079	344.69	599.64	1	1	0.0	8
10	-1.65326	92.481	421.22	1	1	1.0	8
11	-1.57180	43801.	10975.	1	1	8.0	8
12	-1.42792	105281	23172.	1	1	8.0	8
13		Dropped from Test					
14	-0.87477	63.217	27.431	1	1	8.0	8
15	-0.94408	8281.5	12113.	1	1	2.0	8
16		Dropped from Test					
17	-0.73335	4.E+07	8.E+06	1	1	8.0	8
18		Dropped from Test					
19	-1.23396	7.E+06	2.E+06	1	1	8.0	8
20	-0.13709	346.20	163.24	1	1	6.0	8
21		Dropped from Test					
22	-0.86500	55795.	82275.	1	1	2.0	8
23		Dropped from Test					
24	0.26479	1533.7	2618.1	1	1	0.0	8
25	-1.78956	13427.	30557.	1	1	3.0	8
26	-0.52846	2.E+06	2.E+06	1	1	7.0	8
27	0.76292	12716.	2849.9	1	1	8.0	8
28	-0.79719	22095.	5101.9	1	1	8.0	8
29	-0.54464	13745.	18366.	1	1	0.0	8
30	-1.28643	6.E+07	1.E+07	1	1	8.0	8
31	-1.36918	2.E+06	1.E+06	1	1	8.0	8
32	-0.88654	6551.3	22228.	1	1	2.0	8
33	-0.54435	13664.	18299.	1	1	0.0	8
34	-0.84866	1652.8	4824.8	1	1	0.0	8
35	-0.74112	562.68	918.00	1	1	1.0	8
36	-0.74112	562.68	918.00	1	1	1.0	8
37	-0.77840	544.49	867.23	1	1	0.0	8
38	-1.78812	115170	48081.	1	1	8.0	8
39	-0.64607	3050.4	3967.9	1	1	0.0	8
40		Dropped from Test					
41	-0.41374	5.6041	46.444	1	1	0.0	8
42	-0.45054	316.67	92.383	1	1	8.0	8
43	0.59353	273.49	269.24	1	1	2.0	8
44	-0.19928	2981.1	531.42	1	1	8.0	8
45	-0.82705	453.14	91.197	1	1	8.0	8
46	-1.58883	341.26	1835.0	1	1	6.0	8
47	-0.44295	119630	153923	1	1	0.0	8
48	-0.96754	594003	307945	1	1	3.0	8
49	-1.40906	257.36	76.638	1	1	7.0	8
50		Dropped from Test					
51	-1.89178	52917.	23994.	1	1	8.0	8
52		Dropped from Test					
53	-0.06348	9.6210	2.2647	1	1	8.0	8
54	-1.25496	1968.2	454.80	1	1	6.0	8
55		Dropped from Test					
56	-0.24961	8.9737	2.0897	1	1	6.0	8
57	-0.45598	1.2661	2.0787	1	1	2.0	8

Unit Root Test Continued

58	-0.17329	328.00	48.123	1	1	8.0	8
59	-0.93835	381341	356994	1	1	6.0	8
60	-0.31829	523929	578301	1	1	2.0	8
61	-1.14089	2.E+07	1.E+07	1	1	4.0	8
62	-0.69749	985487	2.E+06	1	1	1.0	8
63	0.03994	28.215	11.289	1	1	6.0	8
64	-2.39074	19.843	18.956	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.77675	-18.173	1.174	-0.554	0.919		440

Null Hypothesis: Unit root (common unit root process)
Series: ROE
Date: 09/23/18 Time: 14:18
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 416
Cross-sections included: 52 (12 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 50.2008	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on ROE

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.99855	13.942	14.530	1	1	8.0	8
2	-1.01911	431.98	220.77	1	1	8.0	8
3	-1.24044	33.531	18.127	1	1	4.0	8
4		Dropped from Test					
5	-0.89223	0.0937	72.284	1	1	2.0	8
6	-0.67750	76.642	108.53	1	1	8.0	8
7	-0.73486	92.816	67.274	1	1	1.0	8
8	-0.70540	41.541	47.182	1	1	0.0	8
9	-1.31777	38.916	24.920	1	1	8.0	8
10	-28.3978	204.43	1471.3	1	1	8.0	8
11	-1.22233	5543.8	3161.1	1	1	5.0	8
12	-1.21336	444.53	114.75	1	1	8.0	8
13		Dropped from Test					
14	-0.73366	248.28	287.71	1	1	3.0	8
15	-1.50936	38464.	18961.	1	1	8.0	8
16		Dropped from Test					
17	-0.28307	120.86	112.03	1	1	2.0	8
18		Dropped from Test					
19	-0.10810	8.0447	1.9458	1	1	8.0	8
20	-0.71503	14.280	16.912	1	1	1.0	8
21		Dropped from Test					
22	-0.89368	17.764	2.8160	1	1	8.0	8
23		Dropped from Test					
24	0.81831	6.7705	37.142	1	1	0.0	8
25	-1.28628	20.375	129.52	1	1	1.0	8
26	-0.39895	163.66	107.72	1	1	4.0	8
27		Dropped from Test					
28	-1.17272	18.774	12.240	1	1	4.0	8
29		Dropped from Test					
30	-0.73636	2.5375	4.8943	1	1	0.0	8

Unit Root Test Continued

31	-0.77665	174.79	30.415	1	1	8.0	8
32	-1.03881	27.692	15.644	1	1	5.0	8
33	-1.58968	6.9902	4.6795	1	1	8.0	8
34	-1.00468	104.16	26.144	1	1	8.0	8
35	-0.95953	203.90	50.654	1	1	8.0	8
36	-0.21135	0.9768	2.2624	1	1	2.0	8
37	-1.14751	11.744	2.3534	1	1	8.0	8
38	-1.53410	41.752	17.555	1	1	6.0	8
39	-1.98706	4.8700	1.8152	1	1	8.0	8
40	Dropped from Test						
41	-1.58901	3.0829	1.0132	1	1	8.0	8
42	-1.27550	20.645	7.4081	1	1	8.0	8
43	-1.22543	13.146	4.5471	1	1	8.0	8
44	-1.00468	104.16	26.144	1	1	8.0	8
45	-0.55829	551.68	1871.2	1	1	0.0	8
46	-0.84909	61.992	89.458	1	1	1.0	8
47	-0.58229	215.28	245.31	1	1	1.0	8
48	-5.94607	8.8749	264.63	1	1	8.0	8
49	-1.05809	55.909	46.011	1	1	2.0	8
50	-1.58901	3.0829	1.0132	1	1	8.0	8
51	-0.93720	86.869	132.33	1	1	3.0	8
52	Dropped from Test						
53	1.47530	116.66	368.72	1	1	1.0	8
54	-1.79294	398.98	124.72	1	1	6.0	8
55	Dropped from Test						
56	Dropped from Test						
57	-1.08385	7.7784	46.011	1	1	8.0	8
58	-1.02049	42.574	27.324	1	1	8.0	8
59	-0.83610	48.841	73.402	1	1	0.0	8
60	-0.69600	24.769	20.140	1	1	1.0	8
61	-1.25868	18.464	10.400	1	1	8.0	8
62	-0.15887	35.905	5.9286	1	1	8.0	8
63	-1.01045	507.05	1234.1	1	1	0.0	8
64	-2.08467	7.6933	4.1766	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.90695	-47.787	2.051	-0.554	0.919		416

Null Hypothesis: Unit root (common unit root process)
Series: WMC
Date: 09/23/18 Time: 14:19
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 471
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-8.15793	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on WMC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.01022	45896.	11228.	1	1	8.0	8
2	-1.17432	11040.	9736.6	1	1	3.0	8
3	-1.32573	16697.	7055.8	1	1	8.0	8

Unit Root Test Continued

4	-0.35624	196647	154011	1	1	1.0	8
5	-0.43738	97505.	18809.	1	1	8.0	8
6	-1.22264	26433.	12107.	1	1	8.0	8
7	-1.49130	67091.	64439.	1	1	1.0	8
8	-1.89019	7657.4	5172.7	1	1	8.0	8
9	-0.75857	192.93	217.70	1	1	1.0	8
10	-0.99036	529.41	210.78	1	1	8.0	8
11	-0.70161	16120.	20943.	1	1	0.0	8
12		Dropped from Test					
13	-1.19588	454.73	488.75	1	1	2.0	8
14	-2.01077	1843.0	1102.8	1	1	8.0	8
15	-1.71413	2632.5	2725.6	1	1	8.0	8
16	-1.64434	9020.0	7765.7	1	1	8.0	8
17	-0.61277	5870.4	17588.	1	1	1.0	8
18	-0.69935	122406	106489	1	1	1.0	8
19	-0.91922	4079.6	20882.	1	1	2.0	8
20	-1.60618	2439.8	2661.7	1	1	8.0	8
21	-2.81683	7363.2	5631.2	1	1	8.0	8
22	-0.86669	8140.3	17541.	1	1	2.0	8
23	-0.63373	512.61	229.51	1	1	8.0	8
24	-1.19947	35364.	32149.	1	1	4.0	8
25	-0.66520	17952.	35202.	1	1	0.0	8
26	-2.10400	1153.5	1109.7	1	1	8.0	8
27	-1.00647	46838.	119430	1	1	0.0	8
28	-1.16527	2129.0	6852.0	1	1	3.0	8
29	-0.93130	387.07	2517.3	1	1	1.0	8
30	-1.64696	15048.	5821.5	1	1	7.0	8
31	-0.80064	1754.8	1722.9	1	1	1.0	8
32	0.38724	16808.	4927.4	1	1	8.0	8
33	-1.73260	15629.	9392.8	1	1	8.0	8
34	0.45086	237.00	199.11	1	1	1.0	8
35	-1.66921	2541.2	1894.8	1	1	8.0	8
36	-1.50328	3871.9	8131.0	1	1	0.0	8
37	-0.82417	65327.	24866.	1	1	7.0	8
38	-1.00442	1740.2	4791.9	1	1	2.0	8
39	-1.29828	428.40	2417.4	1	1	8.0	8
40	-0.63373	512.61	229.51	1	1	8.0	8
41	-1.88098	0.0841	0.1361	1	1	7.0	8
42		Dropped from Test					
43	-0.94886	0.0891	0.0992	1	1	1.0	8
44	-1.42663	0.0411	0.0248	1	1	8.0	8
45	-2.46615	0.1668	0.1746	1	1	1.0	8
46		Dropped from Test					
47	-0.82574	3.1112	1.5721	1	1	5.0	8
48	-2.57167	0.4211	0.3411	1	1	6.0	8
49	-1.29740	0.2579	0.1165	1	1	8.0	8
50		Dropped from Test					
51	-0.19353	0.2766	0.3617	1	1	1.0	8
52	-0.88009	0.0638	0.0881	1	1	2.0	8
53	-0.87697	0.2493	0.1805	1	1	3.0	8
54	-0.85506	0.0671	0.1396	1	1	2.0	8
55	-1.05128	0.0484	0.1188	1	1	0.0	8
56	-0.65378	0.9525	0.1749	1	1	8.0	8
57		Dropped from Test					
58	-81.3531	6381.8	7638.6	1	1	0.0	8
59	-1.55316	11417.	14251.	1	1	1.0	8
60	-0.67421	13103.	20728.	1	1	3.0	8
61	3.14490	77864.	93654.	1	1	0.0	8
62	-0.20032	77748.	9659.2	1	1	8.0	8
63	-1.34286	0.0093	0.0029	1	1	8.0	8
64	-1.00000	0.0034	0.0033	1	1	2.0	7

Unit Root Test Continued

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-0.94636	-17.573	1.131	-0.554	0.919	471

Null Hypothesis: Unit root (common unit root process)
Series: CDC
Date: 09/23/18 Time: 14:19
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 472
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-8.14018	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on CDC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.35231	1.E+06	1.E+06	1	1	0.0	8
2	-0.81064	25149.	5864.2	1	1	8.0	8
3	-1.19857	1606.1	11108.	1	1	0.0	8
4	-0.36788	192879	147532	1	1	1.0	8
5	-0.74158	148014	29133.	1	1	7.0	8
6	-1.22033	32036.	13343.	1	1	8.0	8
7		Dropped from Test					
8	-0.40550	148.56	119.39	1	1	1.0	8
9	-0.62807	1122.2	2040.8	1	1	0.0	8
10		Dropped from Test					
11	-1.06316	2164.3	9860.2	1	1	8.0	8
12	-0.02233	77.026	20.382	1	1	6.0	8
13	-1.83225	709.77	258.62	1	1	8.0	8
14	0.26725	3300.5	4009.8	1	1	0.0	8
15	-0.78319	875.34	432.63	1	1	5.0	8
16	-0.98951	28981.	4007.8	1	1	8.0	8
17	0.45574	1772.6	2640.1	1	1	0.0	8
18	-0.65918	24884.	11078.	1	1	8.0	8
19	-0.89650	32842.	19551.	1	1	5.0	8
20	-1.71766	1704.1	5760.7	1	1	8.0	8
21	-1.78768	15889.	5792.2	1	1	8.0	8
22	-0.49680	2.E+06	2.E+06	1	1	2.0	8
23	-0.90746	360.94	489.18	1	1	3.0	8
24	-0.70215	212.03	153.74	1	1	5.0	8
25	-0.90409	4463.2	13869.	1	1	3.0	8
26	-0.83557	4308.4	6580.9	1	1	3.0	8
27	-0.82130	67.060	12.081	1	1	8.0	8
28	-0.45155	21.733	17.641	1	1	1.0	8
29	-0.81454	4008.4	26725.	1	1	1.0	8
30	-0.76269	58497.	99508.	1	1	1.0	8
31	-0.51142	425520	420210	1	1	1.0	8
32	-0.86669	8140.3	17541.	1	1	2.0	8
33	-2.10903	703.36	1000.7	1	1	2.0	8
34	-1.19947	35364.	32149.	1	1	4.0	8
35	-0.94857	12547.	18627.	1	1	1.0	8
36	-0.66520	17952.	35202.	1	1	0.0	8
37	-2.10400	1153.5	1109.7	1	1	8.0	8

Unit Root Test Continued

38	-0.35953	156970	22252.	1	1	8.0	8
39	-1.16196	2032.1	6472.7	1	1	3.0	8
40		Dropped from Test					
41	-1.81683	0.2165	0.2719	1	1	8.0	8
42	-0.44061	0.8440	0.5493	1	1	5.0	8
43	-0.47941	0.1873	0.2469	1	1	0.0	8
44	-1.91136	0.1179	0.1069	1	1	8.0	8
45	-1.59686	0.0536	0.0682	1	1	3.0	8
46	0.71831	61.731	56.160	1	1	3.0	8
47	-0.06802	46.784	24.170	1	1	6.0	8
48	-0.40878	164.92	62.936	1	1	6.0	8
49	-0.84840	0.3635	0.5632	1	1	0.0	8
50		Dropped from Test					
51	0.29946	6045.7	1598.3	1	1	8.0	8
52	-1.09148	15.754	5.3977	1	1	7.0	8
53	-2.16829	4.6895	2.1989	1	1	7.0	8
54	-0.86050	11.918	3.3288	1	1	8.0	8
55	-0.48969	38.167	36.335	1	1	8.0	8
56	-0.65378	0.9525	0.1749	1	1	8.0	8
57		Dropped from Test					
58	-1.24734	179.99	110.16	1	1	8.0	8
59	-0.59296	34347.	79780.	1	1	1.0	8
60	-0.60806	2967.3	49912.	1	1	1.0	8
61	-0.38069	33281.	7779.4	1	1	7.0	8
62	-0.33698	70817.	11579.	1	1	8.0	8
63	-0.72093	0.0260	0.0344	1	1	1.0	8
64	-1.92308	0.0041	0.0016	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.71928	-16.312	1.173	-0.554	0.919		472

Null Hypothesis: Unit root (common unit root process)
Series: EHSC
Date: 09/23/18 Time: 14:20
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 478
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 12.6854	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on EHSC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.00258	36485.	85403.	1	1	1.0	8
2	-1.39884	507.94	312.79	1	1	7.0	8
3	-1.07099	194.91	574.54	1	1	1.0	8
4	-0.57613	2635.5	538.06	1	1	8.0	8
5	-1.19946	106054	35590.	1	1	6.0	8
6	-0.74222	18021.	3871.3	1	1	8.0	8
7	-0.24010	73052.	65547.	1	1	3.0	8
8	-0.65011	2530.7	2748.1	1	1	2.0	8
9	-0.92572	84.140	167.64	1	1	0.0	8
10	-1.75796	39.133	38.296	1	1	5.0	8

Unit Root Test Continued

11	-1.13340	861.57	2294.8	1	1	1.0	8
12	-0.89650	32842.	19551.	1	1	5.0	8
13	-0.93007	270.65	368.14	1	1	3.0	8
14	-1.30710	949.09	1338.3	1	1	3.0	8
15	-0.51142	12181.	16333.	1	1	3.0	8
16	-1.46815	149.26	155.73	1	1	5.0	8
17	-0.80551	2602.2	2958.7	1	1	3.0	8
18	-0.69935	122406	106489	1	1	1.0	8
19	-0.34757	963.19	1834.5	1	1	2.0	8
20	-1.49360	517.59	171.79	1	1	6.0	6
21	0.99108	8426.7	12854.	1	1	2.0	8
22	-0.47048	146374	170195	1	1	2.0	8
23	-1.71413	2632.5	2725.6	1	1	8.0	8
24	-1.64434	9020.0	7765.7	1	1	8.0	8
25	-1.33773	1945.0	1722.8	1	1	8.0	8
26	-1.01401	1387.1	443.17	1	1	8.0	8
27	-0.91922	4079.6	20882.	1	1	2.0	8
28	-1.52854	3786.7	1929.8	1	1	6.0	8
29	-2.55050	286.30	261.07	1	1	8.0	8
30	-0.86662	8139.5	17546.	1	1	2.0	8
31	-0.90746	360.94	489.18	1	1	3.0	8
32	-0.79716	50.966	98.307	1	1	3.0	8
33	-1.34939	1682.4	2069.0	1	1	5.0	8
34	-1.64434	9020.0	7765.7	1	1	8.0	8
35	-1.14407	1817.2	832.96	1	1	8.0	8
36	-0.81888	3914.4	26491.	1	1	1.0	8
37	-0.89913	5189.1	6661.0	1	1	2.0	8
38	-2.32203	1617.3	957.40	1	1	8.0	8
39	-0.86669	8140.3	17541.	1	1	2.0	8
40	-0.34164	177.30	223.51	1	1	2.0	8
41	-2.48853	15.729	18.345	1	1	8.0	8
42		Dropped from Test					
43	-0.82574	3.1112	1.5721	1	1	5.0	8
44	-0.96645	20.293	34.293	1	1	2.0	8
45	-2.48853	15.729	18.345	1	1	8.0	8
46		Dropped from Test					
47	-0.82574	3.1112	1.5721	1	1	5.0	8
48	-1.68357	4.1767	20.382	1	1	0.0	8
49	-0.73548	40.636	18.960	1	1	4.0	8
50		Dropped from Test					
51	-1.11001	0.7502	14.416	1	1	0.0	8
52	-1.09148	15.754	5.3977	1	1	7.0	8
53	-2.16829	4.6895	2.1989	1	1	7.0	8
54	-0.86050	11.918	3.3288	1	1	8.0	8
55	-0.31676	1.3912	0.1935	1	1	8.0	8
56		Dropped from Test					
57	-1.24734	1.7999	1.1016	1	1	8.0	8
58	-0.78158	4.1573	5.5103	1	1	3.0	8
59	-0.38069	33281.	7779.4	1	1	7.0	8
60	-1.52729	15709.	20987.	1	1	2.0	8
61	-0.58851	3726.2	40473.	1	1	1.0	8
62	-0.33698	70817.	11579.	1	1	8.0	8
63	-0.67857	0.0055	0.0070	1	1	1.0	8
64	-2.50000	0.0106	0.0448	1	1	5.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.96611	-21.067	1.143	-0.554	0.919		478

Unit Root Test Continued

LLC Test Result at Level: Individual Intercept and Trend

Null Hypothesis: Unit root (common unit root process)
Series: ROCE
Date: 09/23/18 Time: 14:22
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 424
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 167.805	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on ROCE

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.50544	3.1766	1.7165	1	1	8.0	8
2	-1.13196	92.841	43.438	1	1	7.0	8
3	-1.46763	4.9130	1.9457	1	1	7.0	8
4		Dropped from Test					
5	-0.91356	0.0015	9.4800	1	1	8.0	8
6	-1.47224	27.379	9.0179	1	1	8.0	8
7	-0.70983	19.494	5.2353	1	1	7.0	8
8	-0.41617	13.025	8.2719	1	1	1.0	8
9	-0.99702	16.857	3.3857	1	1	5.0	8
10	-40.8760	11.834	221.19	1	1	8.0	8
11	-1.59910	1240.0	362.25	1	1	8.0	8
12	-1.15883	252.67	44.076	1	1	8.0	8
13		Dropped from Test					
14	-2.43049	103.14	63.537	1	1	7.0	8
15	-1.53159	14816.	5085.6	1	1	8.0	8
16		Dropped from Test					
17	-1.09541	30.441	38.594	1	1	2.0	8
18		Dropped from Test					
19	-2.20343	2.6980	1.0798	1	1	7.0	8
20	-0.83066	4.6462	5.5135	1	1	3.0	8
21		Dropped from Test					
22	-1.07921	14.628	2.5228	1	1	8.0	8
23		Dropped from Test					
24	-0.47945	1.5743	3.2623	1	1	5.0	8
25	-0.91808	1.5850	44.699	1	1	2.0	8
26	-0.72216	52.024	8.2813	1	1	8.0	8
27	-2.50633	0.0328	0.0082	1	1	8.0	8
28	-0.80952	5.0363	11.628	1	1	0.0	8
29		Dropped from Test					
30	-1.53441	0.5415	0.2227	1	1	8.0	8
31	-1.71652	16.436	19.676	1	1	8.0	8
32	-2.85946	2.5292	1.5214	1	1	8.0	8
33	-1.81730	2.9341	1.2485	1	1	7.0	8
34	-1.60622	26.206	37.912	1	1	1.0	8
35	-1.45189	19.214	6.1864	1	1	8.0	8
36	0.06178	0.2037	0.0661	1	1	7.0	8
37	-1.24383	1.1259	0.3721	1	1	5.0	8
38	-1.78367	15.463	8.1897	1	1	5.0	8
39	-2.13303	0.4766	0.1976	1	1	8.0	8
40		Dropped from Test					
41	-1.83050	0.4331	0.1326	1	1	8.0	8

Unit Root Test Continued

42	-2.71599	2.5519	1.3118	1	1	7.0	8
43	-1.44882	3.6971	1.3296	1	1	5.0	8
44	-1.59906	22.767	14.059	1	1	4.0	8
45	1.36862	177.25	356.84	1	1	0.0	8
46	-0.50884	13.967	2.4174	1	1	7.0	8
47	-0.17876	44.717	49.130	1	1	0.0	8
48	-2.73991	20.266	45.366	1	1	8.0	8
49	-1.15553	28.455	5.0943	1	1	8.0	8
50	-1.78737	0.4323	0.1422	1	1	8.0	8
51	-1.19431	8.6725	15.231	1	1	5.0	8
52		Dropped from Test					
53	-0.32199	7.0659	1.5730	1	1	7.0	8
54	-2.03138	34569.	22335.	1	1	8.0	8
55		Dropped from Test					
56		Dropped from Test					
57	-1.16340	0.8768	7.9089	1	1	7.0	8
58	-1.21515	4.1529	1.3608	1	1	7.0	8
59	-0.65462	4.8865	1.0292	1	1	8.0	8
60	-0.36604	3.7498	0.6129	1	1	7.0	8
61	-0.74259	5.2558	0.9669	1	1	5.0	8
62	-2.69028	1.4274	0.8906	1	1	8.0	8
63	-2.35440	26.999	99.007	1	1	1.0	8
64	-2.52905	2.9181	1.5681	1	1	5.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.91584	-169.859	1.590	-0.703	1.003		424

Null Hypothesis: Unit root (common unit root process)
Series: EPS
Date: 09/23/18 Time: 14:22
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 440
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-24.1305	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on EPS

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.46492	5.E+07	1.E+07	1	1	6.0	8
2	-1.77510	147652	64519.	1	1	8.0	8
3	-1.35400	6.E+08	2.E+08	1	1	8.0	8
4	-1.48079	8.E+06	2.E+06	1	1	8.0	8
5	-1.30331	400067	1.E+07	1	1	5.0	8
6	-1.92234	2.E+09	1.E+09	1	1	8.0	8
7	-0.30155	386.93	604.26	1	1	1.0	8
8	-0.77296	547.46	750.67	1	1	1.0	8
9	-1.01562	344.55	597.78	1	1	0.0	8
10	-2.19293	73.722	317.60	1	1	1.0	8
11	-1.58178	42750.	10969.	1	1	8.0	8
12	-1.44826	104683	23477.	1	1	8.0	8
13		Dropped from Test					
14	-1.74565	36.417	18.824	1	1	8.0	8

Unit Root Test Continued

15	-1.52118	2448.1	10793.	1	1	2.0	8
16		Dropped from Test					
17	-1.32835	2.E+07	7.E+06	1	1	8.0	8
18		Dropped from Test					
19	-1.14857	7.E+06	1.E+06	1	1	8.0	8
20	-1.42206	100.55	34.864	1	1	8.0	8
21		Dropped from Test					
22	-0.80562	52804.	15668.	1	1	8.0	8
23		Dropped from Test					
24	-3.44450	527.64	2197.5	1	1	0.0	8
25	-1.20744	7888.8	16871.	1	1	4.0	8
26	-1.41175	828387	401195	1	1	8.0	8
27	-3.80326	6668.3	2858.1	1	1	8.0	8
28	-2.79256	5808.7	5162.1	1	1	8.0	8
29	-0.94454	12018.	18063.	1	1	0.0	8
30	-1.47111	4.E+07	1.E+07	1	1	8.0	8
31	-1.18944	2.E+06	531386	1	1	8.0	8
32	-0.88192	5930.5	10870.	1	1	4.0	8
33	-0.94354	11944.	17999.	1	1	0.0	8
34	-0.90516	1422.2	4661.6	1	1	0.0	8
35	-0.73478	562.21	755.27	1	1	1.0	8
36	-0.73478	562.21	755.27	1	1	1.0	8
37	-0.78016	544.46	751.20	1	1	1.0	8
38	-1.79724	89044.	34700.	1	1	7.0	8
39	-1.03722	2557.4	3768.8	1	1	1.0	8
40		Dropped from Test					
41	-0.53771	5.4825	43.628	1	1	0.0	8
42	-2.25733	91.972	69.519	1	1	8.0	8
43	-0.67465	179.44	24.737	1	1	8.0	8
44	-1.30049	1667.9	526.40	1	1	8.0	8
45	-1.79866	309.69	72.096	1	1	8.0	8
46	-1.59478	334.84	990.38	1	1	5.0	8
47	-0.74856	112385	104005	1	1	1.0	8
48	-1.46040	461851	527664	1	1	2.0	8
49	-1.43723	254.70	66.239	1	1	7.0	8
50		Dropped from Test					
51	-2.63897	26283.	20238.	1	1	8.0	8
52		Dropped from Test					
53	-1.03207	4.6318	1.1831	1	1	8.0	8
54	-2.30789	655.57	381.02	1	1	6.0	8
55		Dropped from Test					
56	-1.41782	3.9032	1.1538	1	1	7.0	8
57	-1.18139	0.6725	2.0787	1	1	2.0	8
58	-1.43191	140.67	44.282	1	1	8.0	8
59	-2.05181	105797	159394	1	1	6.0	8
60	-2.21721	140700	441929	1	1	2.0	8
61	-1.12514	2.E+07	1.E+07	1	1	4.0	8
62	-0.76649	984604	405870	1	1	4.0	8
63	-0.77379	16.790	3.3685	1	1	8.0	8
64	-2.39148	19.843	18.102	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.30234	-34.300	1.115	-0.703	1.003		440

Null Hypothesis: Unit root (common unit root process)
Series: ROE
Date: 09/23/18 Time: 14:23
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1

Unit Root Test Continued

Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 424
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-28.2826	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on ROE

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.52518	9.2268	6.1839	1	1	8.0	8
2	-1.14934	225.25	96.337	1	1	7.0	8
3	-1.41489	27.931	17.991	1	1	4.0	8
4		Dropped from Test					
5	-0.87884	0.0823	17.195	1	1	6.0	8
6	-1.61642	14.086	69.055	1	1	8.0	8
7	-0.28676	34.418	107.82	1	1	0.0	8
8	-0.36037	26.761	3.4770	1	1	8.0	8
9	-1.23554	38.697	8.2787	1	1	6.0	8
10	-26.6095	116.81	1503.5	1	1	8.0	8
11	-1.25107	4081.6	986.24	1	1	8.0	8
12	-1.17349	427.83	77.038	1	1	8.0	8
13		Dropped from Test					
14	-1.96051	161.02	180.77	1	1	4.0	8
15	-1.50183	38393.	14417.	1	1	8.0	8
16		Dropped from Test					
17	-1.15603	86.399	112.11	1	1	2.0	8
18		Dropped from Test					
19	-2.18860	2.7970	1.1748	1	1	7.0	8
20	-0.81142	7.7557	3.2163	1	1	5.0	8
21		Dropped from Test					
22	-1.65489	11.745	2.7451	1	1	8.0	8
23		Dropped from Test					
24	-0.49665	3.4234	5.4825	1	1	6.0	8
25	-0.94044	3.4719	95.168	1	1	2.0	8
26	-0.79258	147.90	24.904	1	1	8.0	8
27	-13.6552	0.0964	0.0253	1	1	8.0	8
28	-1.15297	15.818	20.071	1	1	3.0	8
29		Dropped from Test					
30	-2.02558	0.7875	1.4127	1	1	1.0	8
31	-1.90584	30.086	31.031	1	1	8.0	8
32	-2.09097	21.385	16.334	1	1	4.0	8
33	-1.80360	6.0438	2.5528	1	1	8.0	8
34	-1.70811	53.555	21.897	1	1	8.0	8
35	-1.46037	108.01	37.018	1	1	8.0	8
36	-0.41447	0.5278	0.6329	1	1	2.0	8
37	-1.41276	10.346	2.2825	1	1	8.0	8
38	-1.87074	27.971	11.553	1	1	8.0	8
39	-2.12670	4.0467	1.7897	1	1	8.0	8
40		Dropped from Test					
41	-1.98130	1.8793	0.7584	1	1	8.0	8
42	-2.59845	11.477	4.9569	1	1	6.0	8
43	-1.64294	10.343	3.2679	1	1	8.0	8
44	-1.70811	53.555	21.897	1	1	8.0	8
45	0.38910	517.09	1268.7	1	1	0.0	8
46	-0.45362	51.295	8.7440	1	1	6.0	8
47	-0.24363	203.52	169.55	1	1	1.0	8
48	-6.06258	6.5004	260.87	1	1	8.0	8

Unit Root Test Continued

49	-1.00855	52.692	12.066	1	1	6.0	8
50	-1.98130	1.8793	0.7584	1	1	8.0	8
51	-0.91342	86.704	27.558	1	1	8.0	8
52		Dropped from Test					
53	0.69448	59.099	106.77	1	1	3.0	8
54	-2.25834	203.42	124.57	1	1	6.0	8
55		Dropped from Test					
56		Dropped from Test					
57	-1.25629	3.1774	31.508	1	1	8.0	8
58	-1.77251	21.447	9.9970	1	1	8.0	8
59	-0.70983	19.494	5.2353	1	1	7.0	8
60	-0.41617	13.025	8.2719	1	1	1.0	8
61	-0.99702	16.857	3.3857	1	1	5.0	8
62	-1.86616	17.867	5.8535	1	1	8.0	8
63	-2.40113	154.71	1233.0	1	1	0.0	8
64	-2.26186	7.2563	2.9638	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.96575	-31.097	2.151	-0.703	1.003		424

Null Hypothesis: Unit root (common unit root process)
Series: WMC
Date: 09/23/18 Time: 14:24
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 471
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-12.4967	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on WMC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.60424	26886.	10328.	1	1	8.0	8
2	-1.51557	9201.5	14236.	1	1	2.0	8
3	-1.80821	8448.8	6351.0	1	1	8.0	8
4	-1.18819	123341	158135	1	1	1.0	8
5	-1.37909	25128.	18775.	1	1	8.0	8
6	-1.53395	8252.3	10250.	1	1	8.0	8
7	-1.61122	61605.	219033	1	1	0.0	8
8	-1.75532	5836.3	2125.6	1	1	8.0	8
9	-1.07345	163.87	212.14	1	1	1.0	8
10	-1.06652	438.58	109.94	1	1	6.0	8
11	-0.57973	11186.	2077.5	1	1	8.0	8
12		Dropped from Test					
13	-2.26472	380.04	406.87	1	1	2.0	8
14	-1.94400	1179.9	501.40	1	1	8.0	8
15	-1.66983	2569.2	1572.2	1	1	8.0	8
16	-2.45149	5999.5	3170.0	1	1	8.0	8
17	-0.52899	5434.3	3061.3	1	1	4.0	8
18	-0.93777	120133	89509.	1	1	1.0	8
19	-1.39873	2408.7	9109.5	1	1	3.0	8
20	-1.60259	1128.8	1407.0	1	1	8.0	8
21	-2.78597	7273.5	5318.9	1	1	8.0	8

Unit Root Test Continued

22	-2.05537	5339.8	14118.	1	1	2.0	8
23	-1.09898	386.51	236.40	1	1	8.0	8
24	-1.29955	15828.	14680.	1	1	6.0	8
25	-1.38362	11489.	33819.	1	1	0.0	8
26	-2.66641	906.45	615.16	1	1	8.0	8
27	-1.11483	37238.	119092	1	1	0.0	8
28	-1.18122	1933.5	6671.0	1	1	3.0	8
29	-1.46058	338.43	1914.0	1	1	1.0	8
30	-1.71812	13112.	5324.7	1	1	7.0	8
31	-1.14902	1610.6	1702.6	1	1	1.0	8
32	-1.35703	3120.6	1586.4	1	1	8.0	8
33	-1.67813	13900.	5251.4	1	1	8.0	8
34	-1.82824	147.49	171.19	1	1	1.0	8
35	-1.62874	2539.4	523.33	1	1	7.0	8
36	-1.76627	2295.8	3113.5	1	1	1.0	8
37	-1.22071	43245.	30418.	1	1	4.0	8
38	-0.95282	1588.3	851.71	1	1	8.0	8
39	-2.33920	125.90	732.85	1	1	8.0	8
40	-1.09898	386.51	236.40	1	1	8.0	8
41	-1.74049	0.0656	0.0226	1	1	8.0	8
42		Dropped from Test					
43	-1.30461	0.0565	0.0996	1	1	1.0	8
44	-1.44466	0.0410	0.0156	1	1	6.0	8
45	-2.28656	0.1494	0.1386	1	1	1.0	8
46		Dropped from Test					
47	-1.01415	1.2440	0.6652	1	1	8.0	8
48	-2.77435	0.2313	0.2412	1	1	5.0	8
49	-1.22229	0.2274	0.0469	1	1	6.0	8
50		Dropped from Test					
51	-1.03675	0.1277	0.3603	1	1	1.0	8
52	-0.79124	0.0627	0.0829	1	1	2.0	8
53	-0.75173	0.2334	0.0334	1	1	8.0	8
54	-1.12835	0.0652	0.1399	1	1	2.0	8
55	-1.34320	0.0391	0.1176	1	1	0.0	8
56	-1.49918	0.5693	0.1405	1	1	8.0	8
57		Dropped from Test					
58	54.6360	4943.2	4595.0	1	1	2.0	8
59	-1.52559	11374.	14763.	1	1	1.0	8
60	-1.10447	6474.4	21619.	1	1	3.0	8
61	14.8620	44322.	59859.	1	1	1.0	8
62	-1.42518	33934.	8796.0	1	1	8.0	8
63	-1.45364	0.0065	0.0024	1	1	8.0	8
64	-1.03125	0.0028	0.0021	1	1	3.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.37019	-25.924	1.090	-0.703	1.003		471

Null Hypothesis: Unit root (common unit root process)
Series: CDC
Date: 09/23/18 Time: 14:25
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 480
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 11.4379	0.0000

Unit Root Test Continued

** Probabilities are computed assuming asympotic normality

Intermediate results on CDC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.34683	794192	1.E+06	1	1	0.0	8
2	-2.73461	9346.5	5687.0	1	1	8.0	8
3	-1.46231	1306.5	11064.	1	1	0.0	8
4	-1.30516	140749	280131	1	1	0.0	8
5	-1.66408	30941.	28939.	1	1	7.0	8
6	-1.57151	10047.	11477.	1	1	8.0	8
7		Dropped from Test					
8	-0.61606	111.02	129.21	1	1	0.0	8
9	-2.38281	521.87	1947.8	1	1	0.0	8
10	-2.47619	20.815	7.7997	1	1	8.0	8
11	-1.16818	2015.7	9347.4	1	1	8.0	8
12	-1.86444	26.455	9.7236	1	1	8.0	8
13	-2.20866	354.91	120.98	1	1	8.0	8
14	-1.40122	2035.9	3313.7	1	1	1.0	8
15	-1.10475	758.59	448.59	1	1	5.0	8
16	-2.13953	11959.	3902.2	1	1	8.0	8
17	-0.92104	1164.8	1903.2	1	1	0.0	8
18	-2.01464	12723.	5916.0	1	1	8.0	8
19	-0.97622	23478.	4825.8	1	1	8.0	8
20	-1.86613	1223.6	2634.4	1	1	8.0	8
21	-1.84143	15300.	5644.1	1	1	8.0	8
22	-0.19502	1.E+06	898268	1	1	1.0	8
23	-0.95374	357.27	447.67	1	1	3.0	8
24	-1.94875	26.471	82.690	1	1	5.0	8
25	-0.98153	3808.3	5839.3	1	1	5.0	8
26	-1.19159	2577.8	6588.7	1	1	3.0	8
27	-2.37826	22.872	11.974	1	1	8.0	8
28	-1.55944	16.446	16.564	1	1	1.0	8
29	-0.89395	3962.6	7701.5	1	1	3.0	8
30	-0.50751	41460.	48084.	1	1	1.0	8
31	-0.72679	418714	508750	1	1	0.0	8
32	-2.05537	5339.8	14118.	1	1	2.0	8
33	-2.07941	697.18	1053.0	1	1	1.0	8
34	-1.29955	15828.	14680.	1	1	6.0	8
35	-1.12278	7537.6	17247.	1	1	1.0	8
36	-1.38362	11489.	33819.	1	1	0.0	8
37	-2.66641	906.45	615.16	1	1	8.0	8
38	-3.34034	72252.	19437.	1	1	8.0	8
39	-1.17024	1922.8	6319.5	1	1	3.0	8
40		Dropped from Test					
41	-2.22335	0.2064	0.0879	1	1	8.0	8
42	-3.03843	0.4411	0.5750	1	1	4.0	8
43	-1.10098	0.1490	0.2469	1	1	0.0	8
44	-2.09783	0.0624	0.0980	1	1	8.0	8
45	-1.97374	0.0438	0.0717	1	1	3.0	8
46	-2.96448	34.757	6.7120	1	1	8.0	8
47	-1.08750	26.178	12.222	1	1	8.0	8
48	-2.27309	16.231	63.574	1	1	6.0	8
49	-0.33071	0.1945	0.0430	1	1	8.0	8
50		Dropped from Test					
51	-2.52276	2787.7	662.59	1	1	8.0	8
52	-1.80575	12.295	4.6463	1	1	6.0	8
53	-2.05450	4.4455	1.1413	1	1	8.0	8
54	-2.62445	4.2179	2.9301	1	1	8.0	8
55	-2.18098	9.2605	9.3371	1	1	8.0	8

Unit Root Test Continued

56	-1.49918	0.5693	0.1405	1	1	8.0	8
57		Dropped from Test					
58	-1.01999	167.08	36.428	1	1	6.0	8
59	-1.14659	15459.	79376.	1	1	1.0	8
60	-0.60413	2966.8	50149.	1	1	1.0	8
61	-2.31659	14830.	5336.1	1	1	7.0	8
62	-1.24420	42525.	10517.	1	1	8.0	8
63	-0.61024	0.0246	0.0046	1	1	8.0	8
64	-3.71123	0.0004	0.0015	1	1	6.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.42352	-26.186	1.188	-0.703	1.003		480

Null Hypothesis: Unit root (common unit root process)
Series: EHSC
Date: 09/23/18 Time: 14:26
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 486
Cross-sections included: 61 (3 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-16.2856	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on EHSC

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.24323	31017.	80695.	1	1	1.0	8
2	-1.38451	361.37	158.61	1	1	8.0	8
3	-1.22765	187.72	69.522	1	1	8.0	8
4	-2.24952	325.31	390.48	1	1	8.0	8
5	-1.78044	31641.	35591.	1	1	6.0	8
6	-1.28738	15278.	2949.9	1	1	8.0	8
7	-1.19646	23131.	93503.	1	1	2.0	8
8	-0.34828	1579.0	1389.6	1	1	2.0	8
9	-1.09037	65.860	167.12	1	1	0.0	8
10	-1.06482	32.875	5.2073	1	1	8.0	8
11	-0.94620	763.69	181.08	1	1	8.0	8
12	-0.97622	23478.	4825.8	1	1	8.0	8
13	-1.01287	112.20	53.732	1	1	8.0	8
14	-1.65857	255.57	173.44	1	1	8.0	8
15	-0.63108	10617.	2617.4	1	1	8.0	8
16	-1.73971	136.89	148.22	1	1	5.0	8
17	-2.83754	1896.5	2225.1	1	1	3.0	8
18	-0.93777	120133	89509.	1	1	1.0	8
19	-1.08513	446.96	1324.7	1	1	2.0	8
20	-1.63427	358.71	161.49	1	1	6.0	6
21	-0.03399	1084.9	2800.4	1	1	1.0	8
22	0.31046	15296.	35580.	1	1	2.0	8
23	-1.66983	2569.2	1572.2	1	1	8.0	8
24	-2.45149	5999.5	3170.0	1	1	8.0	8
25	-1.16146	1130.2	458.63	1	1	5.0	8
26	-1.00996	1257.6	408.00	1	1	8.0	8
27	-1.39873	2408.7	9109.5	1	1	3.0	8
28	-1.76529	719.47	1690.8	1	1	6.0	8

Unit Root Test Continued

29	-2.89352	233.60	178.37	1	1	8.0	8
30	-2.05479	5341.4	14124.	1	1	2.0	8
31	-0.95374	357.27	447.67	1	1	3.0	8
32	-0.59550	49.842	20.126	1	1	8.0	8
33	-1.40060	1063.7	5193.6	1	1	3.0	8
34	-2.45149	5999.5	3170.0	1	1	8.0	8
35	-1.39368	1123.2	324.40	1	1	6.0	8
36	-0.91486	3847.5	7706.4	1	1	3.0	8
37	-1.04325	4913.6	6567.9	1	1	2.0	8
38	-2.44754	1402.9	703.61	1	1	8.0	8
39	-2.05537	5339.8	14118.	1	1	2.0	8
40	-0.57035	58.439	62.866	1	1	1.0	8
41	-2.70162	14.614	9.9989	1	1	8.0	8
42	Dropped from Test						
43	-1.01415	1.2440	0.6652	1	1	8.0	8
44	-3.25382	3.7146	34.140	1	1	2.0	8
45	-2.70162	14.614	9.9989	1	1	8.0	8
46	-10.7804	0.4185	0.1548	1	1	8.0	8
47	-1.01415	1.2440	0.6652	1	1	8.0	8
48	-2.06926	3.2925	10.980	1	1	1.0	8
49	-1.82659	25.701	26.544	1	1	3.0	8
50	Dropped from Test						
51	-0.99780	0.2219	4.9630	1	1	3.0	8
52	-1.80575	12.295	4.6463	1	1	6.0	8
53	-2.05450	4.4455	1.1413	1	1	8.0	8
54	-2.62445	4.2179	2.9301	1	1	8.0	8
55	-1.49489	0.3460	0.1867	1	1	8.0	8
56	Dropped from Test						
57	-1.01999	1.6708	0.3643	1	1	6.0	8
58	-1.36492	1.7842	5.4398	1	1	3.0	8
59	-2.31659	14830.	5336.1	1	1	7.0	8
60	-1.51155	15559.	21229.	1	1	2.0	8
61	-0.72056	3337.3	40170.	1	1	1.0	8
62	-1.24420	42525.	10517.	1	1	8.0	8
63	-0.46857	0.0049	0.0050	1	1	0.0	8
64	-2.91358	0.0084	0.0326	1	1	5.0	8

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.13041	-26.010	1.241	-0.703	1.003		486

LLC Test Result at First Difference: Individual Intercept

Null Hypothesis: Unit root (common unit root process)
Series: D(ROCE)
Date: 09/23/18 Time: 14:32
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 364
Cross-sections included: 52 (12 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-90.9229	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(ROCE)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs

Unit Root Test Continued

1	-1.71701	5.7455	9.3788	1	1	7.0	7
2	-1.52755	254.75	103.62	1	1	6.0	7
3	-1.68862	9.7729	3.7228	1	1	7.0	7
4	Dropped from Test						
5	-0.91663	0.0046	76.620	1	1	5.0	7
6	-1.88485	38.940	37.096	1	1	7.0	7
7	-1.54993	44.407	22.927	1	1	6.0	7
8	-0.96295	31.142	26.324	1	1	2.0	7
9	-1.81374	29.312	11.126	1	1	5.0	7
10	-38.1935	22.721	1664.2	1	1	5.0	7
11	-1.97413	3017.4	1388.1	1	1	7.0	7
12	-1.86512	445.04	131.30	1	1	7.0	7
13	Dropped from Test						
14	-2.69180	223.76	93.945	1	1	7.0	7
15	-1.80598	38359.	13394.	1	1	6.0	7
16	Dropped from Test						
17	-0.98962	42.552	51.885	1	1	2.0	7
18	Dropped from Test						
19	-3.22960	5.1963	5.2288	1	1	7.0	7
20	-0.97873	13.143	4.5296	1	1	7.0	7
21	Dropped from Test						
22	-1.83894	25.625	7.8929	1	1	7.0	7
23	Dropped from Test						
24	-1.28415	3.1158	14.720	1	1	4.0	7
25	-1.12079	4.0973	188.93	1	1	2.0	7
26	-1.49532	92.830	27.584	1	1	7.0	7
27	Dropped from Test						
28	-0.85091	11.122	16.183	1	1	1.0	7
29	Dropped from Test						
30	-1.54068	1.1555	0.6985	1	1	5.0	7
31	-1.92052	52.944	81.103	1	1	7.0	7
32	-3.05218	4.1710	7.2732	1	1	7.0	7
33	-1.95208	9.4073	3.0372	1	1	7.0	7
34	-2.07047	69.216	434.79	1	1	0.0	7
35	-1.61530	50.859	13.733	1	1	7.0	7
36	-0.60410	0.4843	0.1361	1	1	7.0	7
37	-1.71641	2.1445	1.6475	1	1	3.0	7
38	-2.24402	37.321	47.807	1	1	2.0	7
39	-2.26427	0.6460	0.6026	1	1	7.0	7
40	Dropped from Test						
41	-2.16513	0.8572	4.9707	1	1	0.0	7
42	-2.47468	4.9269	2.7612	1	1	5.0	7
43	-1.95385	7.0209	3.8533	1	1	7.0	7
44	-1.90932	50.198	17.586	1	1	7.0	7
45	2.17870	341.97	453.86	1	1	1.0	7
46	-1.41985	25.542	7.4511	1	1	6.0	7
47	-0.73772	68.453	44.989	1	1	1.0	7
48	-2.82099	44.751	319.69	1	1	3.0	7
49	-1.90280	51.823	26.974	1	1	4.0	7
50	-2.15035	0.8939	1.5613	1	1	2.0	7
51	-0.78096	11.538	100.25	1	1	3.0	7
52	Dropped from Test						
53	-1.05090	18.252	9.2634	1	1	7.0	7
54	-1.97440	28120.	62157.	1	1	7.0	7
55	Dropped from Test						
56	Dropped from Test						
57	-1.17634	2.6603	23.455	1	1	7.0	7
58	-1.66035	5.8680	6.6338	1	1	7.0	7
59	-1.43117	10.707	3.9991	1	1	7.0	7
60	-1.39364	7.9970	5.4041	1	1	1.0	7
61	-1.62477	8.8840	2.9749	1	1	5.0	7
62	-3.28417	3.2938	4.4419	1	1	7.0	7

Unit Root Test Continued

63	-2.66913	80.136	296.98	1	1	2.0	7
64	-3.00236	4.9364	5.3160	1	1	5.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.92504	-86.577	1.645	-0.554	0.919		364

Null Hypothesis: Unit root (common unit root process)
Series: D(EPS)
Date: 09/23/18 Time: 14:32
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 385
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 20.1866	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(EPS)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.62862	7.E+07	5.E+07	1	1	7.0	7
2	-1.82898	136108	171878	1	1	7.0	7
3	-1.98797	1.E+09	1.E+09	1	1	6.0	7
4	-1.93538	1.E+07	5.E+06	1	1	7.0	7
5	-1.31202	899216	9.E+07	1	1	4.0	7
6	-2.14959	2.E+09	4.E+09	1	1	7.0	7
7	-0.76985	575.02	1874.9	1	1	2.0	7
8	-0.94647	1070.4	968.52	1	1	1.0	7
9	-1.38330	578.29	752.62	1	1	2.0	7
10	-1.97529	172.78	196.67	1	1	4.0	7
11	-1.98038	88571.	34609.	1	1	7.0	7
12	-1.94910	212655	118304	1	1	4.0	7
13		Dropped from Test					
14	-1.71912	91.970	29.140	1	1	7.0	7
15	-1.46944	2887.9	13140.	1	1	2.0	7
16		Dropped from Test					
17	-1.79285	5.E+07	2.E+07	1	1	5.0	7
18		Dropped from Test					
19	-1.79220	1.E+07	4.E+06	1	1	7.0	7
20	-1.98995	131.96	121.07	1	1	7.0	7
21		Dropped from Test					
22	-1.25915	114039	52340.	1	1	7.0	7
23		Dropped from Test					
24	-3.16029	1520.5	3228.5	1	1	2.0	7
25	-1.59151	12872.	80437.	1	1	4.0	7
26	-1.78663	2.E+06	3.E+06	1	1	7.0	7
27	-3.17852	13254.	23402.	1	1	5.0	7
28	-2.94997	12716.	31964.	1	1	5.0	7
29	-1.02782	20168.	35644.	1	1	0.0	7
30	-1.95060	1.E+08	3.E+07	1	1	7.0	7
31	-2.04914	4.E+06	3.E+06	1	1	7.0	7
32	-1.05214	15289.	13898.	1	1	5.0	7
33	-1.02519	20078.	35372.	1	1	0.0	7
34	-0.91671	3780.0	5510.2	1	1	2.0	7
35	-0.89942	1060.0	985.50	1	1	1.0	7

Unit Root Test Continued

36	-0.89942	1060.0	985.50	1	1	1.0	7
37	-0.95537	1071.7	967.82	1	1	1.0	7
38	-2.17408	197410	138876	1	1	7.0	7
39	-1.12205	4528.1	3988.3	1	1	2.0	7
40		Dropped from Test					
41	-0.92007	11.815	57.123	1	1	1.0	7
42	-2.50118	174.29	132.43	1	1	6.0	7
43	-1.38105	381.60	133.97	1	1	7.0	7
44	-1.61711	3212.7	1048.1	1	1	7.0	7
45	-2.12212	661.80	237.79	1	1	7.0	7
46	-1.73924	824.78	3171.9	1	1	3.0	7
47	-1.16088	180622	149032	1	1	1.0	7
48	-1.88149	999040	3.E+06	1	1	0.0	7
49	-1.93493	472.46	177.82	1	1	6.0	7
50		Dropped from Test					
51	-3.30086	52773.	66154.	1	1	7.0	7
52		Dropped from Test					
53	-1.71105	7.8157	2.7826	1	1	6.0	7
54	-2.55606	1774.3	1277.7	1	1	6.0	7
55		Dropped from Test					
56	-1.73186	9.8773	11.090	1	1	1.0	7
57	-1.35292	1.1679	0.6871	1	1	7.0	7
58	-1.66355	334.52	104.70	1	1	7.0	7
59	-2.04626	176620	2.E+06	1	1	0.0	7
60	-1.99097	432049	652799	1	1	0.0	7
61	-1.53255	4.E+07	2.E+07	1	1	4.0	7
62	-1.15352	1.E+06	835113	1	1	6.0	7
63	-1.38482	27.428	7.9625	1	1	7.0	7
64	-2.46201	26.081	51.077	1	1	6.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.52761	-29.758	1.107	-0.554	0.919		385

Null Hypothesis: Unit root (common unit root process)
Series: D(ROE)
Date: 09/23/18 Time: 14:33
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 371
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-18.0266	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(ROE)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.56085	11.148	34.651	1	1	7.0	7
2	-1.54713	617.95	278.60	1	1	5.0	7
3	-1.61101	54.988	19.012	1	1	7.0	7
4		Dropped from Test					
5	-0.90188	0.2447	124.27	1	1	4.0	7
6	-1.70610	40.253	381.33	1	1	7.0	7
7	-1.14003	83.978	419.59	1	1	0.0	7
8	-1.05249	58.859	11.501	1	1	7.0	7

Unit Root Test Continued

9	-1.76306	63.259	26.794	1	1	5.0	7
10	-24.6068	224.28	11120.	1	1	5.0	7
11	-2.00747	9947.4	3711.7	1	1	7.0	7
12	-1.83652	754.64	214.60	1	1	7.0	7
13		Dropped from Test					
14	-1.86785	370.43	116.54	1	1	7.0	7
15	-1.76074	103973	38283.	1	1	7.0	7
16		Dropped from Test					
17	-1.04332	122.14	161.05	1	1	2.0	7
18		Dropped from Test					
19	-2.93517	5.8051	5.5826	1	1	7.0	7
20	-1.08037	20.514	6.1811	1	1	7.0	7
21		Dropped from Test					
22	-2.28216	22.112	13.072	1	1	5.0	7
23		Dropped from Test					
24	-1.29615	6.7859	30.715	1	1	4.0	7
25	-1.12086	9.6573	401.14	1	1	2.0	7
26	-1.56860	266.40	87.302	1	1	7.0	7
27	-0.10294	0.1714	0.1594	1	1	7.0	7
28	-1.43803	35.745	64.026	1	1	1.0	7
29		Dropped from Test					
30	-1.97669	1.2114	4.6792	1	1	2.0	7
31	-2.03108	99.314	118.75	1	1	7.0	7
32	-2.41746	36.591	24.541	1	1	7.0	7
33	-1.84118	18.268	6.8804	1	1	6.0	7
34	-2.01501	129.17	52.749	1	1	7.0	7
35	-1.63239	305.16	85.119	1	1	7.0	7
36	-0.46936	1.1695	1.3786	1	1	0.0	7
37	-1.99517	20.577	6.8671	1	1	7.0	7
38	-2.36645	73.716	68.181	1	1	4.0	7
39	-2.21789	4.2543	5.4060	1	1	7.0	7
40		Dropped from Test					
41	-2.18582	4.3229	9.1090	1	1	1.0	7
42	-2.37635	22.676	13.259	1	1	5.0	7
43	-1.85626	25.320	9.8941	1	1	7.0	7
44	-2.01501	129.17	52.749	1	1	7.0	7
45	1.20555	1141.9	1590.1	1	1	1.0	7
46	-1.18867	110.71	21.682	1	1	7.0	7
47	-0.85939	328.45	244.97	1	1	1.0	7
48	-6.07259	24.382	2107.5	1	1	3.0	7
49	-1.72489	96.462	102.28	1	1	1.0	7
50	-2.18582	4.3229	9.1090	1	1	1.0	7
51	-0.96448	107.04	159.68	1	1	5.0	7
52		Dropped from Test					
53	0.15926	159.35	251.40	1	1	4.0	7
54	-2.56482	526.21	470.58	1	1	6.0	7
55		Dropped from Test					
56		Dropped from Test					
57	-1.28681	9.2358	145.45	1	1	7.0	7
58	-2.08014	37.982	50.160	1	1	7.0	7
59	-1.54993	44.407	22.927	1	1	6.0	7
60	-0.96295	31.142	26.324	1	1	2.0	7
61	-1.81374	29.312	11.126	1	1	5.0	7
62	-2.07638	36.260	12.882	1	1	7.0	7
63	-2.89563	390.04	1308.5	1	1	2.0	7
64	-2.80589	13.691	10.404	1	1	6.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.12368	-21.783	1.933	-0.554	0.919		371

Unit Root Test Continued

Null Hypothesis: Unit root (common unit root process)
Series: D(WMC)
Date: 09/23/18 Time: 14:34
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 412
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-14.7183	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(WMC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.82736	51711.	26364.	1	1	6.0	7
2	-1.76634	23820.	36133.	1	1	1.0	7
3	-1.92510	9310.1	13739.	1	1	7.0	7
4	-1.21485	203563	284889	1	1	1.0	7
5	-1.30864	43640.	42047.	1	1	7.0	7
6	-1.51732	8637.2	20245.	1	1	6.0	7
7	-2.28794	79336.	170973	1	1	2.0	7
8	-2.04109	16087.	9941.6	1	1	7.0	7
9	-1.09865	273.40	346.15	1	1	1.0	7
10	-1.77769	702.64	319.74	1	1	5.0	7
11	-1.13954	25359.	5818.3	1	1	7.0	7
12		Dropped from Test					
13	-2.45159	753.20	803.43	1	1	1.0	7
14	-2.00462	1727.5	1732.7	1	1	7.0	7
15	-1.58068	5503.4	6167.1	1	1	6.0	7
16	-2.77328	16220.	12973.	1	1	7.0	7
17	-0.75778	12372.	5696.4	1	1	4.0	7
18	-1.30859	171995	172166	1	1	1.0	7
19	-1.52410	6641.4	37373.	1	1	0.0	7
20	-1.62035	3835.5	3982.4	1	1	6.0	7
21	-2.98866	19543.	21863.	1	1	7.0	7
22	-1.77652	13892.	11799.	1	1	3.0	7
23	-1.73686	675.15	706.58	1	1	7.0	7
24	-1.29862	43531.	22901.	1	1	7.0	7
25	-1.56710	15216.	39816.	1	1	2.0	7
26	-2.45094	1722.8	2014.8	1	1	6.0	7
27	-0.97632	67847.	105169	1	1	3.0	7
28	-1.14138	3710.7	3268.5	1	1	7.0	7
29	-2.25866	692.89	6650.5	1	1	1.0	7
30	-2.07809	32267.	16785.	1	1	7.0	7
31	-1.03823	2385.7	2237.5	1	1	1.0	7
32	-1.67900	7560.3	8039.8	1	1	7.0	7
33	-1.87265	43872.	17062.	1	1	7.0	7
34	-2.70865	233.70	1321.5	1	1	0.0	7
35	-1.86720	3321.8	2053.1	1	1	6.0	7
36	-1.80855	5055.7	6047.4	1	1	1.0	7
37	-1.40931	96921.	52225.	1	1	7.0	7
38	-1.26713	3685.4	2266.1	1	1	7.0	7
39	-2.21619	423.01	2962.4	1	1	7.0	7
40	-1.73686	675.15	706.58	1	1	7.0	7
41	-1.79534	0.1633	0.0540	1	1	7.0	7
42		Dropped from Test					

Unit Root Test Continued

43	-1.15789	0.1137	0.2011	1	1	1.0	7
44	-1.97614	0.0858	0.0400	1	1	6.0	7
45	-2.57990	0.3055	0.5827	1	1	2.0	7
46		Dropped from Test					
47	-1.78477	3.3660	3.0116	1	1	7.0	7
48	-2.92399	0.4053	0.7454	1	1	6.0	7
49	-2.04667	0.3553	0.1698	1	1	5.0	7
50		Dropped from Test					
51	-1.07968	0.3333	0.3298	1	1	2.0	7
52	-1.09952	0.1105	0.2095	1	1	2.0	7
53	-1.56395	0.3349	0.0945	1	1	7.0	7
54	-1.00054	0.0881	0.3442	1	1	2.0	7
55	-1.26316	0.0731	0.1615	1	1	2.0	7
56	-1.95775	1.2286	0.4759	1	1	7.0	7
57		Dropped from Test					
58	97.0339	7972.7	8375.6	1	1	0.0	7
59	-2.25510	20065.	37310.	1	1	1.0	7
60	-1.19461	17153.	51461.	1	1	1.0	7
61	10.6570	85778.	97260.	1	1	0.0	7
62	-1.87710	77530.	28314.	1	1	7.0	7
63	-2.00000	0.0131	0.0069	1	1	7.0	7
64	-1.35294	0.0061	0.0063	1	1	2.0	6

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.66528	-25.808	1.077	-0.554	0.919		412

Null Hypothesis: Unit root (common unit root process)
Series: D(CDC)
Date: 09/23/18 Time: 14:35
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 413
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-13.5313	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(CDC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.04648	2.E+06	1.E+06	1	1	1.0	7
2	-2.97304	26681.	24981.	1	1	7.0	7
3	-1.61438	3965.6	10664.	1	1	1.0	7
4	-1.51012	246504	270158	1	1	1.0	7
5	-1.65177	34087.	99705.	1	1	6.0	7
6	-1.53934	8672.4	20294.	1	1	7.0	7
7		Dropped from Test					
8	-1.07699	155.48	138.30	1	1	1.0	7
9	-2.19817	1081.6	4927.5	1	1	0.0	7
10		Dropped from Test					
11	-1.51295	6853.9	52956.	1	1	7.0	7
12	-2.42625	63.449	99.493	1	1	2.0	7
13	-2.58487	784.51	493.00	1	1	7.0	7
14	-1.01945	3329.9	1229.5	1	1	7.0	7
15	-1.30240	1483.4	611.58	1	1	7.0	7

Unit Root Test Continued

16	-2.79382	26615.	13152.	1	1	7.0	7
17	-0.79764	2073.8	2059.3	1	1	2.0	7
18	-2.36235	27552.	46170.	1	1	4.0	7
19	-1.44703	54492.	12171.	1	1	7.0	7
20	-1.82648	4385.6	7451.2	1	1	6.0	7
21	-1.90347	15787.	16004.	1	1	7.0	7
22	-0.58277	2.E+06	2.E+06	1	1	1.0	7
23	-1.19035	752.77	245.36	1	1	7.0	7
24	-1.77829	93.267	98.958	1	1	7.0	7
25	-1.12610	10666.	6104.8	1	1	7.0	7
26	-1.23403	6275.7	2414.1	1	1	7.0	7
27	-2.45548	66.408	43.657	1	1	7.0	7
28	-2.19065	31.770	51.945	1	1	1.0	7
29	-1.13001	7117.5	30236.	1	1	0.0	7
30	-0.77345	105889	95461.	1	1	1.0	7
31	-0.91838	638672	449072	1	1	1.0	7
32	-1.77652	13892.	11799.	1	1	3.0	7
33	-2.32267	1637.3	1846.7	1	1	2.0	7
34	-1.29862	43531.	22901.	1	1	7.0	7
35	-0.92496	12241.	26121.	1	1	2.0	7
36	-1.56710	15216.	39816.	1	1	2.0	7
37	-2.45094	1722.8	2014.8	1	1	6.0	7
38	-3.75768	146577	81963.	1	1	7.0	7
39	-1.15363	4006.8	3136.7	1	1	7.0	7
40		Dropped from Test					
41	-3.91872	0.3130	0.5641	1	1	7.0	7
42	-3.53324	0.9235	2.6341	1	1	1.0	7
43	-1.44791	0.1715	0.2779	1	1	2.0	7
44	-1.98370	0.1641	0.6297	1	1	4.0	7
45	-2.78345	0.0925	0.2084	1	1	1.0	7
46	-4.20043	32.283	19.285	1	1	6.0	7
47	-1.42373	50.614	37.715	1	1	6.0	7
48	-2.46352	57.067	310.06	1	1	6.0	7
49	-1.92041	0.3480	0.1812	1	1	7.0	7
50		Dropped from Test					
51	-2.36669	5893.9	3524.9	1	1	7.0	7
52	-2.58475	19.024	17.033	1	1	5.0	7
53	-2.27540	11.762	14.976	1	1	1.0	7
54	-3.55176	7.0105	12.111	1	1	7.0	7
55	-2.33452	25.175	26.785	1	1	7.0	7
56	-1.95775	1.2286	0.4759	1	1	7.0	7
57		Dropped from Test					
58	-1.95139	229.07	135.07	1	1	5.0	7
59	-1.16479	27077.	21452.	1	1	7.0	7
60	-0.70511	9770.5	35159.	1	1	1.0	7
61	-2.86336	23758.	16580.	1	1	7.0	7
62	-1.90913	79054.	43634.	1	1	5.0	7
63	-1.09677	0.0455	0.0100	1	1	7.0	7
64	-3.82609	0.0010	0.0066	1	1	7.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.71714	-25.279	1.178	-0.554	0.919		413

Null Hypothesis: Unit root (common unit root process)
Series: D(EHSC)
Date: 09/23/18 Time: 14:36
Sample: 2007 2016
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Unit Root Test Continued

Total number of observations: 418
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-14.9117	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(EHSC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.35100	81264.	160915	1	1	1.0	7
2	-1.82356	756.94	401.27	1	1	7.0	7
3	-1.47759	503.61	671.37	1	1	4.0	7
4	-2.48478	471.75	1732.1	1	1	7.0	7
5	-1.78340	38970.	142976	1	1	6.0	7
6	-2.00571	16662.	8911.0	1	1	7.0	7
7	-1.34677	48116.	105963	1	1	2.0	7
8	-0.83765	2859.6	3684.2	1	1	2.0	7
9	-0.87801	131.90	261.99	1	1	0.0	7
10	-2.48832	49.893	28.735	1	1	7.0	7
11	-0.98709	1727.5	554.53	1	1	6.0	7
12	-1.44703	54492.	12171.	1	1	7.0	7
13	-1.22221	295.86	124.79	1	1	7.0	7
14	-1.81651	865.82	435.04	1	1	7.0	7
15	-1.05129	14235.	10606.	1	1	7.0	7
16	-2.12049	259.62	737.60	1	1	3.0	7
17	-3.10109	3479.1	3390.3	1	1	4.0	7
18	-1.30859	171995	172166	1	1	1.0	7
19	-1.18574	923.85	2987.0	1	1	2.0	7
20	-2.05809	1065.7	515.50	1	1	5.0	5
21	-0.27079	3853.4	10661.	1	1	1.0	7
22	0.32321	36364.	124884	1	1	2.0	7
23	-1.58068	5503.4	6167.1	1	1	6.0	7
24	-2.77328	16220.	12973.	1	1	7.0	7
25	-1.63988	1722.9	1515.2	1	1	5.0	7
26	-1.57725	2740.7	923.25	1	1	7.0	7
27	-1.52410	6641.4	37373.	1	1	0.0	7
28	-1.75258	2021.5	5803.2	1	1	7.0	7
29	-3.40655	513.41	1298.3	1	1	6.0	7
30	-1.77577	13894.	11811.	1	1	3.0	7
31	-1.19035	752.77	245.36	1	1	7.0	7
32	-1.00366	81.811	127.18	1	1	5.0	7
33	-1.36936	3130.6	12060.	1	1	1.0	7
34	-2.77328	16220.	12973.	1	1	7.0	7
35	-1.82343	1740.0	923.25	1	1	5.0	7
36	-1.14633	7007.0	30418.	1	1	0.0	7
37	-1.26085	9171.7	8427.9	1	1	2.0	7
38	-3.08542	2985.3	4794.1	1	1	3.0	7
39	-1.77652	13892.	11799.	1	1	3.0	7
40	-0.84904	149.56	238.47	1	1	2.0	7
41	-2.77343	46.387	67.208	1	1	3.0	7
42		Dropped from Test					
43	-1.78477	3.3660	3.0116	1	1	7.0	7
44	-3.24584	6.8083	115.42	1	1	1.0	7
45	-2.77343	46.387	67.208	1	1	3.0	7
46		Dropped from Test					
47	-1.78477	3.3660	3.0116	1	1	7.0	7
48	-2.19861	7.1031	19.697	1	1	1.0	7
49	-1.65220	43.282	103.41	1	1	2.0	7

Unit Root Test Continued

50		Dropped from Test					
51	-0.93395	0.3267	4.6435	1	1	6.0	7
52	-2.58475	19.024	17.033	1	1	5.0	7
53	-2.27540	11.762	14.976	1	1	1.0	7
54	-3.55176	7.0105	12.111	1	1	7.0	7
55	-1.77252	0.9554	0.6626	1	1	7.0	7
56		Dropped from Test					
57	-1.95139	2.2907	1.3507	1	1	5.0	7
58	-1.42866	3.0388	1.9926	1	1	7.0	7
59	-2.86336	23758.	16580.	1	1	7.0	7
60	-1.69709	36318.	31297.	1	1	1.0	7
61	-0.80992	10131.	27590.	1	1	1.0	7
62	-1.90913	79054.	43634.	1	1	5.0	7
63	-0.57353	0.0064	0.0111	1	1	0.0	7
64	-2.75536	0.0250	0.1215	1	1	1.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.35229	-23.477	1.223	-0.554	0.919		418

LLC Test Result at First Difference: Individual Intercept and Trend

Null Hypothesis: Unit root (common unit root process)
Series: D(ROCE)
Date: 09/23/18 Time: 14:37
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 364
Cross-sections included: 52 (12 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-37.1831	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(ROCE)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.69347	5.2418	6.6784	1	1	7.0	7
2	-1.89369	182.71	104.68	1	1	6.0	7
3	-1.61396	9.3037	3.7510	1	1	7.0	7
4		Dropped from Test					
5	-0.91770	0.0046	59.478	1	1	5.0	7
6	-2.04654	30.961	25.173	1	1	7.0	7
7	-2.86449	17.044	19.384	1	1	7.0	7
8	-2.24205	11.758	26.257	1	1	2.0	7
9	-2.70468	4.0039	11.338	1	1	5.0	7
10	-35.9114	11.361	1086.0	1	1	5.0	7
11	-2.06443	2970.6	1292.1	1	1	7.0	7
12	-2.05006	379.73	131.48	1	1	7.0	7
13		Dropped from Test					
14	-2.69424	223.76	76.232	1	1	6.0	7
15	-1.82771	37581.	13511.	1	1	6.0	7
16		Dropped from Test					
17	-0.81361	34.225	36.439	1	1	2.0	7
18		Dropped from Test					
19	-4.72473	2.1772	4.3957	1	1	7.0	7
20	-1.47474	11.585	2.3531	1	1	7.0	7
21		Dropped from Test					

Unit Root Test Continued

22	-2.11266	21.306	7.4793	1	1	7.0	7
23		Dropped from Test					
24	-4.31159	1.5579	4.8621	1	1	7.0	7
25	-1.65200	1.5815	186.18	1	1	2.0	7
26	-2.11057	24.913	29.168	1	1	5.0	7
27		Dropped from Test					
28	-0.86939	11.122	10.520	1	1	3.0	7
29		Dropped from Test					
30	-1.52579	1.0882	0.7002	1	1	5.0	7
31	-1.97171	52.746	81.093	1	1	7.0	7
32	-3.05231	4.1710	3.9895	1	1	6.0	7
33	-2.00288	8.9901	3.0364	1	1	7.0	7
34	-2.25063	66.432	433.70	1	1	0.0	7
35	-1.61739	50.806	13.861	1	1	7.0	7
36	-1.78933	0.0731	0.0579	1	1	7.0	7
37	-1.88777	2.0014	1.5421	1	1	3.0	7
38	-2.39740	35.123	29.112	1	1	4.0	7
39	-2.15855	0.3900	0.6055	1	1	7.0	7
40		Dropped from Test					
41	-2.24878	0.8473	1.3900	1	1	1.0	7
42	-2.38090	3.2231	3.0171	1	1	5.0	7
43	-2.06081	6.6790	2.9192	1	1	7.0	7
44	-1.86638	49.833	17.733	1	1	7.0	7
45	2.21812	115.10	178.32	1	1	1.0	7
46	-2.36265	3.4113	4.0954	1	1	6.0	7
47	-1.24321	36.101	127.86	1	1	0.0	7
48	-3.55937	27.033	182.64	1	1	4.0	7
49	-2.15614	43.634	26.739	1	1	4.0	7
50	-2.27614	0.8713	4.2595	1	1	0.0	7
51	0.16313	1.2275	117.63	1	1	2.0	7
52		Dropped from Test					
53	-3.69632	3.3708	4.6170	1	1	7.0	7
54	-1.81676	5846.3	61941.	1	1	7.0	7
55		Dropped from Test					
56		Dropped from Test					
57	-1.04955	2.3613	23.898	1	1	7.0	7
58	-1.88074	4.4367	3.6124	1	1	7.0	7
59	-2.55562	5.5491	3.8859	1	1	7.0	7
60	-2.52909	2.4712	4.6883	1	1	1.0	7
61	-2.67066	0.6439	3.0693	1	1	5.0	7
62	-3.27999	3.2563	3.3559	1	1	7.0	7
63	-3.04830	72.747	262.83	1	1	2.0	7
64	-3.04772	3.7746	5.3649	1	1	5.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.96413	-42.950	1.989	-0.703	1.003		364

Null Hypothesis: Unit root (common unit root process)
Series: D(EPS)
Date: 09/23/18 Time: 14:38
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 385
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-16.6267	0.0000

Unit Root Test Continued

** Probabilities are computed assuming asympotic normality

Intermediate results on D(EPS)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-2.45674	3.E+07	3.E+07	1	1	7.0	7
2	-1.75450	74929.	173412	1	1	7.0	7
3	-3.41266	8.E+08	8.E+08	1	1	7.0	7
4	-2.08469	1.E+07	4.E+06	1	1	7.0	7
5	-1.28439	879095	9.E+07	1	1	4.0	7
6	-2.06521	8.E+08	2.E+09	1	1	7.0	7
7	-1.37055	460.75	1416.9	1	1	1.0	7
8	-1.39561	1023.8	792.71	1	1	1.0	7
9	-1.66757	491.47	738.36	1	1	2.0	7
10	-1.44465	133.42	52.488	1	1	7.0	7
11	-1.99039	88245.	28667.	1	1	7.0	7
12	-2.03367	205978	113227	1	1	4.0	7
13		Dropped from Test					
14	-1.69599	87.697	30.222	1	1	6.0	7
15	-1.27203	1051.5	5805.1	1	1	3.0	7
16		Dropped from Test					
17	-1.88125	4.E+07	2.E+07	1	1	5.0	7
18		Dropped from Test					
19	-2.20237	9.E+06	3.E+06	1	1	7.0	7
20	-2.43700	91.638	106.11	1	1	6.0	7
21		Dropped from Test					
22	-2.46337	74407.	30391.	1	1	7.0	7
23		Dropped from Test					
24	-3.03321	1387.5	2747.5	1	1	2.0	7
25	-2.39152	4561.8	33825.	1	1	7.0	7
26	-2.11875	2.E+06	2.E+06	1	1	7.0	7
27	-3.83982	9119.9	11590.	1	1	6.0	7
28	-3.36873	11097.	21246.	1	1	5.0	7
29	-0.93766	12153.	3136.7	1	1	7.0	7
30	-2.12625	9.E+07	3.E+07	1	1	7.0	7
31	-3.12761	2.E+06	2.E+06	1	1	7.0	7
32	-1.36452	14687.	7331.4	1	1	7.0	7
33	-0.93412	12080.	3115.4	1	1	7.0	7
34	-0.64214	3507.0	1383.5	1	1	6.0	7
35	-1.27734	1033.0	752.26	1	1	1.0	7
36	-1.27734	1033.0	752.26	1	1	1.0	7
37	-1.41170	1021.8	800.88	1	1	1.0	7
38	-2.15120	132577	75443.	1	1	7.0	7
39	-1.10529	3569.0	1243.3	1	1	5.0	7
40		Dropped from Test					
41	-1.29322	5.9603	38.297	1	1	1.0	7
42	-2.53906	173.36	128.35	1	1	5.0	7
43	-2.96647	167.49	105.99	1	1	7.0	7
44	-1.59844	2843.9	808.55	1	1	7.0	7
45	-2.20063	615.18	238.03	1	1	7.0	7
46	-1.70116	793.96	1119.6	1	1	4.0	7
47	-1.46405	135087	430922	1	1	0.0	7
48	-2.21138	984023	863700	1	1	1.0	7
49	-2.00011	436.53	177.95	1	1	6.0	7
50		Dropped from Test					
51	-4.28584	26548.	40248.	1	1	7.0	7
52		Dropped from Test					
53	-2.71925	1.2548	2.7279	1	1	6.0	7
54	-2.56524	1762.1	1133.5	1	1	6.0	7
55		Dropped from Test					

Unit Root Test Continued

56	-1.75184	9.5952	29.054	1	1	0.0	7
57	-1.21718	0.7123	0.4303	1	1	7.0	7
58	-1.67608	325.54	90.170	1	1	7.0	7
59	-1.98961	165700	2.E+06	1	1	0.0	7
60	-1.79063	400893	597893	1	1	0.0	7
61	-1.66801	4.E+07	2.E+07	1	1	4.0	7
62	-2.13052	916700	341785	1	1	7.0	7
63	-1.72364	15.173	6.7251	1	1	6.0	7
64	-2.39041	14.890	48.968	1	1	6.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.72760	-30.570	1.171	-0.703	1.003		385

Null Hypothesis: Unit root (common unit root process)
Series: D(ROE)
Date: 09/23/18 Time: 14:39
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 371
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 8.71517	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(ROE)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.52852	7.6625	22.216	1	1	7.0	7
2	-1.93777	436.52	277.75	1	1	5.0	7
3	-1.52753	51.910	18.472	1	1	7.0	7
4		Dropped from Test					
5	-0.94150	0.2227	150.88	1	1	3.0	7
6	-1.70945	40.191	172.26	1	1	7.0	7
7	-2.95346	26.740	418.82	1	1	0.0	7
8	-2.17431	18.807	10.207	1	1	6.0	7
9	-2.38476	20.703	27.381	1	1	5.0	7
10	-23.0894	112.14	7110.4	1	1	5.0	7
11	-2.85252	5830.6	3632.3	1	1	7.0	7
12	-2.00057	650.16	214.88	1	1	7.0	7
13		Dropped from Test					
14	-1.65840	336.84	84.950	1	1	6.0	7
15	-1.78576	95538.	35747.	1	1	7.0	7
16		Dropped from Test					
17	-0.82507	101.30	111.71	1	1	2.0	7
18		Dropped from Test					
19	-3.47089	4.6026	4.7609	1	1	7.0	7
20	-1.82998	14.809	4.1798	1	1	7.0	7
21		Dropped from Test					
22	-2.32173	21.385	14.711	1	1	4.0	7
23		Dropped from Test					
24	-4.32820	3.3983	10.204	1	1	7.0	7
25	-1.56431	5.0931	401.56	1	1	2.0	7
26	-2.10429	79.034	61.552	1	1	7.0	7
27	4.78947	0.0980	0.1159	1	1	6.0	7
28	-2.56356	31.346	62.710	1	1	1.0	7

Unit Root Test Continued

29		Dropped from Test					
30	-1.93654	1.1702	3.8643	1	1	1.0	7
31	-1.98677	98.995	102.80	1	1	7.0	7
32	-2.39113	36.557	10.627	1	1	7.0	7
33	-1.85822	17.596	6.6465	1	1	6.0	7
34	-1.99334	129.01	51.427	1	1	7.0	7
35	-1.65033	302.24	85.731	1	1	7.0	7
36	-1.66575	0.4298	1.3769	1	1	0.0	7
37	-2.09330	19.418	6.7558	1	1	7.0	7
38	-2.70715	62.946	32.084	1	1	7.0	7
39	-2.10941	1.5925	5.4906	1	1	7.0	7
40		Dropped from Test					
41	-2.19865	4.3209	23.271	1	1	0.0	7
42	-2.37546	13.553	14.231	1	1	5.0	7
43	-1.84488	25.236	8.0875	1	1	7.0	7
44	-1.99334	129.01	51.427	1	1	7.0	7
45	3.16549	152.70	513.60	1	1	1.0	7
46	-2.35625	17.418	16.108	1	1	7.0	7
47	-1.30327	175.37	42.274	1	1	7.0	7
48	-6.06855	24.301	1671.5	1	1	3.0	7
49	-2.06310	79.453	101.36	1	1	1.0	7
50	-2.19865	4.3209	23.271	1	1	0.0	7
51	-1.00371	69.875	255.92	1	1	3.0	7
52		Dropped from Test					
53	-2.46444	65.830	58.239	1	1	7.0	7
54	-2.57119	525.89	371.85	1	1	6.0	7
55		Dropped from Test					
56		Dropped from Test					
57	-1.18605	8.4766	137.15	1	1	7.0	7
58	-2.15586	35.609	27.868	1	1	7.0	7
59	-2.86449	17.044	19.384	1	1	7.0	7
60	-2.24205	11.758	26.257	1	1	2.0	7
61	-2.70468	4.0039	11.338	1	1	5.0	7
62	-1.97843	32.986	12.306	1	1	7.0	7
63	-3.58116	320.19	1210.8	1	1	2.0	7
64	-2.85575	11.807	10.397	1	1	6.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.58035	-19.786	1.987	-0.703	1.003		371

Null Hypothesis: Unit root (common unit root process)
Series: D(WMC)
Date: 09/23/18 Time: 14:39
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 412
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	- 18.3777	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(WMC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.74393	47211.	23341.	1	1	6.0	7

Unit Root Test Continued

2	-1.84498	23706.	15530.	1	1	3.0	7
3	-1.79619	2805.9	9520.1	1	1	7.0	7
4	-1.06452	199868	238101	1	1	1.0	7
5	-1.19351	36533.	41853.	1	1	7.0	7
6	-1.39644	3244.0	20272.	1	1	6.0	7
7	-2.25872	50767.	160640	1	1	2.0	7
8	-2.08685	12061.	6399.4	1	1	5.0	7
9	-0.95589	258.61	1143.8	1	1	0.0	7
10	-2.17672	359.87	275.12	1	1	5.0	7
11	-3.00752	6446.8	5802.6	1	1	7.0	7
12		Dropped from Test					
13	-2.21897	662.07	558.75	1	1	2.0	7
14	-2.08120	1677.4	1709.2	1	1	7.0	7
15	-1.58203	5443.7	3910.0	1	1	5.0	7
16	-2.73799	15441.	9378.8	1	1	5.0	7
17	-1.41119	6486.6	5475.9	1	1	4.0	7
18	-1.40263	140097	674603	1	1	0.0	7
19	-1.55212	6621.0	26736.	1	1	0.0	7
20	-1.63221	3817.4	3212.5	1	1	7.0	7
21	-3.10161	18993.	17084.	1	1	7.0	7
22	-1.42563	12131.	2141.5	1	1	7.0	7
23	-1.95394	142.45	387.55	1	1	7.0	7
24	-1.25062	42960.	23300.	1	1	7.0	7
25	-1.20701	2957.6	22632.	1	1	2.0	7
26	-2.29254	935.24	934.46	1	1	5.0	7
27	-0.64526	35228.	29165.	1	1	7.0	7
28	-0.91251	2363.4	2534.6	1	1	7.0	7
29	-2.68318	460.91	6173.4	1	1	1.0	7
30	-2.08298	31655.	14719.	1	1	7.0	7
31	-0.77803	1986.4	5817.3	1	1	0.0	7
32	-2.24446	4572.7	7069.6	1	1	7.0	7
33	-1.93787	40617.	14765.	1	1	7.0	7
34	-2.73002	180.62	216.68	1	1	3.0	7
35	-2.11886	1595.6	1810.0	1	1	6.0	7
36	-1.99847	4450.0	6022.9	1	1	1.0	7
37	-1.39016	96816.	48929.	1	1	7.0	7
38	-2.18480	3050.8	1388.0	1	1	7.0	7
39	-2.05534	376.42	1898.1	1	1	7.0	7
40	-1.95394	142.45	387.55	1	1	7.0	7
41	-2.04707	0.1228	0.0539	1	1	7.0	7
42		Dropped from Test					
43	-1.06017	0.1087	0.2145	1	1	1.0	7
44	-2.13289	0.0625	0.0399	1	1	6.0	7
45	-2.49174	0.1967	0.5853	1	1	2.0	7
46		Dropped from Test					
47	-4.49121	1.4721	1.3654	1	1	7.0	7
48	-2.92300	0.4051	0.7280	1	1	6.0	7
49	-2.42600	0.2209	0.1592	1	1	5.0	7
50		Dropped from Test					
51	-1.02415	0.3306	0.0990	1	1	4.0	7
52	-1.71556	0.0859	0.1973	1	1	2.0	7
53	-1.95911	0.1817	0.0957	1	1	7.0	7
54	-0.79224	0.0659	0.0860	1	1	3.0	7
55	-1.20155	0.0697	0.1721	1	1	2.0	7
56	-2.03743	0.9872	0.4152	1	1	7.0	7
57		Dropped from Test					
58	116.306	4133.6	4573.0	1	1	2.0	7
59	-2.51304	19209.	44636.	1	1	2.0	7
60	-1.11432	17071.	51456.	1	1	1.0	7
61	3.39851	65636.	54828.	1	1	2.0	7
62	-1.92271	73801.	25312.	1	1	7.0	7
63	-2.23077	0.0124	0.0069	1	1	6.0	7

Unit Root Test Continued

64	-2.15493	0.0047	0.0030	1	1	4.0	6

	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled	-1.69601	-31.130	1.136	-0.703	1.003	412

Null Hypothesis: Unit root (common unit root process)
Series: D(CDC)
Date: 09/23/18 Time: 14:40
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 413
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-18.5483	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(CDC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-0.27680	1.E+06	1.E+06	1	1	1.0	7
2	-2.97582	26680.	24626.	1	1	7.0	7
3	-1.69793	3951.7	10489.	1	1	1.0	7
4	-1.43372	235242	102924	1	1	5.0	7
5	-1.55075	19117.	82084.	1	1	7.0	7
6	-1.40008	1197.4	20169.	1	1	7.0	7
7		Dropped from Test					
8	-1.24683	130.48	123.44	1	1	1.0	7
9	-1.27029	855.14	1584.7	1	1	1.0	7
10		Dropped from Test					
11	-1.88344	5631.5	36113.	1	1	7.0	7
12	-2.44641	62.629	115.30	1	1	1.0	7
13	-2.77690	622.68	474.43	1	1	7.0	7
14	-0.93004	1421.5	480.20	1	1	6.0	7
15	-1.33112	1466.3	476.44	1	1	7.0	7
16	-3.02290	24333.	13097.	1	1	7.0	7
17	-0.26274	971.14	243.07	1	1	7.0	7
18	-2.28676	27071.	49149.	1	1	3.0	7
19	-1.87602	36207.	12204.	1	1	7.0	7
20	-1.84093	4252.5	6118.6	1	1	6.0	7
21	-1.74438	5663.2	14946.	1	1	7.0	7
22	-1.42400	394507	2.E+06	1	1	1.0	7
23	-1.29240	673.09	208.79	1	1	7.0	7
24	-1.72632	86.273	53.029	1	1	7.0	7
25	-1.19144	10485.	5586.3	1	1	7.0	7
26	-1.15706	5822.7	2031.0	1	1	7.0	7
27	-2.40926	64.805	31.821	1	1	7.0	7
28	-2.51099	24.887	52.133	1	1	1.0	7
29	-1.33218	6052.5	25017.	1	1	0.0	7
30	-2.74009	55408.	92963.	1	1	1.0	7
31	-1.07139	440788	418209	1	1	1.0	7
32	-1.42563	12131.	2141.5	1	1	7.0	7
33	-1.53076	1565.2	1612.1	1	1	2.0	7
34	-1.25062	42960.	23300.	1	1	7.0	7

Unit Root Test Continued

35	-0.45917	8063.2	24591.	1	1	2.0	7
36	-1.20701	2957.6	22632.	1	1	2.0	7
37	-2.29254	935.24	934.46	1	1	5.0	7
38	-1.77275	128373	76839.	1	1	7.0	7
39	-0.95123	2964.7	2422.6	1	1	7.0	7
40	Dropped from Test						
41	-4.29225	0.0966	0.2227	1	1	7.0	7
42	-4.09862	0.8143	1.9789	1	1	2.0	7
43	-1.46661	0.0279	0.2512	1	1	2.0	7
44	-1.93219	0.1621	0.1946	1	1	6.0	7
45	-3.61845	0.0832	0.1780	1	1	1.0	7
46	-4.53343	3.5435	19.568	1	1	6.0	7
47	-1.45895	50.120	19.267	1	1	5.0	7
48	-2.56475	48.205	187.81	1	1	6.0	7
49	-2.92991	0.1720	0.1494	1	1	7.0	7
50	Dropped from Test						
51	-2.64342	4905.3	2675.0	1	1	7.0	7
52	-2.67374	15.254	11.890	1	1	5.0	7
53	-2.32851	9.2592	15.092	1	1	1.0	7
54	-4.93622	2.3318	5.3836	1	1	7.0	7
55	-2.34260	21.654	26.910	1	1	7.0	7
56	-2.03743	0.9872	0.4152	1	1	7.0	7
57	Dropped from Test						
58	-2.47964	133.42	126.26	1	1	5.0	7
59	-0.98615	14634.	12172.	1	1	7.0	7
60	-0.71419	5746.0	15262.	1	1	0.0	7
61	-2.80549	21567.	14751.	1	1	6.0	7
62	-2.76366	58369.	28233.	1	1	4.0	7
63	-2.00000	0.0235	0.0100	1	1	7.0	7
64	-3.88104	0.0009	0.0039	1	1	7.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.63793	-29.450	1.365	-0.703	1.003		413

Null Hypothesis: Unit root (common unit root process)
Series: D(EHSC)
Date: 09/23/18 Time: 14:41
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 420
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-12.6218	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate results on D(EHSC)

Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Band-width	Obs
1	-1.08481	79957.	96789.	1	1	3.0	7
2	-1.90436	746.53	430.96	1	1	6.0	7
3	-2.13242	349.30	328.86	1	1	6.0	7
4	-2.37005	152.20	1174.3	1	1	7.0	7
5	-1.75725	32770.	80658.	1	1	7.0	7
6	-2.15473	2874.2	8010.9	1	1	7.0	7
7	-1.35770	36032.	101848	1	1	2.0	7

Unit Root Test Continued

8	-2.15127	1797.5	3684.2	1	1	2.0	7
9	0.33276	46.375	172.19	1	1	1.0	7
10	-3.72841	10.162	21.198	1	1	7.0	7
11	-1.54084	977.24	721.12	1	1	4.0	7
12	-1.87602	36207.	12204.	1	1	7.0	7
13	-1.43376	255.76	119.16	1	1	7.0	7
14	-2.07966	697.96	441.46	1	1	7.0	7
15	-1.79424	6383.9	5099.9	1	1	7.0	7
16	-2.19637	257.76	721.93	1	1	3.0	7
17	-2.42834	3080.1	814.23	1	1	7.0	7
18	-1.40263	140097	674603	1	1	0.0	7
19	-0.80568	897.32	1918.0	1	1	2.0	7
20		Dropped from Test					
21	-3.93352	481.44	5834.8	1	1	3.0	7
22	-2.22220	1773.6	125797	1	1	2.0	7
23	-1.58203	5443.7	3910.0	1	1	5.0	7
24	-2.73799	15441.	9378.8	1	1	5.0	7
25	-2.40932	203.72	1543.9	1	1	5.0	7
26	-2.35884	1728.2	883.12	1	1	7.0	7
27	-1.55212	6621.0	26736.	1	1	0.0	7
28	-1.75578	2020.2	3508.4	1	1	7.0	7
29	-3.34283	500.45	584.05	1	1	6.0	7
30	-1.42451	12131.	2141.2	1	1	7.0	7
31	-1.29240	673.09	208.79	1	1	7.0	7
32	-1.76898	35.970	28.069	1	1	6.0	7
33	-1.31259	2983.7	9576.3	1	1	0.0	7
34	-2.73799	15441.	9378.8	1	1	5.0	7
35	-2.16996	1146.0	894.98	1	1	5.0	7
36	-1.34129	6016.6	25013.	1	1	0.0	7
37	-1.28959	7701.9	2632.1	1	1	5.0	7
38	-3.60872	2446.3	3735.5	1	1	4.0	7
39	-1.42563	12131.	2141.5	1	1	7.0	7
40	-2.11903	87.023	178.02	1	1	1.0	7
41	-2.53474	42.348	47.660	1	1	3.0	7
42		Dropped from Test					
43	-4.49121	1.4721	1.3654	1	1	7.0	7
44	-3.24465	6.8074	115.83	1	1	1.0	7
45	-2.53474	42.348	47.660	1	1	3.0	7
46	-10.3158	0.4252	0.6298	1	1	6.0	7
47	-4.49121	1.4721	1.3654	1	1	7.0	7
48	-1.80148	5.8968	13.252	1	1	1.0	7
49	-0.84948	11.681	116.89	1	1	1.0	7
50		Dropped from Test					
51	-0.74517	0.1296	5.7206	1	1	5.0	7
52	-2.67374	15.254	11.890	1	1	5.0	7
53	-2.32851	9.2592	15.092	1	1	1.0	7
54	-4.93622	2.3318	5.3836	1	1	7.0	7
55	-1.77472	0.8204	0.4553	1	1	7.0	7
56		Dropped from Test					
57	-2.47964	1.3342	1.2626	1	1	5.0	7
58	-1.20270	2.3519	1.7629	1	1	6.0	7
59	-2.80549	21567.	14751.	1	1	6.0	7
60	-1.62619	36266.	29282.	1	1	1.0	7
61	-0.73702	5783.7	12586.	1	1	1.0	7
62	-2.76366	58369.	28233.	1	1	4.0	7
63	-0.97054	0.0016	0.0109	1	1	0.0	7
64	-2.91803	0.0248	0.0691	1	1	2.0	7

	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-1.57473	-26.262	1.417	-0.703	1.003		420

Unit Root Test Continued

Breitung Unit Root Testat Level: Individual Intercept and Trend

Null Hypothesis: Unit root (common unit root process)
Series: ROCE
Date: 09/23/18 Time: 14:44
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 371
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Breitung t-stat	3.57297	0.9998

** Probabilities are computed assuming asympotic normality

Intermediate regression results on ROCE

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	3.07235	1	1	8
2	18.5915	1	1	8
3	3.74314	1	1	8
4		Dropped from Test		
5	3.93464	1	1	8
6	7.92658	1	1	8
7	5.73642	1	1	8
8	4.08905	1	1	8
9	5.15831	1	1	8
10	28.4717	1	1	8
11	56.8774	1	1	8
12	21.3318	1	1	8
13		Dropped from Test		
14	18.4409	1	1	8
15	225.834	1	1	8
16		Dropped from Test		
17	7.24668	1	1	8
18		Dropped from Test		
19	2.93794	1	1	8
20	3.45854	1	1	8
21		Dropped from Test		
22	5.15977	1	1	8
23		Dropped from Test		
24	1.40347	1	1	8
25	4.55948	1	1	8
26	8.80018	1	1	8
27	0.19365	1	1	8
28	3.54360	1	1	8
29		Dropped from Test		
30	1.44583	1	1	8
31	10.9747	1	1	8
32	3.21367	1	1	8
33	3.52988	1	1	8
34	8.93387	1	1	8
35	7.54783	1	1	8
36	0.48288	1	1	8
37	1.54256	1	1	8
38	6.48012	1	1	8
39	1.34712	1	1	8
40		Dropped from Test		
41	1.15773	1	1	8
42	3.34382	1	1	8

Unit Root Test Continued

43	2.74221	1	1	8
44	7.59611	1	1	8
45	14.8558	1	1	8
46	4.16233	1	1	8
47	7.19158	1	1	8
48	17.3233	1	1	8
49	7.20336	1	1	8
50	1.18899	1	1	8
51	4.91333	1	1	8
52		Dropped from Test		
53	2.95550	1	1	8
54	452.783	1	1	8
55		Dropped from Test		
56		Dropped from Test		
57	6.67014	1	1	8
58	2.95958	1	1	8
59	2.83081	1	1	8
60	2.12108	1	1	8
61	2.69817	1	1	8
62	2.41711	1	1	8
63	13.5619	1	1	8
64	3.36957	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.12964	3.573	0.036	371

Null Hypothesis: Unit root (common unit root process)
Series: EPS
Date: 09/23/18 Time: 14:47
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 385
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Breitung t-stat	0.51427	0.6965

** Probabilities are computed assuming asympotic normality

Intermediate regression results on EPS

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	7406.84	1	1	8
2	779.158	1	1	8
3	37436.6	1	1	8
4	3854.65	1	1	8
5	7087.95	1	1	8
6	98765.5	1	1	8
7	21.7345	1	1	8
8	32.3542	1	1	8
9	25.1613	1	1	8
10	16.2929	1	1	8
11	318.436	1	1	8
12	480.443	1	1	8
13		Dropped from Test		
14	11.0964	1	1	8
15	128.403	1	1	8
16		Dropped from Test		

Unit Root Test Continued

17	7870.21	1	1	8
18		Dropped from Test		
19	3366.64	1	1	8
20	17.9918	1	1	8
21		Dropped from Test		
22	324.749	1	1	8
23		Dropped from Test		
24	39.5002	1	1	8
25	136.741	1	1	8
26	1768.16	1	1	8
27	99.5126	1	1	8
28	189.453	1	1	8
29	144.859	1	1	8
30	10555.3	1	1	8
31	1670.64	1	1	8
32	152.208	1	1	8
33	144.509	1	1	8
34	74.4205	1	1	8
35	32.3109	1	1	8
36	32.3109	1	1	8
37	32.3615	1	1	8
38	543.223	1	1	8
39	70.3190	1	1	8
40		Dropped from Test		
41	2.88658	1	1	8
42	21.5703	1	1	8
43	15.1860	1	1	8
44	61.6137	1	1	8
45	27.2424	1	1	8
46	46.4894	1	1	8
47	405.975	1	1	8
48	1023.54	1	1	8
49	25.5985	1	1	8
50		Dropped from Test		
51	394.528	1	1	8
52		Dropped from Test		
53	3.28807	1	1	8
54	57.3487	1	1	8
55		Dropped from Test		
56	3.19674	1	1	8
57	1.44404	1	1	8
58	19.9363	1	1	8
59	905.584	1	1	8
60	711.722	1	1	8
61	6695.71	1	1	8
62	1113.73	1	1	8
63	5.26205	1	1	8
64	11.9916	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.02344	0.514	0.046	385

Null Hypothesis: Unit root (common unit root process)
Series: ROE
Date: 09/23/18 Time: 14:48
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 371
Cross-sections included: 53 (11 dropped)

Unit Root Test Continued

Method	Statistic	Prob.**
Breitung t-stat	4.34843	1.0000

** Probabilities are computed assuming asympotic normality

Intermediate regression results on ROE

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	5.18079	1	1	8
2	28.3129	1	1	8
3	8.45891	1	1	8
4		Dropped from Test		
5	6.15097	1	1	8
6	13.1263	1	1	8
7	6.48311	1	1	8
8	5.76836	1	1	8
9	8.18963	1	1	8
10	75.0670	1	1	8
11	97.0790	1	1	8
12	28.4909	1	1	8
13		Dropped from Test		
14	19.9330	1	1	8
15	383.076	1	1	8
16		Dropped from Test		
17	12.3765	1	1	8
18		Dropped from Test		
19	3.03262	1	1	8
20	3.96833	1	1	8
21		Dropped from Test		
22	5.08755	1	1	8
23		Dropped from Test		
24	2.07663	1	1	8
25	7.41113	1	1	8
26	15.1932	1	1	8
27	0.33197	1	1	8
28	6.02847	1	1	8
29		Dropped from Test		
30	1.71592	1	1	8
31	14.8203	1	1	8
32	6.76953	1	1	8
33	5.03488	1	1	8
34	13.2986	1	1	8
35	18.7328	1	1	8
36	0.89812	1	1	8
37	4.78629	1	1	8
38	9.38308	1	1	8
39	4.07760	1	1	8
40		Dropped from Test		
41	2.72469	1	1	8
42	6.25079	1	1	8
43	5.41677	1	1	8
44	13.2986	1	1	8
45	24.4437	1	1	8
46	8.09220	1	1	8
47	15.4102	1	1	8
48	36.8677	1	1	8
49	9.52909	1	1	8
50	2.72469	1	1	8
51	11.3026	1	1	8
52		Dropped from Test		

Unit Root Test Continued

53	9.92796	1	1	8
54	31.0633	1	1	8
55		Dropped from Test		
56		Dropped from Test		
57	12.6577	1	1	8
58	8.39124	1	1	8
59	5.73642	1	1	8
60	4.08905	1	1	8
61	5.15831	1	1	8
62	6.64123	1	1	8
63	28.2157	1	1	8
64	5.05258	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.14879	4.348	0.034	371

Null Hypothesis: Unit root (common unit root process)
Series: WMC
Date: 09/23/18 Time: 14:49
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total number of observations: 412
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**
Breitung t-stat	0.94098	0.8266

** Probabilities are computed assuming asympotic normality

Intermediate regression results on WMC

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	296.503	1	1	8
2	159.770	1	1	8
3	213.692	1	1	8
4	488.151	1	1	8
5	361.726	1	1	8
6	278.313	1	1	8
7	336.507	1	1	8
8	135.828	1	1	8
9	17.1053	1	1	8
10	29.0242	1	1	8
11	133.261	1	1	8
12		Dropped from Test		
13	26.8412	1	1	8
14	74.5159	1	1	8
15	113.099	1	1	8
16	161.635	1	1	8
17	101.072	1	1	8
18	403.814	1	1	8
19	90.8753	1	1	8
20	113.437	1	1	8
21	182.119	1	1	8
22	119.516	1	1	8
23	31.4730	1	1	8
24	302.439	1	1	8
25	172.779	1	1	8
26	62.8851	1	1	8

Unit Root Test Continued

27	384.660	1	1	8
28	104.592	1	1	8
29	26.2035	1	1	8
30	215.691	1	1	8
31	51.3225	1	1	8
32	103.025	1	1	8
33	236.353	1	1	8
34	14.9398	1	1	8
35	62.7443	1	1	8
36	70.5240	1	1	8
37	331.226	1	1	8
38	74.3387	1	1	8
39	31.9643	1	1	8
40	31.4730	1	1	8
41	0.48428	1	1	8
42		Dropped from Test		
43	0.39081	1	1	8
44	0.37454	1	1	8
45	0.55561	1	1	8
46		Dropped from Test		
47	1.61816	1	1	8
48	1.35319	1	1	8
49	0.64051	1	1	8
50		Dropped from Test		
51	0.60350	1	1	8
52	0.31921	1	1	8
53	0.56540	1	1	8
54	0.30624	1	1	8
55	0.29288	1	1	8
56	1.24945	1	1	8
57		Dropped from Test		
58	76.3723	1	1	8
59	154.037	1	1	8
60	178.307	1	1	8
61	271.116	1	1	8
62	302.559	1	1	8
63	0.14246	1	1	8
64	0.07368	1	1	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.04656	0.941	0.049	412

Null Hypothesis: Unit root (common unit root process)
Series: CDC
Date: 09/23/18 Time: 14:49
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 420
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-0.14065	0.4441

** Probabilities are computed assuming asympotic normality

Intermediate regression results on CDC

Cross section	S.E. of Regression	Lag	Max Lag	Obs

Unit Root Test Continued

1	1256.77	1	1	8
2	202.976	1	1	8
3	80.8353	1	1	8
4	500.848	1	1	8
5	471.945	1	1	8
6	296.997	1	1	8
7		Dropped from Test		
8	11.6075	1	1	8
9	38.7631	1	1	8
10	8.49854	1	1	8
11	117.141	1	1	8
12	9.16053	1	1	8
13	33.8253	1	1	8
14	53.3647	1	1	8
15	40.0530	1	1	8
16	207.489	1	1	8
17	39.7567	1	1	8
18	188.563	1	1	8
19	221.838	1	1	8
20	153.254	1	1	8
21	231.385	1	1	8
22	1299.49	1	1	8
23	27.9645	1	1	8
24	15.5155	1	1	8
25	142.545	1	1	8
26	100.390	1	1	8
27	9.87161	1	1	8
28	5.45861	1	1	8
29	82.3258	1	1	8
30	265.200	1	1	8
31	741.216	1	1	8
32	119.516	1	1	8
33	42.6761	1	1	8
34	302.439	1	1	8
35	160.665	1	1	8
36	172.779	1	1	8
37	62.8851	1	1	8
38	396.766	1	1	8
39	102.052	1	1	8
40		Dropped from Test		
41	0.65400	1	1	8
42	0.98751	1	1	8
43	0.51805	1	1	8
44	0.45158	1	1	8
45	0.35626	1	1	8
46	7.64732	1	1	8
47	7.44293	1	1	8
48	15.8010	1	1	8
49	0.47633	1	1	8
50		Dropped from Test		
51	77.7528	1	1	8
52	5.30773	1	1	8
53	3.44486	1	1	8
54	4.29371	1	1	8
55	7.70703	1	1	8
56	1.24945	1	1	8
57		Dropped from Test		
58	16.9091	1	1	8
59	261.799	1	1	8
60	98.2890	1	1	8
61	211.560	1	1	8
62	303.805	1	1	8

Unit Root Test Continued

63	0.19331	1	1	8
64	0.08689	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.00668	-0.141	0.047	420

Null Hypothesis: Unit root (common unit root process)
Series: EHSC
Date: 09/23/18 Time: 14:50
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total number of observations: 425
Cross-sections included: 61 (3 dropped)

Method	Statistic	Prob.**
Breitung t-stat	6.52365	1.0000

** Probabilities are computed assuming asympotic normality

Intermediate regression results on EHSC

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	337.305	1	1	8
2	35.9769	1	1	8
3	23.5458	1	1	8
4	59.8262	1	1	8
5	441.552	1	1	8
6	166.694	1	1	8
7	312.354	1	1	8
8	44.9070	1	1	8
9	14.3640	1	1	8
10	6.58135	1	1	8
11	37.4076	1	1	8
12	221.838	1	1	8
13	20.9820	1	1	8
14	36.8168	1	1	8
15	129.768	1	1	8
16	18.5101	1	1	8
17	60.1624	1	1	8
18	403.814	1	1	8
19	32.7645	1	1	8
20	37.7516	1	1	6
21	35.2652	1	1	8
22	152.290	1	1	8
23	113.099	1	1	8
24	161.635	1	1	8
25	60.5581	1	1	8
26	54.5836	1	1	8
27	90.8753	1	1	8
28	93.1604	1	1	8
29	28.3412	1	1	8
30	119.507	1	1	8
31	27.9645	1	1	8
32	8.13611	1	1	8
33	91.2839	1	1	8
34	161.635	1	1	8
35	54.6988	1	1	8
36	82.1728	1	1	8

Unit Root Test Continued

37	98.4831	1	1	8
38	69.8786	1	1	8
39	119.516	1	1	8
40	9.48578	1	1	8
41	8.33731	1	1	8
42		Dropped from Test		
43	1.61816	1	1	8
44	5.93477	1	1	8
45	8.33731	1	1	8
46	0.69160	1	1	8
47	1.61816	1	1	8
48	3.25804	1	1	8
49	7.53767	1	1	8
50		Dropped from Test		
51	3.34994	1	1	8
52	5.30773	1	1	8
53	3.44486	1	1	8
54	4.29371	1	1	8
55	1.29661	1	1	8
56		Dropped from Test		
57	1.69091	1	1	8
58	2.88378	1	1	8
59	211.560	1	1	8
60	192.875	1	1	8
61	108.812	1	1	8
62	303.805	1	1	8
63	0.07868	1	1	8
64	0.26908	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.22805	6.524	0.035	425

Breitung Testat First Difference: Individual Intercept and Trend

Null Hypothesis: Unit root (common unit root process)
Series: ROCE
Date: 09/23/18 Time: 14:51
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 371
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Breitung t-stat	3.57297	0.9998

** Probabilities are computed assuming asympotic normality

Intermediate regression results on ROCE

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	3.07235	1	1	8
2	18.5915	1	1	8
3	3.74314	1	1	8
4		Dropped from Test		
5	3.93464	1	1	8
6	7.92658	1	1	8
7	5.73642	1	1	8
8	4.08905	1	1	8
9	5.15831	1	1	8
10	28.4717	1	1	8

Unit Root Test Continued

11	56.8774	1	1	8
12	21.3318	1	1	8
13		Dropped from Test		
14	18.4409	1	1	8
15	225.834	1	1	8
16		Dropped from Test		
17	7.24668	1	1	8
18		Dropped from Test		
19	2.93794	1	1	8
20	3.45854	1	1	8
21		Dropped from Test		
22	5.15977	1	1	8
23		Dropped from Test		
24	1.40347	1	1	8
25	4.55948	1	1	8
26	8.80018	1	1	8
27	0.19365	1	1	8
28	3.54360	1	1	8
29		Dropped from Test		
30	1.44583	1	1	8
31	10.9747	1	1	8
32	3.21367	1	1	8
33	3.52988	1	1	8
34	8.93387	1	1	8
35	7.54783	1	1	8
36	0.48288	1	1	8
37	1.54256	1	1	8
38	6.48012	1	1	8
39	1.34712	1	1	8
40		Dropped from Test		
41	1.15773	1	1	8
42	3.34382	1	1	8
43	2.74221	1	1	8
44	7.59611	1	1	8
45	14.8558	1	1	8
46	4.16233	1	1	8
47	7.19158	1	1	8
48	17.3233	1	1	8
49	7.20336	1	1	8
50	1.18899	1	1	8
51	4.91333	1	1	8
52		Dropped from Test		
53	2.95550	1	1	8
54	452.783	1	1	8
55		Dropped from Test		
56		Dropped from Test		
57	6.67014	1	1	8
58	2.95958	1	1	8
59	2.83081	1	1	8
60	2.12108	1	1	8
61	2.69817	1	1	8
62	2.41711	1	1	8
63	13.5619	1	1	8
64	3.36957	1	1	8

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.12964	3.573	0.036	371

Null Hypothesis: Unit root (common unit root process)
Series: D(EPS)

Unit Root Test Continued

Date: 09/23/18 Time: 14:52
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 330
Cross-sections included: 55 (9 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-0.01767	0.4929

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(EPS)

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	12604.6	1	1	7
2	915.244	1	1	7
3	52628.6	1	1	7
4	6259.21	1	1	7
5	5235.58	1	1	7
6	147265.	1	1	7
7	29.5803	1	1	7
8	39.2829	1	1	7
9	33.7009	1	1	7
10	15.2428	1	1	7
11	509.184	1	1	7
12	755.003	1	1	7
13		Dropped from Test		
14	16.0187	1	1	7
15	121.870	1	1	7
16		Dropped from Test		
17	12148.1	1	1	7
18		Dropped from Test		
19	5539.54	1	1	7
20	26.6797	1	1	7
21		Dropped from Test		
22	461.580	1	1	7
23		Dropped from Test		
24	55.2545	1	1	7
25	201.385	1	1	7
26	2590.08	1	1	7
27	130.571	1	1	7
28	255.937	1	1	7
29	156.062	1	1	7
30	17213.1	1	1	7
31	2997.76	1	1	7
32	162.499	1	1	7
33	155.505	1	1	7
34	70.3934	1	1	7
35	38.2486	1	1	7
36	38.2486	1	1	7
37	39.4571	1	1	7
38	829.378	1	1	7
39	85.9645	1	1	7
40		Dropped from Test		
41	4.44952	1	1	7
42	30.7850	1	1	7
43	24.0226	1	1	7
44	89.8291	1	1	7
45	45.3701	1	1	7

Unit Root Test Continued

46	75.0926	1	1	7
47	560.975	1	1	7
48	1261.55	1	1	7
49	41.1495	1	1	7
50		Dropped from Test		
51	554.859	1	1	7
52		Dropped from Test		
53	4.99289	1	1	7
54	98.2547	1	1	7
55		Dropped from Test		
56	4.83744	1	1	7
57	1.69315	1	1	7
58	29.4134	1	1	7
59	1322.31	1	1	7
60	847.168	1	1	7
61	9758.44	1	1	7
62	1478.39	1	1	7
63	7.92669	1	1	7
64	18.1310	1	1	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.00141	-0.018	0.080	330

Null Hypothesis: Unit root (common unit root process)
Series: D(ROE)
Date: 09/23/18 Time: 14:53
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 318
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-9.08996	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(ROE)

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	6.40729	1	1	7
2	43.9623	1	1	7
3	11.1979	1	1	7
4		Dropped from Test		
5	3.30141	1	1	7
6	20.2051	1	1	7
7	11.9743	1	1	7
8	8.92664	1	1	7
9	13.7623	1	1	7
10	87.2400	1	1	7
11	162.789	1	1	7
12	45.9292	1	1	7
13		Dropped from Test		
14	25.5324	1	1	7
15	588.939	1	1	7
16		Dropped from Test		
17	12.2187	1	1	7
18		Dropped from Test		
19	4.85969	1	1	7

Unit Root Test Continued

20	6.01320	1	1	7
21		Dropped from Test		
22	8.61475	1	1	7
23		Dropped from Test		
24	3.18964	1	1	7
25	7.14914	1	1	7
26	23.1681	1	1	7
27	0.33806	1	1	7
28	7.59005	1	1	7
29		Dropped from Test		
30	2.22570	1	1	7
31	18.7042	1	1	7
32	8.91245	1	1	7
33	7.76084	1	1	7
34	19.4152	1	1	7
35	28.2477	1	1	7
36	1.26926	1	1	7
37	7.68105	1	1	7
38	15.6752	1	1	7
39	5.30025	1	1	7
40		Dropped from Test		
41	4.14086	1	1	7
42	9.27047	1	1	7
43	8.10171	1	1	7
44	19.4152	1	1	7
45	25.8977	1	1	7
46	12.8186	1	1	7
47	19.0157	1	1	7
48	58.2796	1	1	7
49	15.0152	1	1	7
50	4.14086	1	1	7
51	11.7973	1	1	7
52		Dropped from Test		
53	12.2720	1	1	7
54	52.6065	1	1	7
55		Dropped from Test		
56		Dropped from Test		
57	8.86885	1	1	7
58	14.3789	1	1	7
59	10.2331	1	1	7
60	6.36251	1	1	7
61	9.07247	1	1	7
62	9.66448	1	1	7
63	39.2027	1	1	7
64	9.13789	1	1	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	0.00640	0.090	0.071	318

Null Hypothesis: Unit root (common unit root process)
Series: D(WMC)
Date: 09/23/18 Time: 14:55
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Total number of observations: 381
Cross-sections included: 59 (5 dropped)

Method	Statistic	Prob.**

Unit Root Test Continued

Breitung t-stat	-3.30691	0.0005

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(WMC)

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	408.817	1	1	7
2	307.406	0	1	8
3	277.120	1	1	7
4	1001.61	0	1	8
5	564.483	0	1	8
6	290.191	1	1	7
7	969.931	0	1	8
8	202.856	1	1	7
9	36.1549	0	1	8
10	45.7771	1	1	7
11	214.050	1	1	7
12		Dropped from Test		
13	47.2310	0	1	8
14	104.873	1	1	7
15	138.202	1	1	7
16	233.738	1	1	7
17	146.379	1	1	7
18	878.052	0	1	8
19	174.802	0	1	8
20	153.017	1	1	7
21	297.908	1	1	7
22	142.998	0	1	8
23	53.3117	1	1	7
24	472.836	0	1	8
25	159.152	1	1	7
26	84.8450	1	1	7
27	481.372	0	1	8
28	87.5332	1	1	7
29	49.6023	1	1	7
30	360.022	1	1	7
31	81.5371	0	1	8
32	156.631	1	1	7
33	372.807	1	1	7
34	37.0534	0	1	8
35	86.2230	1	1	7
36	157.654	0	1	8
37	601.216	0	1	8
38	83.4252	1	1	7
39	44.1052	1	1	7
40	53.3117	1	1	7
41	0.74192	1	1	7
42		Dropped from Test		
43	0.78273	0	1	8
44	0.61171	1	1	7
45	1.57793	0	1	8
46		Dropped from Test		
47	2.56379	1	1	7
48	2.46938	1	1	7
49	1.08942	1	1	7
50		Dropped from Test		
51	0.77995	0	1	8
52	0.78754	0	1	8
53	1.12941	0	1	8

Unit Root Test Continued

54	0.98082	0	1	8
55	0.65123	0	1	8
56	1.97625	1	1	7
57		Dropped from Test		
58	79.8235	0	1	8
59	392.856	0	1	8
60	175.002	1	1	7
61	273.142	0	1	8
62	522.164	0	1	8
63	0.27408	0	1	8
64	0.11751	0	0	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.22984	-3.307	0.070	381

Null Hypothesis: Unit root (common unit root process)
Series: D(CDC)
Date: 09/23/18 Time: 14:56
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Total number of observations: 391
Cross-sections included: 60 (4 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-2.69899	0.0035

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(CDC)

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	2047.06	0	1	8
2	331.616	1	1	7
3	210.624	0	1	8
4	977.027	0	1	8
5	527.562	1	1	7
6	299.188	1	1	7
7		Dropped from Test		
8	19.6049	0	1	8
9	69.8519	0	1	8
10	11.4937	1	1	7
11	158.762	1	1	7
12	21.7230	0	1	8
13	60.9587	1	1	7
14	61.5481	0	1	8
15	64.2544	0	1	8
16	318.206	1	1	7
17	40.4547	0	1	8
18	472.949	0	1	8
19	374.151	0	1	8
20	217.147	1	1	7
21	260.754	1	1	7
22	2667.44	0	1	8
23	39.7297	0	1	8
24	19.1163	1	1	7
25	172.175	1	1	7
26	129.648	0	1	8

Unit Root Test Continued

27	16.3497	1	1	7
28	15.7407	0	1	8
29	169.090	0	1	8
30	555.774	0	1	8
31	1305.79	0	1	8
32	142.998	0	1	8
33	75.2350	0	1	8
34	472.836	0	1	8
35	105.619	1	1	7
36	159.152	1	1	7
37	84.8450	1	1	7
38	870.204	0	1	8
39	92.6418	1	1	7
40		Dropped from Test		
41	1.17904	1	1	7
42	1.80803	0	1	8
43	0.87123	0	1	8
44	1.15721	0	1	8
45	0.46980	1	1	7
46	11.0027	1	1	7
47	12.4837	0	1	8
48	26.4250	1	1	7
49	1.02771	0	1	8
50		Dropped from Test		
51	170.353	0	1	8
52	9.36466	1	1	7
53	7.70697	0	1	8
54	6.24404	1	1	7
55	12.2824	1	1	7
56	1.97625	1	1	7
57		Dropped from Test		
58	28.7651	1	1	7
59	320.585	0	1	8
60	132.070	0	1	8
61	352.299	1	1	7
62	431.698	1	1	7
63	0.29007	1	1	7
64	0.16245	1	1	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.17058	-2.699	0.063	391

Null Hypothesis: Unit root (common unit root process)
Series: D(EHSC,2)
Date: 09/23/18 Time: 14:57
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Total number of observations: 364
Cross-sections included: 61 (3 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-4.15167	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(EHSC,2)

Cross	S.E. of

Unit Root Test Continued

section	Regression	Lag	Max Lag	Obs
1	965.967	0	0	7
2	139.055	0	0	7
3	114.118	0	0	7
4	81.3895	0	0	7
5	1256.87	0	0	7
6	659.217	0	0	7
7	661.445	0	0	7
8	231.147	0	0	7
9	21.4882	0	0	7
10	30.3708	0	0	7
11	66.2895	0	0	7
12	697.125	0	0	7
13	50.0460	0	0	7
14	115.448	0	0	7
15	325.332	0	0	7
16	96.6264	0	0	7
17	100.602	0	0	7
18	1712.41	0	0	7
19	181.097	0	0	7
20	126.921	0	0	5
21	301.093	0	0	7
22	1174.76	0	0	7
23	241.287	0	0	7
24	513.792	0	0	7
25	188.476	0	0	7
26	150.329	0	0	7
27	274.192	0	0	7
28	248.868	0	0	7
29	111.444	0	0	7
30	255.948	0	0	7
31	66.2712	0	0	7
32	14.4543	0	0	7
33	107.019	0	0	7
34	513.792	0	0	7
35	153.130	0	0	7
36	251.780	0	0	7
37	276.846	0	0	7
38	207.652	0	0	7
39	256.075	0	0	7
40	58.7613	0	0	7
41	14.4357	0	0	7
42		Dropped from Test		
43	4.09401	0	0	7
44	53.9108	0	0	7
45	14.4357	0	0	7
46	2.82816	0	0	7
47	4.09401	0	0	7
48	14.7620	0	0	7
49	19.8292	0	0	7
50		Dropped from Test		
51	9.85118	0	0	7
52	19.9239	0	0	7
53	15.1078	0	0	7
54	13.6100	0	0	7
55	3.02189	0	0	7
56		Dropped from Test		
57	6.88648	0	0	7
58	6.52294	0	0	7
59	841.094	0	0	7
60	595.919	0	0	7

Unit Root Test Continued

61	200.169	0	0	7
62	968.778	0	0	7
63	0.21030	0	0	7
64	0.27505	0	0	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.28378	-4.152	0.068	364

Null Hypothesis: Unit root (common unit root process)
Series: D(ROCE,2)
Date: 09/23/18 Time: 14:58
Sample: 2007 2016
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Total (balanced) observations: 318
Cross-sections included: 53 (11 dropped)

Method	Statistic	Prob.**
Breitung t-stat	-4.53334	0.0000

** Probabilities are computed assuming asympotic normality

Intermediate regression results on D(ROCE,2)

Cross section	S.E. of Regression	Lag	Max Lag	Obs
1	11.9071	0	0	7
2	47.4651	0	0	7
3	13.1229	0	0	7
4		Dropped from Test		
5	27.2143	0	0	7
6	23.6465	0	0	7
7	32.9171	0	0	7
8	20.6046	0	0	7
9	16.5762	0	0	7
10	89.5165	0	0	7
11	224.924	0	0	7
12	81.3789	0	0	7
13		Dropped from Test		
14	49.0887	0	0	7
15	647.784	0	0	7
16		Dropped from Test		
17	24.4389	0	0	7
18		Dropped from Test		
19	11.4257	0	0	7
20	10.0322	0	0	7
21		Dropped from Test		
22	18.9004	0	0	7
23		Dropped from Test		
24	9.60620	0	0	7
25	44.8825	0	0	7
26	31.0179	0	0	7
27	0.73416	0	0	7
28	6.96070	0	0	7
29		Dropped from Test		
30	4.00570	0	0	7
31	33.4924	0	0	7
32	10.8462	0	0	7

Unit Root Test Continued

33	11.1752	0	0	7
34	45.5595	0	0	7
35	22.9204	0	0	7
36	1.46578	0	0	7
37	4.95796	0	0	7
38	29.3152	0	0	7
39	4.67887	0	0	7
40		Dropped from Test		
41	4.71111	0	0	7
42	10.4161	0	0	7
43	8.41645	0	0	7
44	30.8547	0	0	7
45	20.6227	0	0	7
46	11.9103	0	0	7
47	24.1169	0	0	7
48	18.1602	0	0	7
49	30.6584	0	0	7
50	4.31958	0	0	7
51	18.3755	0	0	7
52		Dropped from Test		
53	10.1526	0	0	7
54	1739.23	0	0	7
55		Dropped from Test		
56		Dropped from Test		
57	25.3403	0	0	7
58	7.87166	0	0	7
59	14.0579	0	0	7
60	9.79781	0	0	7
61	8.19779	0	0	7
62	6.73505	0	0	7
63	68.8011	0	0	7
64	14.1079	0	0	7

	Coefficient	t-Stat	SE Reg	Obs
Pooled	-0.34876	-4.533	0.077	318

Appendix 19: Model Diagnostic Test

Autocorrelation

Model 1

Breusch-Godfrey test for autocorrelation up to order 20
OLS, using observations 2007-2645 (T = 639)
Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value	
const	-0.0186811	2.20885	-0.008457	0.9933	
WMC	0.000570705	0.00935990	0.06097	0.9514	
CDC	-0.000208081	0.00388424	-0.05357	0.9573	
uhat_1	0.121042	0.0402926	3.004	0.0028	***
uhat_2	0.0102280	0.0405895	0.2520	0.8011	
uhat_3	0.00458128	0.0405876	0.1129	0.9102	
uhat_4	0.0484986	0.0405892	1.195	0.2326	
uhat_5	0.0851438	0.0406434	2.095	0.0366	**
uhat_6	0.0496575	0.0407828	1.218	0.2238	
uhat_7	0.00960059	0.0408279	0.2351	0.8142	
uhat_8	0.00245142	0.0408305	0.06004	0.9521	
uhat_9	-0.00437279	0.0408422	-0.1071	0.9148	
uhat_10	0.00640960	0.0408373	0.1570	0.8753	
uhat_11	-0.000993465	0.0408393	-0.02433	0.9806	
uhat_12	-0.00224526	0.0408503	-0.05496	0.9562	
uhat_13	0.000782344	0.0408676	0.01914	0.9847	
uhat_14	-0.00429664	0.0408480	-0.1052	0.9163	
uhat_15	-0.00216339	0.0408142	-0.05301	0.9577	
uhat_16	-0.00308304	0.0406702	-0.07581	0.9396	
uhat_17	-0.00823434	0.0406341	-0.2026	0.8395	
uhat_18	0.000265442	0.0406393	0.006532	0.9948	
uhat_19	-0.00151511	0.0406430	-0.03728	0.9703	
uhat_20	-0.00107434	0.0403699	-0.02661	0.9788	

Unadjusted R-squared = 0.033471

Test statistic: LMF = 1.066605,
with p-value = P(F(20,616) > 1.06661) = 0.381

Alternative statistic: TR^2 = 21.387932,
with p-value = P(Chi-square(20) > 21.3879) = 0.375

Ljung-Box Q' = 28.3378,
with p-value = P(Chi-square(20) > 28.3378) = 0.102

Model 2

Breusch-Godfrey test for autocorrelation up to order 80
OLS, using observations 2007-2645 (T = 639)
Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value	
const	370.942	540.836	0.6859	0.4931	
WMC	-2.37622	2.40600	-0.9876	0.3238	
CDC	-0.442301	0.950729	-0.4652	0.6420	
uhat_1	0.638632	0.0424030	15.06	3.07e-043	***
uhat_2	-0.143375	0.0501958	-2.856	0.0044	***
uhat_3	0.158965	0.0505585	3.144	0.0018	***
uhat_4	-0.0460383	0.0510473	-0.9019	0.3675	
uhat_5	0.189975	0.0510280	3.723	0.0002	***
uhat_6	-0.168035	0.0517002	-3.250	0.0012	***
uhat_7	0.133941	0.0520977	2.571	0.0104	**
uhat_8	-0.158064	0.0523882	-3.017	0.0027	***
uhat_9	0.0759932	0.0528069	1.439	0.1507	
uhat_10	-0.130819	0.0529069	-2.473	0.0137	**
uhat_11	0.245021	0.0531413	4.611	4.98e-06	***
uhat_12	-0.182944	0.0542837	-3.370	0.0008	***

Model Diagnostic Test Continued

uhat_13	0.0960869	0.0548403	1.752	0.0803	*
uhat_14	-0.0982501	0.0549220	-1.789	0.0742	*
uhat_15	0.0857674	0.0550271	1.559	0.1197	
uhat_16	-0.149754	0.0549812	-2.724	0.0067	***
uhat_17	0.171989	0.0554462	3.102	0.0020	***
uhat_18	-0.114049	0.0558371	-2.043	0.0416	**
uhat_19	0.140638	0.0559884	2.512	0.0123	**
uhat_20	-0.0998290	0.0563268	-1.772	0.0769	*
uhat_21	0.101293	0.0564873	1.793	0.0735	*
uhat_22	-0.124619	0.0566072	-2.201	0.0281	**
uhat_23	0.0890418	0.0568317	1.567	0.1177	
uhat_24	-0.348378	0.0569079	-6.122	1.75e-09	***
uhat_25	0.335323	0.0586779	5.715	1.79e-08	***
uhat_26	-0.145267	0.0603301	-2.408	0.0164	**
uhat_27	0.152468	0.0605511	2.518	0.0121	**
uhat_28	-0.00778632	0.0608829	-0.1279	0.8983	
uhat_29	0.159652	0.0608769	2.623	0.0090	***
uhat_30	-0.203358	0.0611515	-3.325	0.0009	***
uhat_31	0.0977292	0.0617481	1.583	0.1141	
uhat_32	0.0552692	0.0618388	0.8938	0.3718	
uhat_33	-0.132540	0.0618068	-2.144	0.0324	**
uhat_34	0.0227634	0.0619673	0.3673	0.7135	
uhat_35	0.108980	0.0619408	1.759	0.0791	*
uhat_36	-0.119998	0.0620296	-1.935	0.0536	*
uhat_37	0.0668520	0.0622625	1.074	0.2834	
uhat_38	-0.0505208	0.0623155	-0.8107	0.4179	
uhat_39	0.0255969	0.0622794	0.4110	0.6812	
uhat_40	-0.0919607	0.0620381	-1.482	0.1388	
uhat_41	0.129420	0.0620563	2.086	0.0375	**
uhat_42	-0.0735994	0.0622953	-1.181	0.2379	
uhat_43	0.0234510	0.0623354	0.3762	0.7069	
uhat_44	-0.00286082	0.0622821	-0.04593	0.9634	
uhat_45	0.0695068	0.0620787	1.120	0.2633	
uhat_46	-0.0970086	0.0620001	-1.565	0.1182	
uhat_47	0.0970748	0.0621220	1.563	0.1187	
uhat_48	-0.0779480	0.0620559	-1.256	0.2096	
uhat_49	0.0607107	0.0620547	0.9783	0.3283	
uhat_50	0.0144708	0.0620008	0.2334	0.8155	
uhat_51	0.0699732	0.0613792	1.140	0.2548	
uhat_52	-0.0480253	0.0610494	-0.7867	0.4318	
uhat_53	0.0453669	0.0611046	0.7424	0.4581	
uhat_54	-0.0834640	0.0607547	-1.374	0.1701	
uhat_55	0.0304485	0.0605340	0.5030	0.6152	
uhat_56	0.0218289	0.0588559	0.3709	0.7109	
uhat_57	-0.0867016	0.0569973	-1.521	0.1288	
uhat_58	0.0507719	0.0570141	0.8905	0.3736	
uhat_59	0.0185923	0.0567899	0.3274	0.7435	
uhat_60	-0.0477465	0.0566342	-0.8431	0.3996	
uhat_61	0.0205111	0.0565110	0.3630	0.7168	
uhat_62	-0.00475783	0.0561920	-0.08467	0.9326	
uhat_63	0.00645378	0.0559678	0.1153	0.9082	
uhat_64	-0.0483282	0.0555086	-0.8706	0.3843	
uhat_65	0.0866881	0.0551562	1.572	0.1166	
uhat_66	-0.0596987	0.0551696	-1.082	0.2797	
uhat_67	0.0125036	0.0550675	0.2271	0.8205	
uhat_68	0.0137350	0.0549376	0.2500	0.8027	
uhat_69	0.00779497	0.0543539	0.1434	0.8860	
uhat_70	-0.0382712	0.0533526	-0.7173	0.4735	
uhat_71	0.0461823	0.0530771	0.8701	0.3846	
uhat_72	-0.0137808	0.0530030	-0.2600	0.7950	
uhat_73	-0.0164232	0.0525827	-0.3123	0.7549	
uhat_74	0.0287433	0.0522828	0.5498	0.5827	
uhat_75	0.0110196	0.0518124	0.2127	0.8317	
uhat_76	-0.0472234	0.0512033	-0.9223	0.3568	
uhat_77	0.00854945	0.0512067	0.1670	0.8675	
uhat_78	-0.0107801	0.0507583	-0.2124	0.8319	
uhat_79	-0.0273229	0.0503768	-0.5424	0.5878	
uhat_80	0.0127451	0.0424734	0.3001	0.7642	

Model Diagnostic Test Continued

```
Unadjusted R-squared = 0.474646

Test statistic: LMF = 6.279184,
with p-value = P(F(80,556) > 6.27918) = 8.12e-041

Alternative statistic: TR^2 = 303.299022,
with p-value = P(Chi-square(80) > 303.299) = 1.02e-027

Ljung-Box Q' = 544.909,
with p-value = P(Chi-square(80) > 544.909) = 2.56e-070
```

Model 3

```
Breusch-Godfrey test for autocorrelation up to order 50
OLS, using observations 2007-2645 (T = 639)
Dependent variable: uhat
```

	coefficient	std. error	t-ratio	p-value	
const	0.554281	1.75253	0.3163	0.7519	
WMC	-0.00324031	0.00761887	-0.4253	0.6708	
CDC	-0.000726654	0.00308904	-0.2352	0.8141	
uhat_1	0.565492	0.0413050	13.69	3.23e-037	***
uhat_2	-0.293671	0.0474007	-6.196	1.09e-09	***
uhat_3	0.219288	0.0488373	4.490	8.57e-06	***
uhat_4	0.0692332	0.0495022	1.399	0.1625	
uhat_5	0.291751	0.0496231	5.879	6.92e-09	***
uhat_6	-0.110939	0.0509316	-2.178	0.0298	**
uhat_7	0.0676044	0.0511360	1.322	0.1867	
uhat_8	-0.0776867	0.0511761	-1.518	0.1295	
uhat_9	-0.0992909	0.0512138	-1.939	0.0530	*
uhat_10	-0.0117361	0.0511294	-0.2295	0.8185	
uhat_11	-0.0285597	0.0505112	-0.5654	0.5720	
uhat_12	0.0557593	0.0506286	1.101	0.2712	
uhat_13	-0.00423032	0.0508353	-0.08322	0.9337	
uhat_14	0.0733347	0.0508439	1.442	0.1497	
uhat_15	-0.0362318	0.0509483	-0.7111	0.4773	
uhat_16	0.0297350	0.0509283	0.5839	0.5595	
uhat_17	-0.0814469	0.0511337	-1.593	0.1117	
uhat_18	0.0378114	0.0512516	0.7378	0.4610	
uhat_19	-0.0712965	0.0513233	-1.389	0.1653	
uhat_20	0.0458224	0.0514523	0.8906	0.3735	
uhat_21	-0.0209177	0.0514586	-0.4065	0.6845	
uhat_22	0.0549320	0.0515055	1.067	0.2866	
uhat_23	-0.00531374	0.0514924	-0.1032	0.9178	
uhat_24	0.0374762	0.0514842	0.7279	0.4670	
uhat_25	-0.00148543	0.0515081	-0.02884	0.9770	
uhat_26	-0.0293120	0.0515062	-0.5691	0.5695	
uhat_27	0.0215881	0.0515067	0.4191	0.6753	
uhat_28	-0.0639811	0.0515938	-1.240	0.2154	
uhat_29	0.0333098	0.0515704	0.6459	0.5186	
uhat_30	-0.0387680	0.0516835	-0.7501	0.4535	
uhat_31	0.0631027	0.0515871	1.223	0.2217	
uhat_32	-0.0707279	0.0516955	-1.368	0.1718	
uhat_33	0.0328852	0.0516322	0.6369	0.5244	
uhat_34	-0.0518437	0.0515303	-1.006	0.3148	
uhat_35	0.0622195	0.0515135	1.208	0.2276	
uhat_36	-0.0879062	0.0515841	-1.704	0.0889	*
uhat_37	0.0841136	0.0515813	1.631	0.1035	
uhat_38	0.0507467	0.0518013	0.9796	0.3277	
uhat_39	-0.0588334	0.0516697	-1.139	0.2553	
uhat_40	0.195639	0.0517361	3.781	0.0002	***
uhat_41	-0.124423	0.0523448	-2.377	0.0178	**
uhat_42	0.0654904	0.0524299	1.249	0.2121	
uhat_43	-0.0428174	0.0523956	-0.8172	0.4141	
uhat_44	-0.0153873	0.0523362	-0.2940	0.7689	
uhat_45	0.0858743	0.0521098	1.648	0.0999	*
uhat_46	0.0224712	0.0506046	0.4441	0.6572	

Model Diagnostic Test Continued

```
  uhat_47    -0.104100      0.0505739    -2.058     0.0400    **
  uhat_48     0.0757715     0.0497964     1.522     0.1286
  uhat_49    -0.0532749     0.0481706    -1.106     0.2692
  uhat_50     0.00284928    0.0418903     0.06802   0.9458

  Unadjusted R-squared = 0.447441

Test statistic: LMF = 9.490410,
with p-value = P(F(50,586) > 9.49041) = 1.06e-048

Alternative statistic: TR^2 = 285.914892,
with p-value = P(Chi-square(50) > 285.915) = 8.43e-035

Ljung-Box Q' = 549.6,
with p-value = P(Chi-square(50) > 549.6) = 2.75e-085
```

Appendix 20: White Test of Heteroskedasticity

Model 1 White's test for heteroskedasticity
OLS, using observations 2007-2646 (T = 638)
Missing or incomplete observations dropped: 2
Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value
const	3462.84	2213.63	1.564	0.1182
WMC	-6.65212	18.9740	-0.3506	0.7260
CDC	-5.03507	8.54719	-0.5891	0.5560
EHSC	-0.130771	14.4427	-0.009054	0.9928
sq_WMC	0.00221011	0.0241745	0.09142	0.9272
X2_X3	0.00330576	0.0168453	0.1962	0.8445
X2_X4	0.00302360	0.0188144	0.1607	0.8724
sq_CDC	0.00104572	0.00358073	0.2920	0.7704
X3_X4	-0.000322580	0.0107452	-0.03002	0.9761
sq_EHSC	-0.000751420	0.00746739	-0.1006	0.9199

Unadjusted R-squared = 0.001308

Test statistic: TR^2 = 0.834212,
with p-value = P(Chi-square(9) > 0.834212) = 0.999734

Model 2 White's test for heteroskedasticity
OLS, using observations 2007-2646 (T = 638)
Missing or incomplete observations dropped: 2
Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value
const	-6.71481e+07	1.67474e+08	-0.4009	0.6886
WMC	1.77648e+06	1.43550e+06	1.238	0.2163
CDC	256375	646645	0.3965	0.6919
EHSC	1.71790e+06	1.09268e+06	1.572	0.1164
sq_WMC	-1976.02	1828.94	-1.080	0.2804
X2_X3	773.624	1274.45	0.6070	0.5441
X2_X4	259.284	1423.42	0.1822	0.8555
sq_CDC	-93.0245	270.903	-0.3434	0.7314
X3_X4	-323.902	812.937	-0.3984	0.6904
sq_EHSC	-848.534	564.951	-1.502	0.1336

Unadjusted R-squared = 0.014015

Test statistic: TR^2 = 8.941401,
with p-value = P(Chi-square(9) > 8.941401) = 0.442701

Model 3 White's test for heteroskedasticity
OLS, using observations 2007-2646 (T = 638)
Missing or incomplete observations dropped: 2
Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value	
const	1802.68	1313.21	1.373	0.1703	
WMC	7.67293	11.2561	0.6817	0.4957	
CDC	-7.65821	5.07052	-1.510	0.1315	
EHSC	16.8319	8.56798	1.965	0.0499	**
sq_WMC	-0.0123393	0.0143412	-0.8604	0.3899	
X2_X3	0.00538110	0.00999330	0.5385	0.5904	
X2_X4	-0.00150722	0.0111615	-0.1350	0.8926	
sq_CDC	0.00225868	0.00212423	1.063	0.2881	
X3_X4	-0.00505119	0.00637447	-0.7924	0.4284	
sq_EHSC	-0.00727481	0.00442994	-1.642	0.1011	

Unadjusted R-squared = 0.009527
Test statistic: TR^2 = 6.077955,
with p-value = P(Chi-square(9) > 6.077955) = 0.732092

Appendix 21: Ramsey RESET Test

Model 1

```
RESET test for specification (squares and cubes)
Test statistic: F = 0.125112,
with p-value = P(F(2,632) > 0.125112) = 0.882

RESET test for specification (squares only)
Test statistic: F = 0.197917,
with p-value = P(F(1,633) > 0.197917) = 0.657

RESET test for specification (cubes only)
Test statistic: F = 0.022117,
with p-value = P(F(1,633) > 0.0221173) = 0.882
```

Model 2

```
RESET test for specification (squares and cubes)
Test statistic: F = 1.070572,
with p-value = P(F(2,632) > 1.07057) = 0.343

RESET test for specification (squares only)
Test statistic: F = 2.125982,
with p-value = P(F(1,633) > 2.12598) = 0.145

RESET test for specification (cubes only)
Test statistic: F = 2.111683,
with p-value = P(F(1,633) > 2.11168) = 0.147
```

Model 3

```
RESET test for specification (squares and cubes)
Test statistic: F = 0.119324,
with p-value = P(F(2,632) > 0.119324) = 0.888

RESET test for specification (squares only)
Test statistic: F = 0.158219,
with p-value = P(F(1,633) > 0.158219) = 0.691

RESET test for specification (cubes only)
Test statistic: F = 0.222232,
with p-value = P(F(1,633) > 0.222232) = 0.638
```

Appendix 22: Test for Multicollinearity

	ROCE	EPS	ROE	WMC	CDC	EHSC
ROCE	1.000000	0.051189	0.537875	-0.017518	0.008256	0.006077
EPS	0.051189	1.000000	0.099880	0.097992	0.102060	0.099558
ROE	0.537875	0.099880	1.000000	-0.002611	0.038974	0.027608
WMC	-0.017518	0.097992	-0.002611	1.000000	0.294807	0.398807
CDC	0.008256	0.102060	0.038974	0.294807	1.000000	0.387858
EHSC	0.006077	0.099558	0.027608	0.398807	0.387858	1.000000

Kao Residual Co-integration Test

Model 1

Kao Residual Cointegration Test
Series: ROCE WMC CDC EHSC
Date: 09/23/18 Time: 15:46
Sample: 2007 2016
Included observations: 640
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	4.241378	0.0000
Residual variance	4255.707	
HAC variance	545.1567	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/23/18 Time: 15:46
Sample (adjusted): 2009 2016
Included observations: 509 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.325941	0.063801	-20.78242	0.0000
D(RESID(-1))	0.210461	0.043278	4.862995	0.0000

R-squared	0.569955	Mean dependent var	-0.584266
Adjusted R-squared	0.569107	S.D. dependent var	69.40288
S.E. of regression	45.55773	Akaike info criterion	10.47976
Sum squared resid	1052282.	Schwarz criterion	10.49639
Log likelihood	-2665.099	Hannan-Quinn criter.	10.48628
Durbin-Watson stat	1.316070		

Model 2

Kao Residual Cointegration Test
Series: EPS WMC CDC EHSC
Date: 09/23/18 Time: 15:48
Sample: 2007 2016
Included observations: 640
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-6.789672	0.0000

Test for Multicollinearity Continued

Residual variance	2454.941
HAC variance	555.8427

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/23/18 Time: 15:48
Sample (adjusted): 2009 2016
Included observations: 509 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.386955	0.050450	-27.49168	0.0000
D(RESID(-1))	0.525754	0.039482	13.31627	0.0000

R-squared	0.612882	Mean dependent var	-1.116880
Adjusted R-squared	0.612119	S.D. dependent var	52.58202
S.E. of regression	32.74815	Akaike info criterion	9.819491
Sum squared resid	543727.7	Schwarz criterion	9.836122
Log likelihood	-2497.061	Hannan-Quinn criter.	9.826012
Durbin-Watson stat	2.617873		

Model 3

Kao Residual Cointegration Test
Series: ROE WMC CDC EHSC
Date: 09/23/18 Time: 15:48
Sample: 2007 2016
Included observations: 640
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-5.794769	0.0000

Residual variance	2454.941
HAC variance	555.8427

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/23/18 Time: 15:48
Sample (adjusted): 2009 2016
Included observations: 509 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.386955	0.050450	-27.49168	0.0000
D(RESID(-1))	0.525754	0.039482	13.31627	0.0000

R-squared	0.612882	Mean dependent var	-1.116880
Adjusted R-squared	0.612119	S.D. dependent var	52.58202
S.E. of regression	32.74815	Akaike info criterion	9.819491
Sum squared resid	543727.7	Schwarz criterion	9.836122
Log likelihood	-2497.061	Hannan-Quinn criter.	9.826012
Durbin-Watson stat	2.617873		

Appendix 23: Pedroni Residual Co-integration

Model 1

Pedroni Residual Cointegration Test
Series: ROCE WMC CDC EHSC
Date: 09/23/18 Time: 15:50
Sample: 2007 2016
Included observations: 640
Cross-sections included: 43 (21 dropped)
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 0
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-4.282385	1.0000	-3.940552	1.0000
Panel rho-Statistic	3.361945	0.9996	3.209146	0.9993
Panel PP-Statistic	-11.97633	0.0000	-6.160793	0.0000
Panel ADF-Statistic	-7.502010	0.0000	-5.343393	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	6.126524	1.0000
Group PP-Statistic	-10.11742	0.0000
Group ADF-Statistic	-6.286922	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	-0.325	3.643197	3.607883	2.00	9
2	0.196	205.3088	122.9701	6.00	9
3	-0.125	5.658709	1.430080	6.00	9
4	Dropped from Test				
5	0.313	52.86661	52.86661	0.00	9
6	0.554	54.56337	65.34345	1.00	9
7	Dropped from Test				
8	-0.548	5.766335	5.766335	0.00	9
9	0.229	20.64343	18.81495	2.00	9
10	-0.293	533.9149	410.3174	2.00	9
11	-0.188	1026.164	902.9514	2.00	9
12	Dropped from Test				
13	Dropped from Test				
14	0.484	165.7732	124.1237	4.00	9
15	-0.225	12808.02	3635.133	8.00	9
16	Dropped from Test				
17	-0.066	29.76667	29.76667	0.00	9
18	Dropped from Test				
19	-0.911	1.729371	1.525485	1.00	9
20	0.328	5.279809	5.279809	0.00	7
21	Dropped from Test				
22	-0.573	5.057349	0.931365	8.00	9
23	Dropped from Test				
24	-0.191	7.974085	7.856799	1.00	9
25	-0.814	10.72862	7.893947	2.00	9

Pedroni Residual Co-integration Continued

26	0.680	65.47829	83.90318	1.00	9
27	-0.199	0.032921	0.021018	3.00	9
28	0.528	7.994123	8.754326	1.00	9
29	Dropped from Test				
30	0.181	1.023775	1.023775	0.00	9
31	-0.183	70.68577	17.09052	8.00	9
32	-0.413	3.305944	0.690515	8.00	9
33	-0.363	0.530858	0.072445	8.00	9
34	-0.281	43.27612	45.57333	1.00	9
35	0.047	30.45166	29.52310	1.00	9
36	0.300	0.692605	0.717763	1.00	9
37	0.375	1.046205	0.565265	5.00	9
38	-0.126	9.905234	3.046254	6.00	9
39	-0.375	0.551060	0.452206	2.00	9
40	Dropped from Test				
41	-0.592	0.130802	0.130802	0.00	9
42	Dropped from Test				
43	-0.020	1.681823	0.817971	8.00	9
44	-0.013	19.26186	4.501172	6.00	9
45	0.605	201.3672	289.6121	1.00	9
46	Dropped from Test				
47	Dropped from Test				
48	-0.056	124.2419	57.20152	4.00	9
49	-0.247	10.28470	2.426411	6.00	9
50	Dropped from Test				
51	-0.553	9.708977	12.44372	1.00	9
52	Dropped from Test				
53	Dropped from Test				
54	Dropped from Test				
55	Dropped from Test				
56	Dropped from Test				
57	Dropped from Test				
58	0.027	7.086550	6.722237	2.00	9
59	0.347	8.568360	8.202903	1.00	9
60	0.123	3.609682	3.256584	2.00	9
61	0.143	4.320492	2.258091	7.00	9
62	Dropped from Test				
63	0.162	97.97508	94.61796	1.00	9
64	-0.124	2.877422	2.088525	3.00	8

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	-0.325	3.643197	0	0	9
2	0.196	205.3088	0	0	9
3	-0.125	5.658709	0	0	9
4	Dropped from Test				
5	0.313	52.86661	0	0	9
6	0.554	54.56337	0	0	9
7	Dropped from Test				
8	-0.548	5.766335	0	0	9
9	0.229	20.64343	0	0	9
10	-0.293	533.9149	0	0	9
11	-0.188	1026.164	0	0	9
12	Dropped from Test				
13	Dropped from Test				
14	0.484	165.7732	0	0	9
15	-0.225	12808.02	0	0	9
16	Dropped from Test				
17	-0.066	29.76667	0	0	9
18	Dropped from Test				

Pedroni Residual Co-integration Continued

19	-0.911	1.729371	0	0	9
20	0.328	5.279809	0	0	7
21	Dropped from Test				
22	-0.573	5.057349	0	0	9
23	Dropped from Test				
24	-0.191	7.974085	0	0	9
25	-0.814	10.72862	0	0	9
26	0.680	65.47829	0	0	9
27	-0.199	0.032921	0	0	9
28	0.528	7.994123	0	0	9
29	Dropped from Test				
30	0.181	1.023775	0	0	9
31	-0.183	70.68577	0	0	9
32	-0.413	3.305944	0	0	9
33	-0.363	0.530858	0	0	9
34	-0.281	43.27612	0	0	9
35	0.047	30.45166	0	0	9
36	0.300	0.692605	0	0	9
37	0.375	1.046205	0	0	9
38	-0.126	9.905234	0	0	9
39	-0.375	0.551060	0	0	9
40	Dropped from Test				
41	-0.592	0.130802	0	0	9
42	Dropped from Test				
43	-0.020	1.681823	0	0	9
44	-0.013	19.26186	0	0	9
45	0.605	201.3672	0	0	9
46	Dropped from Test				
47	Dropped from Test				
48	-0.056	124.2419	0	0	9
49	-0.247	10.28470	0	0	9
50	Dropped from Test				
51	-0.553	9.708977	0	0	9
52	Dropped from Test				
53	Dropped from Test				
54	Dropped from Test				
55	Dropped from Test				
56	Dropped from Test				
57	Dropped from Test				
58	0.027	7.086550	0	0	9
59	0.347	8.568360	0	0	9
60	0.123	3.609682	0	0	9
61	0.143	4.320492	0	0	9
62	Dropped from Test				
63	0.162	97.97508	0	0	9
64	-0.124	2.877422	0	0	8

Model 2

Pedroni Residual Cointegration Test
Series: EPS WMC CDC EHSC
Date: 09/23/18 Time: 15:50
Sample: 2007 2016
Included observations: 640
Cross-sections included: 45 (19 dropped)
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 0
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

Weighted

Pedroni Residual Co-integration Continued

	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-1.272140	0.8983	-3.715327	0.9999
Panel rho-Statistic	2.458708	0.9930	3.849030	0.9999
Panel PP-Statistic	-3.548457	0.0002	-3.095669	0.0010
Panel ADF-Statistic	-3.537361	0.0002	-2.989857	0.0014

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	6.728081	1.0000
Group PP-Statistic	-6.941415	0.0000
Group ADF-Statistic	-2.426828	0.0076

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	-0.180	35830746	39317279	1.00	9
2	0.206	208559.1	80349.16	6.00	9
3	0.413	8.54E+08	8.96E+08	2.00	9
4	-0.006	3845261.	3278899.	2.00	9
5	0.232	80541048	80541048	0.00	9
6	-0.270	6.99E+08	9.55E+08	1.00	9
7	Dropped from Test				
8	-0.472	286.4111	161.5493	4.00	9
9	-0.050	219.5738	219.5738	0.00	9
10	-0.400	136.6273	106.7781	2.00	9
11	-0.230	36381.02	5807.868	8.00	9
12	Dropped from Test				
13	Dropped from Test				
14	0.445	46.37990	37.92558	3.00	9
15	-0.103	4398.984	3924.824	2.00	9
16	Dropped from Test				
17	-0.105	17172539	3886047.	8.00	9
18	Dropped from Test				
19	-0.075	6167562.	5535014.	2.00	9
20	-0.129	231.1999	180.0370	3.00	7
21	Dropped from Test				
22	-0.120	31618.41	6487.050	8.00	9
23	Dropped from Test				
24	-0.263	1238.073	421.3559	8.00	9
25	-0.757	10027.98	1975.031	8.00	9
26	0.561	5386138.	5386138.	0.00	9
27	-0.277	9202.099	5332.424	5.00	9
28	-0.168	7402.535	1428.644	8.00	9
29	0.497	16543.44	19449.43	1.00	9
30	-0.192	6809049.	8718031.	1.00	9
31	0.053	1928301.	1830649.	3.00	9
32	-0.258	8808.098	3439.783	6.00	9
33	0.513	12127.21	12910.84	2.00	9
34	0.398	1009.681	1014.737	2.00	9
35	0.152	689.5573	689.5573	0.00	9
36	0.410	618.3525	733.8704	1.00	9
37	0.220	395.1872	350.7079	1.00	9
38	-0.255	114466.0	17167.28	8.00	9
39	0.253	1791.120	1791.120	0.00	9
40	Dropped from Test				
41	0.309	29.10918	33.88641	1.00	9
42	Dropped from Test				

Pedroni Residual Co-integration Continued

43	-0.220	532.2391	453.2564	1.00	9
44	0.333	5256.846	5285.787	1.00	9
45	0.092	504.7501	504.7501	0.00	9
46	Dropped from Test				
47	Dropped from Test				
48	0.023	324884.4	324658.4	2.00	9
49	-0.209	122.8818	21.25344	6.00	9
50	Dropped from Test				
51	-0.453	47284.00	10024.07	6.00	9
52	Dropped from Test				
53	Dropped from Test				
54	Dropped from Test				
55	Dropped from Test				
56	Dropped from Test				
57	Dropped from Test				
58	-0.132	325.8091	325.8091	0.00	9
59	-0.057	344222.1	353316.8	2.00	9
60	0.998	190302.0	269599.9	2.00	9
61	0.082	22281160	22426671	1.00	9
62	Dropped from Test				
63	0.236	46.53409	50.73087	2.00	9
64	-0.128	41.12222	29.13627	2.00	8

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	-0.180	35830746	0	0	9
2	0.206	208559.1	0	0	9
3	0.413	8.54E+08	0	0	9
4	-0.006	3845261.	0	0	9
5	0.232	80541048	0	0	9
6	-0.270	6.99E+08	0	0	9
7	Dropped from Test				
8	-0.472	286.4111	0	0	9
9	-0.050	219.5738	0	0	9
10	-0.400	136.6273	0	0	9
11	-0.230	36381.02	0	0	9
12	Dropped from Test				
13	Dropped from Test				
14	0.445	46.37990	0	0	9
15	-0.103	4398.984	0	0	9
16	Dropped from Test				
17	-0.105	17172539	0	0	9
18	Dropped from Test				
19	-0.075	6167562.	0	0	9
20	-0.129	231.1999	0	0	7
21	Dropped from Test				
22	-0.120	31618.41	0	0	9
23	Dropped from Test				
24	-0.263	1238.073	0	0	9
25	-0.757	10027.98	0	0	9
26	0.561	5386138.	0	0	9
27	-0.277	9202.099	0	0	9
28	-0.168	7402.535	0	0	9
29	0.497	16543.44	0	0	9
30	-0.192	6809049.	0	0	9
31	0.053	1928301.	0	0	9
32	-0.258	8808.098	0	0	9
33	0.513	12127.21	0	0	9
34	0.398	1009.681	0	0	9
35	0.152	689.5573	0	0	9

Pedroni Residual Co-integration Continued

36	0.410	618.3525	0	0	9
37	0.220	395.1872	0	0	9
38	-0.255	114466.0	0	0	9
39	0.253	1791.120	0	0	9
40	Dropped from Test				
41	0.309	29.10918	0	0	9
42	Dropped from Test				
43	-0.220	532.2391	0	0	9
44	0.333	5256.846	0	0	9
45	0.092	504.7501	0	0	9
46	Dropped from Test				
47	Dropped from Test				
48	0.023	324884.4	0	0	9
49	-0.209	122.8818	0	0	9
50	Dropped from Test				
51	-0.453	47284.00	0	0	9
52	Dropped from Test				
53	Dropped from Test				
54	Dropped from Test				
55	Dropped from Test				
56	Dropped from Test				
57	Dropped from Test				
58	-0.132	325.8091	0	0	9
59	-0.057	344222.1	0	0	9
60	0.998	190302.0	0	0	9
61	0.082	22281160	0	0	9
62	Dropped from Test				
63	0.236	46.53409	0	0	9
64	-0.128	41.12222	0	0	8

Model 3

Pedroni Residual Cointegration Test
Series: ROE WMC CDC EHSC
Date: 09/23/18 Time: 15:48
Sample: 2007 2016
Included observations: 640
Cross-sections included: 43 (21 dropped)
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 0
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-5.277725	1.0000	-3.725594	0.9999
Panel rho-Statistic	4.437679	1.0000	3.379285	0.9996
Panel PP-Statistic	-3.658575	0.0001	-4.966812	0.0000
Panel ADF-Statistic	-2.973704	0.0015	-4.463152	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	5.903696	1.0000
Group PP-Statistic	-9.431685	0.0000
Group ADF-Statistic	-6.040596	0.0000

Cross section specific results

Pedroni Residual Co-integration Continued

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	-0.325	11.68180	11.68180	0.00	9
2	0.225	493.9175	319.1060	6.00	9
3	-0.123	28.99358	7.806336	5.00	9
4	Dropped from Test				
5	0.358	119.9059	119.9059	0.00	9
6	-0.034	185.0703	253.5909	1.00	9
7	Dropped from Test				
8	-0.562	10.06703	3.165777	6.00	9
9	0.195	47.65962	41.56588	3.00	9
10	-0.302	3589.632	2762.517	2.00	9
11	-0.228	1756.653	1499.735	2.00	9
12	Dropped from Test				
13	Dropped from Test				
14	0.565	184.9408	150.6043	4.00	9
15	0.035	41427.20	17376.60	8.00	9
16	Dropped from Test				
17	-0.123	76.99664	76.99664	0.00	9
18	Dropped from Test				
19	-0.814	4.191777	4.191777	0.00	9
20	-0.050	7.942960	8.733243	1.00	7
21	Dropped from Test				
22	-0.263	10.83059	1.831347	8.00	9
23	Dropped from Test				
24	-0.186	16.97700	16.72150	1.00	9
25	-0.804	25.56821	18.18755	2.00	9
26	0.680	170.0050	214.5540	1.00	9
27	-0.215	0.097163	0.061135	3.00	9
28	0.320	23.63875	27.32779	1.00	9
29	Dropped from Test				
30	-0.022	2.236178	2.236178	0.00	9
31	-0.029	123.9414	44.44259	8.00	9
32	-0.506	10.45323	2.739536	8.00	9
33	0.310	2.967257	2.003598	4.00	9
34	-0.219	79.57581	79.57581	0.00	9
35	-0.105	164.3913	159.1073	1.00	9
36	0.508	2.790476	2.790476	0.00	9
37	0.065	8.642250	3.500239	6.00	9
38	-0.279	22.32593	23.46859	1.00	9
39	-0.501	4.252908	0.864548	8.00	9
40	Dropped from Test				
41	-0.463	1.082919	1.082919	0.00	9
42	Dropped from Test				
43	0.002	9.584442	3.230415	8.00	9
44	-0.034	69.96419	55.28213	2.00	9
45	0.615	858.6677	1178.682	1.00	9
46	Dropped from Test				
47	Dropped from Test				
48	-0.114	745.0294	362.1345	4.00	9
49	-0.146	24.66339	13.21904	3.00	9
50	Dropped from Test				
51	-0.632	42.13748	49.95063	1.00	9
52	Dropped from Test				
53	Dropped from Test				
54	Dropped from Test				
55	Dropped from Test				
56	Dropped from Test				
57	Dropped from Test				
58	-0.034	51.04795	47.85418	2.00	9

Pedroni Residual Co-integration Continued

59	0.166	42.17669	40.85398	1.00	9
60	0.194	19.40125	19.40125	0.00	9
61	0.070	14.49511	6.069898	8.00	9
62	Dropped from Test				
63	0.174	378.3932	343.5748	1.00	9
64	-0.313	7.059508	2.334168	7.00	8

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	-0.325	11.68180	0	0	9
2	0.225	493.9175	0	0	9
3	-0.123	28.99358	0	0	9
4	Dropped from Test				
5	0.358	119.9059	0	0	9
6	-0.034	185.0703	0	0	9
7	Dropped from Test				
8	-0.562	10.06703	0	0	9
9	0.195	47.65962	0	0	9
10	-0.302	3589.632	0	0	9
11	-0.228	1756.653	0	0	9
12	Dropped from Test				
13	Dropped from Test				
14	0.565	184.9408	0	0	9
15	0.035	41427.20	0	0	9
16	Dropped from Test				
17	-0.123	76.99664	0	0	9
18	Dropped from Test				
19	-0.814	4.191777	0	0	9
20	-0.050	7.942960	0	0	7
21	Dropped from Test				
22	-0.263	10.83059	0	0	9
23	Dropped from Test				
24	-0.186	16.97700	0	0	9
25	-0.804	25.56821	0	0	9
26	0.680	170.0050	0	0	9
27	-0.215	0.097163	0	0	9
28	0.320	23.63875	0	0	9
29	Dropped from Test				
30	-0.022	2.236178	0	0	9
31	-0.029	123.9414	0	0	9
32	-0.506	10.45323	0	0	9
33	0.310	2.967257	0	0	9
34	-0.219	79.57581	0	0	9
35	-0.105	164.3913	0	0	9
36	0.508	2.790476	0	0	9
37	0.065	8.642250	0	0	9
38	-0.279	22.32593	0	0	9
39	-0.501	4.252908	0	0	9
40	Dropped from Test				
41	-0.463	1.082919	0	0	9
42	Dropped from Test				
43	0.002	9.584442	0	0	9
44	-0.034	69.96419	0	0	9
45	0.615	858.6677	0	0	9
46	Dropped from Test				
47	Dropped from Test				
48	-0.114	745.0294	0	0	9
49	-0.146	24.66339	0	0	9
50	Dropped from Test				
51	-0.632	42.13748	0	0	9

Pedroni Residual Co-integration Continued

52		Dropped from Test			
53		Dropped from Test			
54		Dropped from Test			
55		Dropped from Test			
56		Dropped from Test			
57		Dropped from Test			
58	-0.034	51.04795	0	0	9
59	0.166	42.17669	0	0	9
60	0.194	19.40125	0	0	9
61	0.070	14.49511	0	0	9
62		Dropped from Test			
63	0.174	378.3932	0	0	9
64	-0.313	7.059508	0	0	8

Appendix 24: Vector Error Correction Model

Model 1

Vector Error Correction Estimates
Date: 09/23/18 Time: 16:05
Sample (adjusted): 2010 2016
Included observations: 445 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1			
ROCE(-1)	1.000000			
WMC(-1)	-0.009145 (0.01039) [-0.88036]			
CDC(-1)	-0.004069 (0.00412) [-0.98660]			
EHSC(-1)	0.001200 (0.00714) [0.16810]			
C	-0.139768			
Error Correction:	D(ROCE)	D(WMC)	D(CDC)	D(EHSC)
CointEq1	-0.816624 (0.04028) [-20.2745]	0.162711 (0.23649) [0.68803]	0.086652 (0.41235) [0.21014]	0.035605 (0.19426) [0.18329]
D(ROCE(-1))	-0.055223 (0.03419) [-1.61495]	-0.118561 (0.20077) [-0.59054]	-0.055062 (0.35007) [-0.15729]	-0.102050 (0.16492) [-0.61880]
D(ROCE(-2))	-0.036664 (0.02552) [-1.43664]	-0.024934 (0.14984) [-0.16640]	-0.016236 (0.26126) [-0.06215]	-0.092679 (0.12308) [-0.75299]
D(WMC(-1))	-0.021670 (0.00859) [-2.52248]	-0.392820 (0.05044) [-7.78806]	-0.139351 (0.08795) [-1.58450]	-0.011000 (0.04143) [-0.26551]
D(WMC(-2))	-0.011332 (0.00852) [-1.33043]	-0.110296 (0.05001) [-2.20553]	-0.268617 (0.08720) [-3.08057]	-0.096280 (0.04108) [-2.34378]
D(CDC(-1))	-0.000879 (0.00457) [-0.19231]	0.015766 (0.02684) [0.58730]	-0.153487 (0.04681) [-3.27918]	-0.029818 (0.02205) [-1.35227]
D(CDC(-2))	-0.001473 (0.00483) [-0.30525]	0.054433 (0.02833) [1.92110]	0.247489 (0.04940) [5.00940]	0.050380 (0.02327) [2.16458]
D(EHSC(-1))	0.020956 (0.01036) [2.02304]	0.095223 (0.06082) [1.56566]	0.281974 (0.10605) [2.65896]	-0.170616 (0.04996) [-3.41513]

Vector Error Correction Model Continued

D(EHSC(-2))	-0.000473	0.122281	0.110252	-0.021142
	(0.01021)	(0.05995)	(0.10454)	(0.04925)
	[-0.04635]	[2.03961]	[1.05468]	[-0.42931]
C	-2.612057	-8.912907	4.698087	-6.102954
	(1.39517)	(8.19149)	(14.2829)	(6.72871)
	[-1.87221]	[-1.08807]	[0.32893]	[-0.90700]
R-squared	0.741047	0.141708	0.119503	0.073162
Adj. R-squared	0.735690	0.123950	0.101286	0.053986
Sum sq. resids	371999.8	12823660	38987130	8652660.
S.E. equation	29.24332	171.6965	299.3753	141.0361
F-statistic	138.3160	7.980061	6.559937	3.815284
Log likelihood	-2128.535	-2916.220	-3163.626	-2828.683
Akaike AIC	9.611395	13.15155	14.26349	12.75812
Schwarz SC	9.703487	13.24364	14.35558	12.85022
Mean dependent	-2.636989	-8.684494	9.055056	-6.177753
S.D. dependent	56.88132	183.4412	315.7951	145.0045

Determinant resid covariance (dof adj.)	3.89E+16
Determinant resid covariance	3.55E+16
Log likelihood	-11004.65
Akaike information criterion	49.65686
Schwarz criterion	50.06207

Model 2

Vector Error Correction Estimates
Date: 09/23/18 Time: 16:12
Sample (adjusted): 2010 2016
Included observations: 445 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
EPS(-1)	1.000000
WMC(-1)	-0.543904
	(2.94472)
	[-0.18471]
CDC(-1)	-1.133268
	(1.16903)
	[-0.96941]
EHSC(-1)	-1.120376
	(2.02139)
	[-0.55426]
C	-1783.514

Error Correction:	D(EPS)	D(WMC)	D(CDC)	D(EHSC)
CointEq1	-0.577988	-0.000659	-0.000302	-0.000734
	(0.02109)	(0.00061)	(0.00106)	(0.00050)
	[-27.4067]	[-1.08664]	[-0.28435]	[-1.47344]
D(EPS(-1))	-0.286391	0.001383	0.001447	-0.000508
	(0.02321)	(0.00067)	(0.00117)	(0.00055)
	[-12.3385]	[2.07182]	[1.23990]	[-0.92718]
D(EPS(-2))	-0.238404	0.000592	0.000398	-3.51E-05
	(0.02147)	(0.00062)	(0.00108)	(0.00051)

Vector Error Correction Model Continued

	[-11.1064]	[0.95929]	[0.36832]	[-0.06924]
D(WMC(-1))	-0.827035	-0.395599	-0.141629	-0.005425
	(1.76612)	(0.05081)	(0.08882)	(0.04171)
	[-0.46828]	[-7.78625]	[-1.59463]	[-0.13004]
D(WMC(-2))	-2.444083	-0.103282	-0.260648	-0.096298
	(1.73634)	(0.04995)	(0.08732)	(0.04101)
	[-1.40760]	[-2.06768]	[-2.98501]	[-2.34815]
D(CDC(-1))	0.427950	0.014914	-0.155015	-0.026458
	(0.93435)	(0.02688)	(0.04699)	(0.02207)
	[0.45802]	[0.55484]	[-3.29907]	[-1.19893]
D(CDC(-2))	0.064831	0.058587	0.251412	0.050537
	(0.98415)	(0.02831)	(0.04949)	(0.02324)
	[0.06588]	[2.06935]	[5.07986]	[2.17417]
D(EHSC(-1))	0.048727	0.084556	0.269248	-0.165505
	(2.12005)	(0.06099)	(0.10661)	(0.05007)
	[0.02298]	[1.38641]	[2.52543]	[-3.30531]
D(EHSC(-2))	1.528817	0.113185	0.102998	-0.021904
	(2.08493)	(0.05998)	(0.10485)	(0.04924)
	[0.73327]	[1.88708]	[0.98234]	[-0.44481]
C	-849.4374	-7.767822	5.802351	-6.416553
	(283.892)	(8.16695)	(14.2766)	(6.70514)
	[-2.99212]	[-0.95113]	[0.40642]	[-0.95696]
R-squared	0.802829	0.149126	0.122637	0.082106
Adj. R-squared	0.798750	0.131522	0.104485	0.063115
Sum sq. resids	1.54E+10	12712828	38848389	8569160.
S.E. equation	5942.501	170.9529	298.8422	140.3539
F-statistic	196.8007	8.471011	6.755979	4.323430
Log likelihood	-4493.370	-2914.288	-3162.833	-2826.525
Akaike AIC	20.23986	13.14287	14.25992	12.74843
Schwarz SC	20.33196	13.23496	14.35202	12.84052
Mean dependent	-620.0243	-8.684494	9.055056	-6.177753
S.D. dependent	13246.49	183.4412	315.7951	145.0045

Determinant resid covariance (dof adj.)	1.52E+21
Determinant resid covariance	1.39E+21
Log likelihood	-13357.05
Akaike information criterion	60.22944
Schwarz criterion	60.63465

Model 3

Vector Error Correction Estimates
Date: 09/23/18 Time: 16:12
Sample (adjusted): 2010 2016
Included observations: 445 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
ROE(-1)	1.000000
WMC(-1)	-2.888901
	(0.36020)
	[-8.02025]

Vector Error Correction Model Continued

CDC(-1)	0.603341			
	(0.14298)			
	[4.21971]			
EHSC(-1)	0.181465			
	(0.24756)			
	[0.73302]			
C	201.3709			

Error Correction:	D(ROE)	D(WMC)	D(CDC)	D(EHSC)
CointEq1	-0.004477	0.116132	-0.061781	-0.002531
	(0.00451)	(0.01488)	(0.02756)	(0.01301)
	[-0.99304]	[7.80392]	[-2.24175]	[-0.19462]
D(ROE(-1))	-0.256966	-0.082485	-0.033166	-0.198259
	(0.04455)	(0.14707)	(0.27236)	(0.12853)
	[-5.76804]	[-0.56087]	[-0.12177]	[-1.54251]
D(ROE(-2))	-0.503160	0.082615	0.049665	-0.205969
	(0.04609)	(0.15216)	(0.28179)	(0.13298)
	[-10.9164]	[0.54296]	[0.17625]	[-1.54888]
D(WMC(-1))	-0.033101	-0.183449	-0.254321	-0.017601
	(0.01653)	(0.05457)	(0.10107)	(0.04769)
	[-2.00232]	[-3.36152]	[-2.51636]	[-0.36904]
D(WMC(-2))	-0.017581	0.002393	-0.330993	-0.105892
	(0.01490)	(0.04918)	(0.09108)	(0.04298)
	[-1.18012]	[0.04866]	[-3.63423]	[-2.46374]
D(CDC(-1))	0.003691	-0.042152	-0.123269	-0.027674
	(0.00793)	(0.02617)	(0.04847)	(0.02287)
	[0.46554]	[-1.61055]	[-2.54322]	[-1.20985]
D(CDC(-2))	-0.000148	0.004338	0.274042	0.051862
	(0.00826)	(0.02728)	(0.05053)	(0.02384)
	[-0.01795]	[0.15899]	[5.42380]	[2.17508]
D(EHSC(-1))	0.030183	0.101437	0.281574	-0.172268
	(0.01728)	(0.05704)	(0.10564)	(0.04985)
	[1.74666]	[1.77821]	[2.66531]	[-3.45540]
D(EHSC(-2))	-0.007693	0.117638	0.116272	-0.013976
	(0.01709)	(0.05642)	(0.10449)	(0.04931)
	[-0.45011]	[2.08494]	[1.11274]	[-0.28343]
C	-1.718094	-8.163903	4.286846	-6.598528
	(2.32495)	(7.67504)	(14.2138)	(6.70768)
	[-0.73898]	[-1.06369]	[0.30160]	[-0.98373]
R-squared	0.259494	0.247891	0.129593	0.080619
Adj. R-squared	0.244173	0.232330	0.111584	0.061598
Sum sq. resids	1031158.	11237197	38540394	8583039.
S.E. equation	48.68756	160.7253	297.6552	140.4675
F-statistic	16.93738	15.93037	7.196226	4.238284
Log likelihood	-2355.384	-2886.836	-3161.062	-2826.885
Akaike AIC	10.63094	13.01949	14.25196	12.75005
Schwarz SC	10.72303	13.11158	14.34406	12.84214
Mean dependent	-0.933775	-8.684494	9.055056	-6.177753
S.D. dependent	56.00244	183.4412	315.7951	145.0045

Vector Error Correction Model Continued

Determinant resid covariance (dof adj.)	9.07E+16
Determinant resid covariance	8.29E+16
Log likelihood	-11193.39
Akaike information criterion	50.50513
Schwarz criterion	50.91033

Appendix 25: Panel OLS

Model 1

Pooled Effect

Dependent Variable: ROCE
Method: Panel Least Squares
Date: 09/23/18 Time: 17:36
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.054074	2.235610	0.918798	0.3586
WMC	-0.005764	0.009895	-0.582495	0.5604
CDC	0.001044	0.004086	0.255526	0.7984
EHSC	0.001779	0.006779	0.262479	0.7930

R-squared	0.000613	Mean dependent var	1.834295
Adjusted R-squared	-0.004116	S.D. dependent var	47.42872
S.E. of regression	47.52624	Akaike info criterion	10.56669
Sum squared resid	1432043.	Schwarz criterion	10.59464
Log likelihood	-3366.774	Hannan-Quinn criter.	10.57754
F-statistic	0.129570	Durbin-Watson stat	1.902693
Prob(F-statistic)	0.942527		

Fixed Effect

Dependent Variable: ROCE
Method: Panel Least Squares
Date: 09/23/18 Time: 17:37
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.427598	2.602706	0.932721	0.3514
WMC	-0.008693	0.012517	-0.694467	0.4877
CDC	0.000373	0.005905	0.063115	0.9497
EHSC	0.002599	0.012791	0.203165	0.8391

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.189400	Mean dependent var	1.834295
Adjusted R-squared	0.095705	S.D. dependent var	47.42872
S.E. of regression	45.10206	Akaike info criterion	10.55482
Sum squared resid	1161526.	Schwarz criterion	11.02301
Log likelihood	-3299.986	Hannan-Quinn criter.	10.73657
F-statistic	2.021460	Durbin-Watson stat	2.345788
Prob(F-statistic)	0.000011		

Random Effect

Dependent Variable: ROCE
Method: Panel EGLS (Cross-section random effects)
Date: 09/23/18 Time: 17:37
Sample: 2007 2016
Periods included: 10

Panel OLS Continued

Cross-sections included: 64
Total panel (unbalanced) observations: 638
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.186881	2.999774	0.729015	0.4663
WMC	-0.006965	0.010760	-0.647324	0.5177
CDC	0.000826	0.004674	0.176672	0.8598
EHSC	0.002111	0.008333	0.253322	0.8001

Effects Specification

	S.D.	Rho
Cross-section random	15.73726	0.1085
Idiosyncratic random	45.10206	0.8915

Weighted Statistics

R-squared	0.000686	Mean dependent var	1.229872
Adjusted R-squared	-0.004043	S.D. dependent var	44.90494
S.E. of regression	44.99570	Sum squared resid	1283604.
F-statistic	0.145087	Durbin-Watson stat	2.122677
Prob(F-statistic)	0.932825		

Unweighted Statistics

R-squared	0.000580	Mean dependent var	1.834295
Sum squared resid	1432090.	Durbin-Watson stat	1.902588

Model 2

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.386438	3	0.9430

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
WMC	3.367390	3.531437	0.773208	0.8520
CDC	0.643438	0.935861	0.272392	0.5753
EHSC	4.296043	3.725701	2.530415	0.7199

Cross-section random effects test equation:
Dependent Variable: EPS
Method: Panel Least Squares
Date: 09/23/18 Time: 18:05
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1252.152	643.3226	1.946383	0.0521

Panel OLS Continued

WMC	3.367390	3.093905	1.088395	0.2769
CDC	0.643438	1.459508	0.440860	0.6595
EHSC	4.296043	3.161643	1.358801	0.1747

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.496553	Mean dependent var	2387.512
Adjusted R-squared	0.438361	S.D. dependent var	14875.50
S.E. of regression	11148.08	Akaike info criterion	21.57500
Sum squared resid	7.10E+10	Schwarz criterion	22.04320
Log likelihood	-6815.426	Hannan-Quinn criter.	21.75676
F-statistic	8.533043	Durbin-Watson stat	1.702232
Prob(F-statistic)	0.000000		

Pooled Effect

Dependent Variable: EPS
Method: Panel Least Squares
Date: 09/23/18 Time: 17:37
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1165.437	695.2441	1.676299	0.0942
WMC	4.133778	3.077362	1.343286	0.1797
CDC	1.908232	1.270776	1.501628	0.1337
EHSC	2.382984	2.108093	1.130398	0.2587

R-squared	0.017446	Mean dependent var	2387.512
Adjusted R-squared	0.012797	S.D. dependent var	14875.50
S.E. of regression	14780.01	Akaike info criterion	22.04619
Sum squared resid	1.38E+11	Schwarz criterion	22.07414
Log likelihood	-7028.734	Hannan-Quinn criter.	22.05704
F-statistic	3.752480	Durbin-Watson stat	0.873530
Prob(F-statistic)	0.010854		

Fixed Effect

Dependent Variable: EPS
Method: Panel Least Squares
Date: 09/23/18 Time: 17:38
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1252.152	643.3226	1.946383	0.0521
WMC	3.367390	3.093905	1.088395	0.2769
CDC	0.643438	1.459508	0.440860	0.6595
EHSC	4.296043	3.161643	1.358801	0.1747

Effects Specification

Cross-section fixed (dummy variables)

Panel OLS Continued

R-squared	0.496553	Mean dependent var	2387.512
Adjusted R-squared	0.438361	S.D. dependent var	14875.50
S.E. of regression	11148.08	Akaike info criterion	21.57500
Sum squared resid	7.10E+10	Schwarz criterion	22.04320
Log likelihood	-6815.426	Hannan-Quinn criter.	21.75676
F-statistic	8.533043	Durbin-Watson stat	1.702232
Prob(F-statistic)	0.000000		

Random Effect

Dependent Variable: EPS
Method: Panel EGLS (Cross-section random effects)
Date: 09/23/18 Time: 17:38
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1247.487	1391.631	0.896421	0.3704
WMC	3.531437	2.966318	1.190512	0.2343
CDC	0.935861	1.363000	0.686618	0.4926
EHSC	3.725701	2.732319	1.363567	0.1732

Effects Specification

	S.D.	Rho
Cross-section random	10005.76	0.4462
Idiosyncratic random	11148.08	0.5538

Weighted Statistics

R-squared	0.011368	Mean dependent var	793.3862
Adjusted R-squared	0.006690	S.D. dependent var	11160.89
S.E. of regression	11123.57	Sum squared resid	7.84E+10
F-statistic	2.430106	Durbin-Watson stat	1.540235
Prob(F-statistic)	0.064216		

Unweighted Statistics

R-squared	0.016217	Mean dependent var	2387.512
Sum squared resid	1.39E+11	Durbin-Watson stat	0.871330

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.105670	3	0.9911

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
WMC	-0.008693	-0.006965	0.000041	0.7871
CDC	0.000373	0.000826	0.000013	0.9001
EHSC	0.002599	0.002111	0.000094	0.9599

Panel OLS Continued

Cross-section random effects test equation:
Dependent Variable: ROCE
Method: Panel Least Squares
Date: 09/23/18 Time: 17:50
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.427598	2.602706	0.932721	0.3514
WMC	-0.008693	0.012517	-0.694467	0.4877
CDC	0.000373	0.005905	0.063115	0.9497
EHSC	0.002599	0.012791	0.203165	0.8391

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.189400	Mean dependent var	1.834295
Adjusted R-squared	0.095705	S.D. dependent var	47.42872
S.E. of regression	45.10206	Akaike info criterion	10.55482
Sum squared resid	1161526.	Schwarz criterion	11.02301
Log likelihood	-3299.986	Hannan-Quinn criter.	10.73657
F-statistic	2.021460	Durbin-Watson stat	2.345788
Prob(F-statistic)	0.000011		

Model 3
Pooled Effect
Dependent Variable: ROE
Method: Panel Least Squares
Date: 09/23/18 Time: 17:39
Sample (adjusted): 2008 2016
Periods included: 9
Cross-sections included: 64
Total panel (unbalanced) observations: 574

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.558295	2.172817	-0.256945	0.7973
WMC	-0.008633	0.009549	-0.904116	0.3663
CDC	0.001970	0.003792	0.519367	0.6037
EHSC	0.003942	0.006354	0.620424	0.5352
ROE(-1)	0.520896	0.036414	14.30498	0.0000

R-squared	0.266240	Mean dependent var	-0.343868
Adjusted R-squared	0.261081	S.D. dependent var	50.78074
S.E. of regression	43.65131	Akaike info criterion	10.39902
Sum squared resid	1084194.	Schwarz criterion	10.43693
Log likelihood	-2979.518	Hannan-Quinn criter.	10.41381
F-statistic	51.61440	Durbin-Watson stat	2.079961
Prob(F-statistic)	0.000000		

Fixed Effect
Dependent Variable: ROE
Method: Panel Least Squares
Date: 09/23/18 Time: 17:39

Panel OLS Continued

Sample (adjusted): 2008 2016
Periods included: 9
Cross-sections included: 64
Total panel (unbalanced) observations: 574

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.568495	2.468214	0.230326	0.8179
WMC	-0.018062	0.011482	-1.573013	0.1163
CDC	0.000536	0.005574	0.096096	0.9235
EHSC	0.007518	0.012715	0.591285	0.5546
ROE(-1)	0.122542	0.042692	2.870352	0.0043

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.482730	Mean dependent var	-0.343868
Adjusted R-squared	0.414238	S.D. dependent var	50.78074
S.E. of regression	38.86510	Akaike info criterion	10.26891
Sum squared resid	764310.9	Schwarz criterion	10.78455
Log likelihood	-2879.178	Hannan-Quinn criter.	10.47004
F-statistic	7.047946	Durbin-Watson stat	2.185426
Prob(F-statistic)	0.000000		

Random Effect

Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Date: 09/23/18 Time: 17:39
Sample (adjusted): 2008 2016
Periods included: 9
Cross-sections included: 64
Total panel (unbalanced) observations: 574
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.558295	1.934576	-0.288588	0.7730
WMC	-0.008633	0.008502	-1.015457	0.3103
CDC	0.001970	0.003376	0.583326	0.5599
EHSC	0.003942	0.005658	0.696829	0.4862
ROE(-1)	0.520896	0.032421	16.06663	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	38.86510	1.0000

Weighted Statistics

R-squared	0.266240	Mean dependent var	-0.343868
Adjusted R-squared	0.261081	S.D. dependent var	50.78074
S.E. of regression	43.65131	Sum squared resid	1084194.
F-statistic	51.61440	Durbin-Watson stat	2.079961
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.266240	Mean dependent var	-0.343868
Sum squared resid	1084194.	Durbin-Watson stat	2.079961

Panel OLS Continued

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.109635	3	0.7747

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
WMC	-0.017326	-0.014732	0.000011	0.4440
CDC	0.001133	0.001804	0.000004	0.7374
EHSC	0.002727	0.003624	0.000036	0.8810

Cross-section random effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Date: 09/23/18 Time: 18:37
Sample: 2007 2016
Periods included: 10
Cross-sections included: 64
Total panel (unbalanced) observations: 638

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.593476	2.223369	0.716694	0.4739
WMC	-0.017326	0.010693	-1.620360	0.1057
CDC	0.001133	0.005044	0.224657	0.8223
EHSC	0.002727	0.010927	0.249574	0.8030

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.430803	Mean dependent var	0.149091
Adjusted R-squared	0.365012	S.D. dependent var	48.35039
S.E. of regression	38.52856	Akaike info criterion	10.23976
Sum squared resid	847621.1	Schwarz criterion	10.70795
Log likelihood	-3199.483	Hannan-Quinn criter.	10.42151
F-statistic	6.548003	Durbin-Watson stat	1.854450
Prob(F-statistic)	0.000000		

Appendix 26: Granger Causality Test

Model 1

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 17:41
Sample: 2007 2016
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROCE	575	0.12809	0.7206
ROCE does not Granger Cause WMC		0.07868	0.7792
CDC does not Granger Cause ROCE	576	0.01684	0.8968
ROCE does not Granger Cause CDC		0.05939	0.8075
EHSC does not Granger Cause ROCE	574	0.05325	0.8176
ROCE does not Granger Cause EHSC		0.09983	0.7521
CDC does not Granger Cause WMC	575	6.91066	0.0088
WMC does not Granger Cause CDC		0.00720	0.9324
EHSC does not Granger Cause WMC	573	17.8806	3.E-05
WMC does not Granger Cause EHSC		5.32147	0.0214
EHSC does not Granger Cause CDC	574	9.83937	0.0018
CDC does not Granger Cause EHSC		6.14826	0.0134

Model 2

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 17:42
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause EPS	511	0.66723	0.5136
EPS does not Granger Cause WMC		3.82062	0.0225
CDC does not Granger Cause EPS	512	0.33091	0.7184
EPS does not Granger Cause CDC		2.27228	0.1041
EHSC does not Granger Cause EPS	510	0.18730	0.8293
EPS does not Granger Cause EHSC		0.17160	0.8424
CDC does not Granger Cause WMC	511	2.37684	0.0939
WMC does not Granger Cause CDC		0.06132	0.9405
EHSC does not Granger Cause WMC	509	6.92054	0.0011
WMC does not Granger Cause EHSC		3.16435	0.0431
EHSC does not Granger Cause CDC	510	3.71547	0.0250
CDC does not Granger Cause EHSC		6.19863	0.0022

Model 3

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 17:43
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.

Granger Causality Test Continued

WMC does not Granger Cause ROE	511	0.70149	0.4963
ROE does not Granger Cause WMC		0.66745	0.5135
CDC does not Granger Cause ROE	512	0.29694	0.7432
ROE does not Granger Cause CDC		0.17346	0.8408
EHSC does not Granger Cause ROE	510	1.46220	0.2327
ROE does not Granger Cause EHSC		0.35591	0.7007
CDC does not Granger Cause WMC	511	2.37684	0.0939
WMC does not Granger Cause CDC		0.06132	0.9405
EHSC does not Granger Cause WMC	509	6.92054	0.0011
WMC does not Granger Cause EHSC		3.16435	0.0431
EHSC does not Granger Cause CDC	510	3.71547	0.0250
CDC does not Granger Cause EHSC		6.19863	0.0022

South Africa
Model 1
Pairwise Granger Causality Tests
Date: 09/23/18 Time: 20:52
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROCE	320	0.68326	0.5057
ROCE does not Granger Cause WMC		0.96448	0.3823
CDC does not Granger Cause ROCE	320	0.34309	0.7098
ROCE does not Granger Cause CDC		0.39469	0.6742
EHSC does not Granger Cause ROCE	318	0.94563	0.3895
ROCE does not Granger Cause EHSC		0.11928	0.8876
CDC does not Granger Cause WMC	320	1.15252	0.3172
WMC does not Granger Cause CDC		0.54204	0.5821
EHSC does not Granger Cause WMC	318	3.84062	0.0225
WMC does not Granger Cause EHSC		4.63387	0.0104
EHSC does not Granger Cause CDC	318	2.75266	0.0653
CDC does not Granger Cause EHSC		5.24168	0.0058

Model 2
Pairwise Granger Causality Tests
Date: 09/23/18 Time: 20:53
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause EPS	320	0.62521	0.5358
EPS does not Granger Cause WMC		2.44098	0.0887
CDC does not Granger Cause EPS	320	0.21089	0.8100
EPS does not Granger Cause CDC		1.33053	0.2658
EHSC does not Granger Cause EPS	318	0.07071	0.9318

Granger Causality Test Continued

EPS does not Granger Cause EHSC		0.24499	0.7829
CDC does not Granger Cause WMC	320	1.15252	0.3172
WMC does not Granger Cause CDC		0.54204	0.5821
EHSC does not Granger Cause WMC	318	3.84062	0.0225
WMC does not Granger Cause EHSC		4.63387	0.0104
EHSC does not Granger Cause CDC	318	2.75266	0.0653
CDC does not Granger Cause EHSC		5.24168	0.0058

Model 3

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 20:53
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROE	320	0.63053	0.5330
ROE does not Granger Cause WMC		1.15937	0.3150
CDC does not Granger Cause ROE	320	0.35878	0.6988
ROE does not Granger Cause CDC		0.29272	0.7464
EHSC does not Granger Cause ROE	318	1.33928	0.2635
ROE does not Granger Cause EHSC		0.26481	0.7675
CDC does not Granger Cause WMC	320	1.15252	0.3172
WMC does not Granger Cause CDC		0.54204	0.5821
EHSC does not Granger Cause WMC	318	3.84062	0.0225
WMC does not Granger Cause EHSC		4.63387	0.0104
EHSC does not Granger Cause CDC	318	2.75266	0.0653
CDC does not Granger Cause EHSC		5.24168	0.0058

Nigeria
Model 1

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:07
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROCE	144	0.45407	0.6360
ROCE does not Granger Cause WMC		0.17574	0.8390
CDC does not Granger Cause ROCE	144	0.07142	0.9311
ROCE does not Granger Cause CDC		0.00942	0.9906
EHSC does not Granger Cause ROCE	144	0.04059	0.9602
ROCE does not Granger Cause EHSC		0.01527	0.9848
CDC does not Granger Cause WMC	144	3.96588	0.0211
WMC does not Granger Cause CDC		1.88476	0.1557
EHSC does not Granger Cause WMC	144	1.52982	0.2202

Granger Causality Test Continued

WMC does not Granger Cause EHSC		0.67925	0.5087

EHSC does not Granger Cause CDC	144	0.82913	0.4386
CDC does not Granger Cause EHSC		0.10535	0.9001

Model 2

Pairwise Granger Causality Tests
Date: 09/23/18   Time: 21:08
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause EPS	144	0.73937	0.4793
EPS does not Granger Cause WMC		3.36680	0.0373
CDC does not Granger Cause EPS	144	2.77829	0.0656
EPS does not Granger Cause CDC		1.78388	0.1718
EHSC does not Granger Cause EPS	144	0.72604	0.4856
EPS does not Granger Cause EHSC		0.06043	0.9414
CDC does not Granger Cause WMC	144	3.96588	0.0211
WMC does not Granger Cause CDC		1.88476	0.1557
EHSC does not Granger Cause WMC	144	1.52982	0.2202
WMC does not Granger Cause EHSC		0.67925	0.5087
EHSC does not Granger Cause CDC	144	0.82913	0.4386
CDC does not Granger Cause EHSC		0.10535	0.9001

Model 3

Pairwise Granger Causality Tests
Date: 09/23/18   Time: 21:09
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROE	144	0.94187	0.3924
ROE does not Granger Cause WMC		0.32588	0.7224
CDC does not Granger Cause ROE	144	0.12208	0.8852
ROE does not Granger Cause CDC		1.21357	0.3003
EHSC does not Granger Cause ROE	144	2.05906	0.1314
ROE does not Granger Cause EHSC		3.55908	0.0311
CDC does not Granger Cause WMC	144	3.96588	0.0211
WMC does not Granger Cause CDC		1.88476	0.1557
EHSC does not Granger Cause WMC	144	1.52982	0.2202
WMC does not Granger Cause EHSC		0.67925	0.5087
EHSC does not Granger Cause CDC	144	0.82913	0.4386
CDC does not Granger Cause EHSC		0.10535	0.9001

Ghana

Model 1

Pairwise Granger Causality Tests
Date: 09/23/18   Time: 21:36

Granger Causality Test Continued

Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROCE	32	4.00224	0.0300
ROCE does not Granger Cause WMC		1.34354	0.2778
CDC does not Granger Cause ROCE	32	5.93207	0.0073
ROCE does not Granger Cause CDC		0.62289	0.5439
EHSC does not Granger Cause ROCE	32	4.36301	0.0228
ROCE does not Granger Cause EHSC		0.70403	0.5034
CDC does not Granger Cause WMC	32	0.62379	0.5435
WMC does not Granger Cause CDC		0.26458	0.7695
EHSC does not Granger Cause WMC	32	0.14632	0.8646
WMC does not Granger Cause EHSC		0.94463	0.4013
EHSC does not Granger Cause CDC	32	0.41300	0.6658
CDC does not Granger Cause EHSC		0.06168	0.9403

Model 2

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:37
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause EPS	32	2.02190	0.1520
EPS does not Granger Cause WMC		0.23409	0.7929
CDC does not Granger Cause EPS	32	0.13881	0.8710
EPS does not Granger Cause CDC		0.67251	0.5188
EHSC does not Granger Cause EPS	32	0.09847	0.9065
EPS does not Granger Cause EHSC		2.58145	0.0942
CDC does not Granger Cause WMC	32	0.62379	0.5435
WMC does not Granger Cause CDC		0.26458	0.7695
EHSC does not Granger Cause WMC	32	0.14632	0.8646
WMC does not Granger Cause EHSC		0.94463	0.4013
EHSC does not Granger Cause CDC	32	0.41300	0.6658
CDC does not Granger Cause EHSC		0.06168	0.9403

Model 3

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:38
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROE	32	6.74926	0.0042
ROE does not Granger Cause WMC		1.77905	0.1880
CDC does not Granger Cause ROE	32	7.00187	0.0036

Granger Causality Test Continued

ROE does not Granger Cause CDC		0.67033	0.5198
EHSC does not Granger Cause ROE	32	5.41290	0.0106
ROE does not Granger Cause EHSC		0.80510	0.4575
CDC does not Granger Cause WMC	32	0.62379	0.5435
WMC does not Granger Cause CDC		0.26458	0.7695
EHSC does not Granger Cause WMC	32	0.14632	0.8646
WMC does not Granger Cause EHSC		0.94463	0.4013
EHSC does not Granger Cause CDC	32	0.41300	0.6658
CDC does not Granger Cause EHSC		0.06168	0.9403

Tanzania

Model 1

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:38
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROCE	15	5.05230	0.0304
ROCE does not Granger Cause WMC		0.42665	0.6640
CDC does not Granger Cause ROCE	16	2.46366	0.1306
ROCE does not Granger Cause CDC		1.08871	0.3703
EHSC does not Granger Cause ROCE	16	0.08450	0.9196
ROCE does not Granger Cause EHSC		0.18763	0.8315
CDC does not Granger Cause WMC	15	0.65350	0.5411
WMC does not Granger Cause CDC		1.76925	0.2199
EHSC does not Granger Cause WMC	15	0.44057	0.6556
WMC does not Granger Cause EHSC		1.95521	0.1920
EHSC does not Granger Cause CDC	16	0.06710	0.9355
CDC does not Granger Cause EHSC		1.91976	0.1927

Model 2

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:39
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause EPS	15	0.17723	0.8402
EPS does not Granger Cause WMC		1.22457	0.3344
CDC does not Granger Cause EPS	16	0.19784	0.8234
EPS does not Granger Cause CDC		0.81191	0.4689
EHSC does not Granger Cause EPS	16	0.04263	0.9584
EPS does not Granger Cause EHSC		0.12326	0.8852
CDC does not Granger Cause WMC	15	0.65350	0.5411
WMC does not Granger Cause CDC		1.76925	0.2199
EHSC does not Granger Cause WMC	15	0.44057	0.6556

Granger Causality Test Continued

WMC does not Granger Cause EHSC		1.95521	0.1920
EHSC does not Granger Cause CDC	16	0.06710	0.9355
CDC does not Granger Cause EHSC		1.91976	0.1927

Model 3

Pairwise Granger Causality Tests
Date: 09/23/18 Time: 21:40
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WMC does not Granger Cause ROE	15	4.66267	0.0371
ROE does not Granger Cause WMC		0.31442	0.7372
CDC does not Granger Cause ROE	16	3.49750	0.0667
ROE does not Granger Cause CDC		1.13298	0.3569
EHSC does not Granger Cause ROE	16	0.21911	0.8067
ROE does not Granger Cause EHSC		0.18242	0.8357
CDC does not Granger Cause WMC	15	0.65350	0.5411
WMC does not Granger Cause CDC		1.76925	0.2199
EHSC does not Granger Cause WMC	15	0.44057	0.6556
WMC does not Granger Cause EHSC		1.95521	0.1920
EHSC does not Granger Cause CDC	16	0.06710	0.9355
CDC does not Granger Cause EHSC		1.91976	0.1927

Appendix 27: Annual Mean for Variables

Annual Mean for Variables for Firms in South Africa

FIRMS	YEAR	ROCE (%)	EPS	ROE (%)	WMC	CDC	EHSC
African Rainbow Mineral Limited	2007	9.40	9813.60	11.10	0.00	126.90	138.70
	2008	16.30	27789.50	27.00	0.00	49.60	242.00
	2009	8.20	21847.20	14.30	401.40	107.80	998.50
	2010	6.00	18423.80	9.60	570.80	123.30	1141.50
	2011	9.80	31050.20	15.90	313.40	105.80	979.50
	2012	7.70	29699.90	14.90	0.00	2322.70	1250.50
	2013	10.10	26369.80	15.50	516.50	2832.90	987.40
	2014	5.00	29602.00	15.40	451.80	4401.40	1168.50
	2015	3.90	10278.40	6.80	524.80	2163.20	921.60
	2016	2.40	10947.00	4.40	842.10	2349.00	1639.80
Andulela Investment Holdings	2007	-0.80	-37.20	-1.80	0.00	238.60	0.00
	2008	1.90	-51.00	-2.90	0.00	21.90	12.50
	2009	-13.80	-1701.40	-25.70	201.70	333.50	74.90
	2010	-48.40	-171.20	-75.90	410.90	310.50	41.10
	2011	-26.30	-21.50	-40.10	156.70	338.90	73.50
	2012	-1.20	85.10	-2.40	257.50	281.40	71.70
	2013	-13.00	107.40	-24.00	197.50	347.90	0.00
	2014	-5.00	-354.30	-11.00	311.60	802.40	39.00
	2015	1.80	-234.20	2.10	179.20	311.00	34.60
	2016	2.10	89.10	3.80	487.50	547.40	42.10
Anglo American Platinum	2007	0.00	50252.40	0.00	0.00	497.40	0.00
	2008	0.00	0.00	0.00	183.40	469.50	0.00
	2009	5.30	29835.20	10.80	523.20	695.00	67.90
	2010	3.70	62508.50	8.30	99.50	646.10	63.90
	2011	3.20	44371.40	7.20	0.00	707.20	56.80
	2012	4.00	33194.00	8.80	63.60	584.80	55.40
	2013	-3.80	26157.20	-9.30	137.90	724.60	100.30
	2014	1.20	825.70	2.30	44.10	655.90	59.20
	2015	2.50	-60518.40	4.80	92.20	647.70	83.20
	2016	3.00	13938.60	7.60	130.70	746.80	53.20
Anglogold Ashanti	2007	0.00	0.00	0.00	377.30	0.00	0.00
	2008	0.00	0.00	0.00	384.90	0.00	0.00
	2009	0.00	0.00	0.00	177.30	0.00	0.00
	2010	0.00	0.00	0.00	61.60	0.00	0.00
	2011	0.00	0.00	0.00	111.70	0.00	19.60
	2012	0.00	0.00	0.00	342.60	397.20	77.20
	2013	0.00	-8627.90	0.00	1354.90	1450.60	127.60
	2014	0.00	-218.10	0.00	741.60	687.10	76.30
	2015	0.00	-256.00	0.00	1419.50	1222.40	19.20
	2016	0.00	332.40	0.00	514.10	545.10	150.70
Arcelormittal South Africa	2007	10.00	21793.00	26.00	727.60	575.30	710.60
	2008	26.00	31026.20	39.00	408.20	0.00	0.00
	2009	0.80	-2076.90	2.00	1078.40	978.50	898.70
	2010	2.00	7830.70	6.00	1004.50	913.20	821.90
	2011	0.00	2664.20	0.00	587.70	0.00	0.00
	2012	0.00	3163.10	0.00	404.60	0.00	0.00
	2013	0.00	2779.80	0.00	0.00	0.00	334.20
	2014	0.00	3100.40	0.00	0.00	0.00	233.70
	2015	0.00	0.00	0.00	358.40	0.00	320.00
	2016	0.00	0.00	0.00	221.60	0.00	0.00
Assore Limited	2007	15.10	46022.40	24.50	0.00	0.00	255.50
	2008	31.50	165658.00	75.30	0.00	0.00	259.20
	2009	29.50	275026.80	48.90	579.10	639.00	469.30
	2010	12.20	28514.70	19.00	456.60	433.80	0.00
	2011	21.70	52697.10	29.90	0.00	0.00	64.60
	2012	23.20	64714.40	35.70	0.00	0.00	53.30
	2013	20.30	50430.80	24.20	41.00	44.10	66.80
	2014	18.20	60466.00	23.10	85.70	76.30	79.50

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

	2015	5.60	19084.80	7.24	89.60	83.20	64.00
	2016	0.00	30137.60	7.90	113.00	117.40	119.70
Atlatsa Resources	2007	2.00	0.00	4.80	148.90	0.00	536.40
	2008	4.20	61.20	7.30	0.00	0.00	1127.00
	2009	15.10	1.40	19.80	635.00	0.00	1803.30
	2010	10.50	47.90	15.60	0.00	0.00	1618.60
	2011	12.00	0.00	18.00	556.40	0.00	1653.40
	2012	22.00	0.00	31.30	0.00	0.00	1603.60
	2013	5.00	0.00	11.20	0.00	0.00	1784.60
	2014	10.00	53.00	18.20	506.40	0.00	2368.20
	2015	0.00	61.40	0.00	256.30	0.00	2778.60
	2016	0.00	82.00	0.00	817.70	0.00	2752.30
Bauba Platinum	2007	1.30	28.80	2.60	177.70	20.30	0.00
	2008	2.90	4.40	4.20	128.30	16.00	0.00
	2009	3.90	-0.40	5.10	183.70	16.00	42.30
	2010	12.60	-43.40	14.60	397.20	32.00	41.10
	2011	10.00	-43.10	17.80	207.70	19.80	153.00
	2012	12.20	-75.40	17.00	161.80	16.60	81.30
	2013	2.30	-27.20	5.30	139.70	10.30	123.00
	2014	8.00	0.00	12.50	254.00	26.50	23.40
	2015	2.86	4.40	4.50	259.80	24.30	0.00
	2016	-2.80	-37.50	-4.00	0.00	53.20	0.00
BHP Billiton	2007	3.10	18.60	6.80	64.30	67.70	0.00
	2008	3.50	27.70	6.50	30.60	74.40	0.00
	2009	3.80	39.90	7.20	35.90	111.80	27.00
	2010	13.80	-11.40	18.40	0.00	75.30	35.20
	2011	7.90	0.00	11.20	23.50	66.60	34.90
	2012	6.90	-18.00	12.60	20.20	71.70	33.50
	2013	13.00	21.90	24.20	30.40	27.30	19.60
	2014	9.00	23.10	15.10	29.60	45.20	21.30
	2015	0.00	22.90	0.00	0.00	0.00	24.60
	2016	0.00	0.00	0.00	0.00	106.40	53.20
Buffalo Coal Corp	2007	0.00	-3.40	0.00	0.00	0.00	0.00
	2008	0.00	-11.70	0.00	26.20	0.00	11.70
	2009	0.00	0.00	0.00	0.00	0.00	12.00
	2010	0.00	0.00	0.00	52.50	0.00	9.10
	2011	0.00	-4.30	0.00	66.60	0.00	15.70
	2012	0.00	-5.10	0.00	11.00	0.00	12.90
	2013	0.00	-20.80	0.00	13.70	0.00	9.10
	2014	-14.10	-32.70	-44.30	18.70	18.70	20.30
	2015	-100.63	0.00	-259.70	0.00	0.00	0.00
	2016	-9.03	37.70	-20.50	0.00	0.00	0.00
Central Rand Gold limited	2007	-17.60	-416.90	-29.20	0.00	69.40	22.80
	2008	-30.80	-236.30	-45.50	8.30	675.10	83.10
	2009	-61.60	-374.80	-81.70	66.50	73.90	117.80
	2010	-128.80	-103.00	-248.10	303.60	61.60	166.70
	2011	-49.00	-19.80	-137.80	317.40	127.30	143.00
	2012	-15.60	-259.10	-64.40	202.30	15.60	99.30
	2013	-63.20	-728.10	-173.30	319.00	142.80	121.50
	2014	6.70	-24.60	14.10	0.00	36.10	138.70
	2015	-98.90	-224.10	-113.90	0.00	138.20	143.40
	2016	-31.70	-67.80	-38.80	0.00	31.00	55.40
Chrometco Limited	2007	0.00	0.00	0.00	0.00	0.00	59.20
	2008	0.00	0.00	0.00	0.00	0.00	113.70
	2009	0.00	0.00	0.00	0.00	0.00	83.90
	2010	-6.40	-66.00	-12.40	0.00	0.00	625.50
	2011	5.10	54.70	13.30	0.00	16.80	395.70
	2012	44.00	979.10	56.70	0.00	9.20	180.20
	2013	-5.40	-89.90	-7.00	0.00	34.90	124.60
	2014	-0.14	6.90	-0.20	0.00	28.00	98.20
	2015	-9.20	-105.00	-11.20	0.00	26.90	131.80
	2016	-10.80	238.70	-13.20	0.00	42.10	0.00
Delrand Resources limited	2007	0.00	0.00	0.00	18.60	35.50	1.70
	2008	0.00	0.00	0.00	20.40	39.40	7.30

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

	2009	0.00	0.00	0.00	26.00	65.90	43.90
	2010	0.00	0.00	0.00	38.80	59.40	50.20
	2011	0.00	0.00	0.00	0.00	0.00	54.90
	2012	0.00	0.00	0.00	49.70	88.30	31.30
	2013	0.00	0.00	0.00	44.10	33.40	0.00
	2014	0.00	0.00	0.00	56.10	39.00	23.40
	2015	0.00	0.00	0.00	56.30	28.20	24.30
	2016	0.00	0.00	0.00	0.00	0.00	0.00
Eastern Platinum limited	2007	-1.10	-0.30	-1.40	0.00	0.00	0.00
	2008	1.88	0.30	2.40	13.70	0.00	55.40
	2009	0.13	0.20	0.19	161.80	59.90	103.80
	2010	0.87	0.00	0.94	0.00	50.20	91.30
	2011	-13.30	-1.60	-16.40	31.30	31.30	50.90
	2012	-7.50	-2.0	-10.50	77.20	62.50	86.40
	2013	-30.50	-25.70	-43.60	95.70	31.90	31.90
	2014	-49.40	-21.10	-53.20	46.90	42.10	54.50
	2015	-10.70	-2.70	-13.60	0.00	177.90	65.30
	2016	0.00	0.00	0.00	0.00	332.40	0.00
Ferrum Crescent Limited	2007	19.10	55.80	20.20	0.00	57.50	50.80
	2008	-25.30	-49.30	-26.40	0.00	11.70	320.80
	2009	-82.70	-315.90	-83.50	203.70	43.90	179.70
	2010	-466.20	-133.80	-728.40	114.20	6.80	228.30
	2011	-94.40	-65.00	-428.00	19.60	33.30	431.00
	2012	114.50	28.10	173.20	0.00	88.30	386.20
	2013	-87.40	-9.10	-101.90	60.80	129.10	258.20
	2014	-133.00	-11.70	-263.40	140.20	65.40	39.00
	2015	-170.20	-6.40	-446.40	179.20	47.40	64.00
	2016	-133.50	-4.90	-179.80	0.00	59.80	68.70
Glencore Plc	2007	0.00	0.00	0.00	0.00	50.80	43.70
	2008	0.00	0.00	0.00	0.00	116.60	0.00
	2009	0.00	0.00	0.00	205.70	79.90	51.90
	2010	0.00	0.00	0.00	182.60	91.30	13.70
	2011	0.00	0.00	0.00	78.40	254.70	31.30
	2012	0.00	0.00	0.00	183.90	386.20	38.60
	2013	0.00	0.00	0.00	45.60	349.40	53.20
	2014	0.00	0.00	0.00	342.80	0.00	37.40
	2015	0.00	0.00	0.00	281.60	486.40	16.60
	2016	0.00	0.00	0.00	0.00	443.20	48.80
Gold Fields limited	2007	14.40	7157.20	20.90	0.00	45.70	0.00
	2008	14.40	9958.10	21.20	0.00	68.50	27.70
	2009	17.60	4573.10	26.90	30.00	117.80	43.90
	2010	18.40	11757.50	27.70	182.60	150.70	29.70
	2011	9.40	19002.30	16.20	350.70	123.40	37.20
	2012	6.30	809.20	11.30	389.90	125.10	108.50
	2013	-8.20	-1200.00	-14.70	171.60	148.90	95.70
	2014	0.30	31.20	0.56	126.20	149.60	144.90
	2015	-4.10	-396.80	-8.80	39.70	236.80	153.60
	2016	2.70	443.20	5.40	0.00	392.20	0.00
Great Basin Gold limited	2007	0.00	0.00	0.00	33.80	294.40	33.80
	2008	0.00	0.00	0.00	275.60	0.00	275.60
	2009	0.00	0.00	0.00	30.00	383.40	30.00
	2010	0.00	0.00	0.00	121.00	91.30	121.00
	2011	0.00	0.00	0.00	270.30	254.70	270.30
	2012	0.00	0.00	0.00	358.60	327.30	358.60
	2013	0.00	0.00	0.00	1195.50	557.50	1195.50
	2014	0.00	0.00	0.00	380.20	433.10	380.20
	2015	0.00	0.00	0.00	631.00	256.00	631.00
	2016	0.00	0.00	0.00	0.00	664.80	0.00
Hulamin limited	2007	0.00	1378.40	0.00	558.40	59.20	6.80
	2008	0.00	1603.80	0.00	116.60	113.70	105.00
	2009	0.00	798.80	0.00	79.90	83.90	71.90
	2010	1.80	593.60	3.80	91.30	625.50	132.40
	2011	1.70	489.80	2.80	195.90	395.70	66.60
	2012	1.70	165.50	3.20	36.80	180.20	106.70

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

	2013	4.50	-6410.20	5.90	0.00	124.60	54.70
	2014	9.90	1869.60	12.30	0.00	98.20	21.80
	2015	3.10	2099.20	6.20	102.40	131.80	24.30
	2016	9.30	2637.00	13.10	0.00	0.00	46.50
Jubilee Platinum Plc	2007	-17.60	-36.00	-18.60	0.00	0.00	37.20
	2008	-12.90	-51.00	-13.10	0.00	0.00	49.60
	2009	-9.90	-73.50	-12.70	179.70	185.70	24.00
	2010	-2.20	-30.80	-2.70	228.30	260.30	1.80
	2011	-6.90	-52.30	-9.30	0.00	0.00	7.80
	2012	-8.70	-48.00	-11.70	0.00	0.00	79.10
	2013	-8.90	-36.60	-11.90	71.40	215.70	31.90
	2014	-9.30	-12.80	-12.70	101.30	261.70	35.80
	2015	-11.80	-5.80	-16.00	89.60	126.70	42..20
	2016	-10.20	0.00	-16.40	0.00	0.00	62.00
Keaton Energy Holdings limited	2007	0.00	0.00	0.00	294.40	45.70	148.90
	2008	0.00	0.00	0.00	0.00	27.70	151.60
	2009	0.00	0.00	0.00	201.70	531.20	59.90
	2010	0.00	0.00	0.00	0.00	121.00	75.30
	2011	0.00	0.00	0.00	233.10	62.70	80.30
	2012	0.00	0.00	0.00	0.00	93.80	108.50
	2013	0.00	0.00	0.00	0.00	255.20	127.60
	2014	0.00	0.00	0.00	361.50	252.40	306.90
	2015	0.00	0.00	0.00	0.00	216.30	256.00
	2016	0.00	0.00	0.00	0.00	392.20	573.90
Kumba Iron Ore limited	2007	4.00	170.90	11.80	76.10	0.00	441.60
	2008	5.40	332.40	10.70	40.80	1778.80	555.50
	2009	4.90	436.90	9.80	63.90	0.00	860.70
	2010	1.40	1019.60	1.90	168.90	3077.50	1164.30
	2011	14.40	1040.20	15.50	70.50	3622.20	1163.60
	2012	8.20	714.10	8.40	161.80	5072.00	1320.40
	2013	4.60	730.50	7.50	291.60	3884.10	837.00
	2014	3.10	534.70	5.80	409.80	3151.80	942.60
	2015	1.20	151.30	2.50	234.20	2240.00	0.00
	2016	1.90	605.00	3.00	0.00	1737.30	0.00
Master Drilling Groups limited	2007	0.00	0.00	0.00	38.90	38.90	0.00
	2008	0.00	0.00	0.00	91.90	16.00	0.00
	2009	0.00	0.00	0.00	95.90	16.00	203.70
	2010	0.00	0.00	0.00	0.00	0.00	114.20
	2011	0.00	0.00	0.00	0.00	49.00	19.60
	2012	0.00	0.00	0.00	0.00	86.40	0.00
	2013	0.00	0.00	0.00	0.00	51.60	60.80
	2014	0.00	0.00	0.00	0.00	35.80	140.20
	2015	0.00	0.00	0.00	0.00	15.40	179.20
	2016	0.00	0.00	0.00	0.00	17.70	0.00
Middle East Diamond Resources	2007	0.00	52.50	0.00	0.00	0.00	0.00
	2008	0.00	56.90	0.00	0.00	0.00	0.00
	2009	0.00	63.90	0.00	601.10	0.00	205.70
	2010	0.00	111.90	0.00	570.80	0.00	182.60
	2011	0.00	90.10	0.00	509.30	23.50	78.40
	2012	0.60	172.90	0.90	0.00	27.60	183.90
	2013	2.00	154.90	3.00	60.80	9.10	45.60
	2014	5.70	177.60	8.40	327.20	4.10	342.80
	2015	1.50	172.80	2.30	140.80	28.20	281.60
	2016	13.60	316.90	19.80	133.00	64.30	0.00
Merafe Ressources limited	2007	9.30	169.20	16.70	0.00	0.00	0.00
	2008	27.40	612.40	41.40	320.80	0.00	0.00
	2009	-4.50	-119.80	-6.50	523.20	147.80	129.80
	2010	7.30	251.10	10.80	274.00	440.60	123.30
	2011	-0.20	117.50	-0.40	242.90	436.90	43.10
	2012	1.10	92.00	1.80	0.00	233.60	119.50
	2013	4.20	167.10	7.20	137.90	164.10	137.90
	2014	4.00	124.60	6.90	0.00	229.00	42.10
	2015	6.40	175.40	10.00	92.20	248.30	28.20
	2016	8.90	469.80	13.70	181.70	383.40	0.00

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

Northam Platinum limited	2007	39.80	9476.90	60.50	104.90	54.10	66.00
	2008	36.20	9144.60	56.50	80.20	77.30	41.80
	2009	36.20	3438.80	56.50	41.90	191.70	52.50
	2010	6.70	4059.20	7.60	123.30	276.20	167.30
	2011	6.40	1753.30	7.30	139.10	80.30	126.20
	2012	2.90	1487.80	3.70	58.80	0.00	110.50
	2013	3.60	2073.40	4.80	118.50	0.00	107.80
	2014	0.12	34.30	0.16	157.40	0.00	35.80
	2015	-5.40	-2597.10	-11.30	105.00	87.00	46.10
	2016	-1.80	0.00	-2.80	0.00	117.40	93.10
Oakbay Resources and Energy limited	2007	0.00	18.60	0.00	50.80	0.00	558.40
	2008	0.00	27.70	0.00	116.60	11.70	116.60
	2009	0.00	39.90	0.00	878.70	14.40	79.90
	2010	0.00	-11.40	0.00	958.90	19.90	91.30
	2011	0.00	0.00	0.00	607.30	0.80	195.90
	2012	0.00	0.00	0.00	386.20	23.90	36.80
	2013	0.00	0.00	0.00	0.00	21.30	0.00
	2014	0.00	0.00	0.00	249.30	17.10	0.00
	2015	-0.70	-348.20	-1.20	358.40	24.30	102.40
	2016	-0.20	-14.20	-0.30	731.30	31.00	0.00
Pan African Reources plc	2007	11.10	79.50	21.80	0.00	0.00	135.40
	2008	11.80	103.50	15.00	0.00	0.00	0.00
	2009	16.30	199.70	20.10	197.70	7.60	179.70
	2010	18.30	305.90	23.00	274.00	10.50	228.30
	2011	18.60	321.30	23.10	156.70	4.30	41.10
	2012	14.90	456.60	26.40	55.20	22.10	44.10
	2013	11.40	524.20	21.80	42.50	16.70	71.40
	2014	10.80	385.40	16.20	101.30	22.30	101.30
	2015	4.90	185.30	7.70	89.60	15.40	89.60
	2016	10.10	669.20	19.00	199.40	22.20	0.00
Platfields limited	2007	0.00	-10.20	0.00	182.70	558.40	44.00
	2008	0.00	58.60	0.00	0.00	116.60	29.20
	2009	0.00	179.90	0.00	93.90	79.90	32.00
	2010	0.00	183.10	0.00	0.00	91.30	68.50
	2011	0.00	-143.60	0.00	70.50	195.90	31.30
	2012	0.00	-149.90	0.00	0.00	36.80	36.80
	2013	0.00	-262.20	0.00	0.00	0.00	45.60
	2014	0.00	-179.60	0.00	44.20	0.00	31.20
	2015	0.00	-131.70	0.00	0.00	102.40	89.60
	2016	0.00	0.00	0.00	39.90	161.80	0.00
Randgold and Exploration company limited	2007	1.90	0.00	2.90	346.90	304.60	76.10
	2008	2.10	0.00	3.60	126.80	422.80	40.80
	2009	0.00	0.00	0.00	189.70	838.70	63.90
	2010	1.30	23560.60	4.20	625.50	1415.50	168.90
	2011	2.20	1292.60	2.80	211.60	1155.80	70.50
	2012	4.20	239.10	5.20	161.80	1563.20	161.80
	2013	2.40	151.90	3.70	150.40	1200.00	291.60
	2014	1.80	0.00	3.10	260.20	1043.90	409.80
	2015	2.70	0.00	4.80	266.20	742.20	234.40
	2016	3.60	0.00	5.50	270.40	952.90	0.00
Royal Bafokeng Platinum Limited	2007	6.00	0.00	10.00	55.80	106.60	38.90
	2008	-11.00	2609.80	-1.80	40.80	97.70	16.00
	2009	16.50	2140.80	28.90	24.00	163.80	16.00
	2010	13.20	4360.50	18.00	9.10	173.50	0.00
	2011	1.40	3271.50	2.90	13.70	703.30	49.00
	2012	0.80	1912.60	1.80	40.50	2333.70	86.40
	2013	1.40	2627.90	1.80	129.10	1598.00	51.60
	2014	1.90	3723.60	2.80	63.90	2073.70	35.80
	2015	-15.00	-1065.00	-21.00	92.20	966.40	15.40
	2016	0.90	1921.30	1.10	0.00	819.90	17.70
Sibanye Gold Limited	2007	0.80	13.50	1.90	558.40	76.10	45.70
	2008	0.00	39.40	0.00	408.20	40.80	55.40
	2009	4.90	-126.60	8.20	679.00	63.90	41.90

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

	2010	-0.20	-392.70	-2.40	547.90	168.90	25.10
	2011	1.20	-315.40	2.80	391.80	70.50	23.50
	2012	4.40	-233.60	7.30	441.40	161.80	27.60
	2013	2.80	-174.20	6.70	273.40	291.60	24.30
	2014	4.70	0.00	14.40	342.80	409.80	19.60
	2015	6.50	42.80	11.10	102.40	234.20	17.50
	2016	-0.10	-150.70	-0.30	0.00	0.00	41.40
South African Coal Mining Holdings limited	2007	1.00	-10.50	2.10	0.00	35.50	35.50
	2008	1.90	58.60	4.50	0.00	40.80	129.80
	2009	3.70	179.90	6.80	179.70	69.90	203.70
	2010	8.10	183.10	10.80	502.30	41.10	114.20
	2011	0.20	-142.60	0.90	0.00	86.20	19.60
	2012	1.10	-149.90	2.90	0.00	62.50	0.00
	2013	4.00	-262.20	10.00	147.30	71.40	60.80
	2014	4.70	-179.60	9.60	163.60	0.00	140.20
	2015	2.50	-131.70	7.50	217.60	65.30	179.20
	2016	1.80	0.00	3.90	0.00	115.20	0.00
Tawana Resources limited	2007	4.00	30.50	11.40	81.20	0.00	0.00
	2008	9.80	5.80	16.30	56.90	0.00	0.00
	2009	14.20	-100.60	28.20	71.90	601.10	205.70
	2010	22.70	-175.80	32.00	41.10	570.80	182.60
	2011	3.80	-180.20	9.80	70.50	509.30	78.40
	2012	20.10	-46.00	27.70	55.20	0.00	183.90
	2013	2.90	-27.20	4.10	42.50	60.80	45.60
	2014	2.70	0.00	5.00	45.20	327.20	342.80
	2015	7.80	4.40	16.90	38.40	140.80	281.60
	2016	6.90	-86.20	14.40	0.00	133.00	0.00
Tharisa plc	2007	6.20	38.90	12.10	216.60	0.00	54.10
	2008	8.40	4.40	14.80	113.70	0.00	84.60
	2009	10.80	-0.40	23.80	205.70	321.50	123.80
	2010	19.40	-43.40	48.40	168.90	274.00	73.10
	2011	1.80	-43.10	6.30	129.30	352.60	43.10
	2012	0.40	-75.40	1.20	180.20	73.60	119.50
	2013	1.50	-27.20	3.00	109.40	45.60	137.90
	2014	6.00	0.00	11.00	99.70	31.20	26.50
	2015	4.90	4.40	12.00	234.20	89.60	28.20
	2016	0.00	-37.50	0.00	265.90	177.30	0.00
The Waterberg Coal Company Limited	2007	1.10	38.90	2.40	157.40	0.00	558.40
	2008	1.60	4.40	2.70	37.90	320.80	116.60
	2009	1.80	-0.40	3.20	37.90	523.20	79.90
	2010	0.90	-43.40	1.70	18.30	274.00	91.30
	2011	1.30	-43.10	1.90	170.40	242.90	195.90
	2012	1.50	-75.40	2.00	22.10	0.00	36.80
	2013	1.80	-27.20	3.50	68.40	137.90	0.00
	2014	2.10	0.00	5.70	67.00	0.00	0.00
	2015	3.70	4.40	8.00	99.80	92.20	102.40
	2016	4.90	-37.50	9.00	201.70	181.70	155.10
Trans Hex Group limited	2007	0.80	27.10	1.40	710.60	104.90	66.00
	2008	0.90	4.40	1.90	116.60	80.20	119.60
	2009	0.60	-0.40	2.10	479.30	41.90	179.70
	2010	1.30	-43.40	2.40	410.90	123.30	228.30
	2011	4.70	-43.10	13.60	626.90	139.10	0.00
	2012	2.80	-75.40	4.20	772.40	58.80	0.00
	2013	3.20	-27.20	4.60	0.00	118.50	0.00
	2014	2.20	0.00	4.70	0.00	157.40	101.30
	2015	2.60	4.40	5.90	102.40	105.00	89.60
	2016	4.40	-37.50	7.80	332.40	0.00	133.00
Wesizwe Platinum Limited	2007	-3.30	-333.30	-7.50	0.00	0.00	43.70
	2008	-1.89	-71.30	-2.00	43.70	150.20	42.30
	2009	-1.80	132.80	-2.90	179.70	387.40	27.20
	2010	11.60	-933.10	14.20	228.30	374.40	111.90
	2011	-4.01	-520.70	-9.90	166.50	360.50	28.60
	2012	0.23	11.00	0.31	242.70	402.70	97.50

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in South Africa**continued**

	2013	-0.24	-8.40	-0.33	192.90	416.20	97.20
	2014	0.10	-215.90	-7.10	116.90	134.00	43.60
	2015	-2.60	-437.80	-7.60	89.60	1438.70	0.00
	2016	4.30	412.00	-.74	177.30	1085.80	161.80
ZCI limited	2007	0.40	-3.40	1.10	216.60	0.00	76.10
	2008	0.80	3.90	1.58	5.80	0.00	40.80
	2009	3.10	60.50	9.50	51.90	179.70	63.90
	2010	0.90	93.40	1.20	73.10	274.00	168.90
	2011	1.20	-59.90	2.70	31.30	156.70	70.50
	2012	1.50	-75.80	3.20	38.60	55.20	161.80
	2013	0.90	-116.70	1.30	54.70	42.50	291.60
	2014	0.70	-52.50	1.30	28.00	101.30	409.80
	2015	3.00	-41.20	6.00	0.00	89.60	234.20
	2016	2.10	0.00	4.20	59.80	199.40	0.00
Lonmin Plc	2007	0.00	0.00	0.00	38.90	0.00	0.00
	2008	0.00	0.00	0.00	91.90	0.00	26.20
	2009	0.00	0.00	0.00	95.90	0.00	22.00
	2010	0.00	0.00	0.00	0.00	0.00	47.90
	2011	0.00	0.00	0.00	0.00	0.00	23.50
	2012	0.00	0.00	0.00	0.00	0.00	27.60
	2013	0.00	0.00	0.00	0.00	0.00	24.30
	2014	0.00	0.00	0.00	0.00	0.00	24.90
	2015	0.00	0.00	0.00	0.00	0.00	0.00
	2016	0.00	0.00	0.00	0.00	0.00	0.00

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Nigeria

FIRMS	YEAR	ROCE (%)	EPS	ROE (%)	WMC	CDC	EHSC
African Paint Plc	2007	0.60	0.00	1.00	0.50	0.90	10.50
	2008	1.20	17.00	3.20	0.80	0.80	8.80
	2009	2.20	12.00	5.10	1.20	1.40	9.20
	2010	0.10	10.00	0.50	1.40	1.30	17.40
	2011	1.20	0.00	2.00	0.60	1.60	10.60
	2012	1.10	0.00	2.00	0.80	1.80	8.80
	2013	2.30	0.00	5.30	1.20	1.20	9.20
	2014	0.10	0.00	0.20	1.30	1.30	16.30
	2015	0.09	0.00	0.30	0.30	2.30	20.30
	2016	0.60	0.00	1.40	0.00	0.00	0.00
AluminiumExtrusion Ind Plc	2007	1.70	0.00	3.30	0.00	0.00	0.00
	2008	3.60	0.00	8.90	0.00	0.20	0.00
	2009	0.20	0.00	0.90	0.00	0.80	0.00
	2010	4.80	14.00	12.00	0.00	0.50	0.00
	2011	4.90	23.00	8.20	0.00	0.90	0.00
	2012	3.10	21.00	4.80	0.00	0.70	0.00
	2013	8.00	62.00	14.10	0.00	1.10	0.00
	2014	9.70	77.00	15.30	0.00	1.70	0.00
	2015	4.40	38.00	7.00	0.00	3.40	0.00
	2016	3.90	38.00	5.80	0.00	0.00	0.00
BergerPaints	2007	1.20	0.00	2.10	0.30	0.90	2.30
	2008	2.30	0.00	4.50	0.70	0.60	1.70
	2009	3.60	0.00	6.80	0.00	0.00	0.00
	2010	4.70	0.00	10.80	0.00	1.10	0.00
	2011	0.40	27.00	0.90	0.00	1.30	0.00
	2012	1.70	36.00	2.90	0.80	1.80	1.80
	2013	4.80	44.00	10.00	0.50	1.50	1.50
	2014	4.10	51.00	9.60	0.70	1.70	2.70
	2015	8.50	114.00	12.80	0.30	1.30	6.30
	2016	4.10	118.00	6.00	0.40	1.40	2.40
Beta Glass	2007	6.60	0.00	11.40	0.90	0.00	10.90
	2008	7.90	0.00	16.30	0.90	1.90	20.90
	2009	12.80	0.00	28.20	0.80	0.90	2.80
	2010	19.60	0.00	32.00	0.10	1.10	23.10

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Nigeria **continued**

	2011	3.80	187.00	9.80	0.30	1.20	2.30
	2012	12.10	199.00	27.70	0.80	1.40	10.80
	2013	1.80	202.00	4.10	0.70	1.70	8.70
	2014	1.90	237.00	5.00	0.30	1.00	2.30
	2015	9.90	249.00	16.90	0.70	1.10	8.70
	2016	8.60	264.00	14.40	0.70	2.10	3.70
Cap plc	2007	6.80	2.00	12.10	0.50	0.80	10.50
	2008	9.70	7.00	14.80	0.80	0.70	8.80
	2009	16.40	19.00	23.80	0.20	1.20	9.20
	2010	27.90	31.00	48.40	1.40	1.10	17.40
	2011	38.70	-12.90	65.60	0.60	1.40	10.60
	2012	43.50	60.00	99.70	0.80	0.90	8.80
	2013	64.90	54.00	111.70	0.20	1.30	9.20
	2014	69.20	48.00	140.80	1.30	1.10	16.30
	2015	62.70	36.00	114.00	0.30	0.90	20.30
	2016	0.00	40.00	0.00	0.00	1.80	0.00
Cement Company of North Nigeria	2007	0.00	0.00	0.00	0.00	3.40	0.00
	2008	1.40	134.00	3.80	0.00	6.20	0.00
	2009	1.60	184.00	4.30	0.00	7.70	0.00
	2010	11.80	101.00	27.00	0.00	8.70	0.00
	2011	10.40	104.00	21.70	0.00	12.30	0.00
	2012	7.60	86.00	16.40	0.00	19.60	0.00
	2013	10.40	124.00	18.80	0.00	18.10	0.00
	2014	12.20	153.00	20.30	0.00	18.70	0.00
	2015	7.00	96.00	11.80	0.00	46.60	2.50
	2016	0.00	102.00	0.00	0.00	54.30	0.00
Dangote Cement	2007	0.00	0.00	0.00	2.30	34.00	2.30
	2008	0.00	0.00	0.00	1.70	27.50	1.70
	2009	0.00	0.00	0.00	0.00	38.70	0.00
	2010	0.00	0.00	0.00	0.00	40.40	0.00
	2011	18.70	1086.00	38.70	0.00	43.50	0.00
	2012	15.40	942.00	35.40	1.80	68.40	1.80
	2013	18.60	1234.00	36.80	1.50	78.30	1.50
	2014	12.30	857.00	26.90	2.70	80.40	2.70
	2015	11.30	713.00	28.10	6.30	88.40	6.30
	2016	0.00	828.00	0.00	2.40	93.90	2.40
Oando	2007	0.00	0.00	0.00	1.90	22.70	10.90
	2008	0.00	0.00	0.00	0.90	0.00	1.90
	2009	0.00	0.00	0.00	0.40	48.20	2.40
	2010	0.00	0.00	0.00	3.20	52.10	3.20
	2011	1.10	829.00	2.80	0.40	39.80	3.40
	2012	1.50	126.00	5.20	0.90	60.30	5.90
	2013	0.39	23.00	0.90	2.10	77.60	2.10
	2014	-20.80	-2076.00	-34.00	1.10	63.20	9.10
	2015	-38.40	-423.00	-97.60	1.80	93.40	2.80
	2016	0.00	0.00	0.00	2.40	88.30	2.40
First Alluminium Nig	2007	1.40	1.00	3.60	0.50	0.80	12.50
	2008	-0.40	-2.00	-1.60	0.80	1.80	18.00
	2009	0.30	2.00	0.80	0.90	1.60	19.40
	2010	-2.20	15.90	-5.40	0.70	1.50	17.60
	2011	-1.90	-13.20	-4.70	0.50	1.90	12.50
	2012	-16.50	-47.60	-22.30	1.80	2.10	7.80
	2013	1.30	4.60	2.10	1.20	1.90	8.20
	2014	0.20	1.40	0.60	0.30	1.30	6.30
	2015	0.00	0.00	0.00	0.80	1.80	20.80
	2016	0.00	0.00	0.00	0.00	0.00	0.00
Japaul Oil and Maritime Services	2007	0.40	0.00	1.00	0.00	0.00	0.00
	2008	1.30	0.00	3.20	0.00	0.00	0.00
	2009	2.10	0.00	5.10	0.00	0.00	0.00
	2010	0.20	0.00	0.50	0.00	0.00	0.00
	2011	1.20	0.00	2.00	0.00	0.00	0.00
	2012	1.30	0.00	2.00	0.00	0.00	0.00
	2013	2.40	0.00	5.30	0.00	0.00	0.00

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Nigeria **continued**

	2014	0.09	0.00	0.20	0.00	0.00	0.00
	2015	0.15	0.00	0.30	0.00	0.00	0.00
	2016	0.80	0.00	1.40	0.00	0.00	0.00
Lafarge Africa	2007	0.00	356.00	0.00	0.00	0.00	12.30
	2008	21.70	375.00	34.30	0.00	0.00	11.70
	2009	6.10	168.00	11.60	0.00	7.40	0.00
	2010	4.80	163.00	10.10	0.00	142.20	0.00
	2011	4.10	288.00	15.40	0.00	173.20	0.00
	2012	5.70	487.00	21.50	1.60	211.00	1.60
	2013	9.70	0.00	35.30	2.30	257.00	2.30
	2014	10.20	767.00	19.10	2.70	243.00	2.70
	2015	8.10	629.00	15.30	2.30	531.00	2.30
	2016	0.00	0.00	0.00	2.40	521.00	2.40
Meyer Plc	2007	0.00	0.00	0.00	0.90	1.90	1.90
	2008	0.00	0.00	0.00	0.90	0.90	0.90
	2009	0.00	0.00	0.00	0.80	2.80	2.80
	2010	0.00	0.00	0.00	0.10	3.10	3.10
	2011	0.00	0.00	0.00	0.30	0.30	0.30
	2012	0.00	0.00	0.00	0.10	12.80	12.80
	2013	0.00	0.00	0.00	0.70	7.70	7.70
	2014	0.00	0.00	0.00	0.30	3.30	3.30
	2015	0.00	0.00	0.00	0.70	9.70	9.70
	2016	0.00	0.00	0.00	0.20	2.70	2.70
Multi verse mining and Exploration	2007	0.00	4.20	0.00	0.50	1.50	1.50
	2008	0.00	3.90	0.00	0.80	1.80	1.80
	2009	1.20	2.20	2.50	0.20	1.20	1.20
	2010	0.60	1.00	1.20	0.40	7.40	7.40
	2011	0.43	1.00	0.67	1.60	1.60	1.60
	2012	0.30	0.70	0.80	0.80	1.80	1.80
	2013	-5.60	-6.90	-11.70	1.20	1.20	1.20
	2014	-11.70	-13.00	-34.50	0.60	6.30	6.30
	2015	-9.40	-10.40	-34.50	0.30	0.30	0.30
	2016	-22.70	-13.70	-96.80	0.00	0.00	0.00
Port Land Paints and Products	2007	0.00	22.00	0.00	1.10	3.10	3.10
	2008	0.00	31.00	0.00	0.30	2.30	2.30
	2009	1000	46.00	21.10	0.80	1.80	1.80
	2010	8.10	33.00	13.80	0.30	2.30	2.30
	2011	6.70	43.00	16.10	0.80	1.80	1.80
	2012	-18.70	-72.00	-39.80	0.40	7.40	7.40
	2013	2.78	14.00	7.40	1.20	2.20	2.20
	2014	6.50	37.00	16.10	0.90	8.90	8.90
	2015	-12.30	-58.00	-33.70	0.80	10.80	10.80
	2016	0.00	-36.00	0.00	0.40	2.40	2.40
Premier Paints	2007	0.00	0.00	0.00	0.30	0.00	1.30
	2008	0.00	0.00	0.00	0.70	18.90	2.70
	2009	0.00	0.00	0.00	0.20	27.40	3.20
	2010	0.00	0.00	0.00	0.20	23.60	1.20
	2011	0.00	0.00	0.00	0.20	29.30	2.20
	2012	0.00	0.00	0.00	0.80	33.40	3.80
	2013	0.00	0.00	0.00	0.50	30.20	5.50
	2014	0.00	0.00	0.00	0.70	39.00	4.70
	2015	0.00	0.00	0.00	0.30	50.00	4.40
	2016	0.00	0.00	0.00	0.40	37.00	5.90
Seplat Petroleum Dev Company limited	2007	0.00	0.50	0.00	0.20	0.20	0.00
	2008	0.00	0.70	0.00	0.40	0.40	0.00
	2009	0.00	0.30	0.00	0.30	0.30	0.00
	2010	0.00	-2.10	0.00	3.20	3.20	0.00
	2011	0.00	1.70	0.00	2.90	2.90	0.00
	2012	0.00	2.90	0.00	1.50	1.50	0.00
	2013	0.00	9.10	0.00	2.40	2.40	0.00
	2014	0.00	4.30	0.00	2.50	2.50	0.00
	2015	0.00	5.30	0.00	3.90	3.90	0.00
	2016	0.00	8.80	0.00	3.30	3.30	0.00

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Nigeria **continued**

Thomas Wyatt Nig	2007	25.00	-1.20	40.00	0.00	0.00	4.80
	2008	26.40	-2.20	56.00	0.00	0.00	4.70
	2009	0.70	-3.90	1.90	0.00	0.00	1.80
	2010	4.20	-2.60	10.10	0.00	0.00	4.50
	2011	3.10	0.20	9.90	0.00	0.00	2.30
	2012	2.80	0.80	7.20	0.00	0.00	0.00
	2013	3.80	1.10	8.20	0.00	0.00	2.60
	2014	2.10	1.80	5.80	0.00	0.00	2.80
	2015	4.10	0.00	8.70	0.00	0.00	3.20
	2016	0.00	0.00	0.00	0.00	0.00	4.50
Total Nigeria	2007	6.30	0.00	15.10	1.70	48.00	2.30
	2008	12.40	0.00	31.58	0.90	47.00	3.30
	2009	10.10	0.00	29.50	1.80	18.00	8.30
	2010	5.40	0.00	12.20	0.60	45.00	7.30
	2011	9.80	46.00	21.70	2.30	23.00	3.30
	2012	10.50	59.00	23.20	0.00	0.00	3.30
	2013	9.70	62.00	21.30	0.80	26.00	1.20
	2014	7.60	44.00	21.30	0.00	28.00	0.00
	2015	2.80	78.00	6.60	1.10	32.00	3.20
	2016	3.10	84.00	7.20	1.50	45.00	4.00

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Ghana

FIRMS	YEAR	ROCE (%)	EPS	ROE (%)	WMC	CDC	EHSC
Ghana Oil	2007	1.10	3275.90	2.00	279.10	279.10	861.40
	2008	1.90	1478.90	4.20	160.20	406.70	813.40
	2009	6.70	0.00	15.10	233.30	841.80	750.50
	2010	4.30	1741.10	10.50	30.70	747.70	727.20
	2011	7.80	890.90	12.00	326.70	326.70	425.70
	2012	9.90	901.50	22.00	0.00	0.00	196.70
	2013	2.10	0.00	5.00	81.60	81.60	557.50
	2014	4.40	0.00	10.00	0.00	0.00	119.50
	2015	0.00	0.00	0.00	167.20	167.20	167.20
	2016	0.00	0.00	0.00	284.60	284.60	284.60
Total Petroleum Ghana	2007	0.80	3154.60	1.30	36.40	36.40	351.90
	2008	0.90	3327.50	2.90	394.40	394.40	342.60
	2009	1.30	3346.90	3.90	537.50	537.50	375.30
	2010	4.50	2867.80	12.60	450.60	450.60	399.40
	2011	4.80	2177.80	10.00	207.90	207.90	613.70
	2012	5.60	2376.60	12.20	0.00	0.00	475.30
	2013	1.10	2379.70	2.30	0.00	0.00	441.90
	2014	4.90	3073.70	8.00	0.00	0.00	142.30
	2015	1.40	1828.40	2.86	203.70	203.70	475.40
	2016	-1.30	0.00	-2.80	334.40	334.40	626.10
Golden Star Resources	2007	1.50	4610.50	3.10	12.10	861.40	157.70
	2008	1.90	6901.40	3.50	73.90	813.40	394.40
	2009	1.80	2738.30	3.80	40.60	750.50	537.50
	2010	6.80	1741.10	13.80	10.20	727.20	450.60
	2011	5.70	-10888.90	7.90	29.70	425.70	207.90
	2012	4.20	2294.60	6.90	32.80	196.70	0.00
	2013	7.80	4895.30	13.00	13.60	557.50	0.00
	2014	5.20	3984.40	9.00	5.70	119.50	0.00
	2015	0.00	4231.40	0.00	10.40	167.20	203.70
	2016	0.00	0.00	0.00	28.50	284.60	334.40
Tullow Oil	2007	4.80	8978.40	8.00	994.90	994.90	994.90
	2008	4.90	7761.10	8.90	1072.20	1072.20	1072.20
	2009	7.30	5172.40	10.60	851.90	851.90	851.90
	2010	8.80	5940.40	14.20	829.60	829.60	829.60
	2011	12.70	5246.50	27.10	920.60	920.60	920.60

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Ghana **continued**

	2012	13.60	4097.50	24.30	827.70	827.70	827.70
	2013	18.40	3535.50	39.40	829.50	829.50	829.50
	2014	19.70	3130.60	44.10	0.00	0.00	0.00
	2015	17.80	2925.40	37.20	167.20	167.20	167.20
	2016	26.80	5695.90	42.70	284.60	284.60	284.60

Source: Secondary data extracted by this study from annual reports.

Annual Mean for Variables for Firms in Tanzania

FIRMS	YEAR	ROCE (%)	EPS	ROE (%)	WMC	CDC	EHSC
Tanga Cement company	2007	-14.20	31.50	-27.60	0.00	0.00	0.30
	2008	-23.80	28.20	-40.80	0.00	0.00	0.30
	2009	-35.90	24.40	-61.60	0.00	0.00	0.40
	2010	-19.20	20.60	-28.80	0.20	0.20	0.30
	2011	-28.30	29.20	-49.00	0.10	0.30	0.30
	2012	-8.60	26.30	-15.60	0.10	0.40	0.20
	2013	-32.80	16.40	-63.20	0.30	0.50	0.20
	2014	-4.80	9.90	6.70	0.00	0.00	0.30
	2015	-6.4	8.50	-9.90	0.00	0.00	0.40
	2016	-18.90	0.00	-31.70	0.00	0.00	0.50
Tanzania Portland Cement Company	2007	0.70	19.0	1.60	0.10	0.20	0.30
	2008	1.10	22.20	2.30	0.10	0.20	0.40
	2009	1.90	42.60	3.50	0.10	0.20	0.30
	2010	1.40	20.90	1.60	0.10	0.20	0.30
	2011	7.20	18.70	12.00	0.20	0.20	0.30
	2012	0.80	34.20	1.20	0.20	0.10	0.40
	2013	1.90	20.90	2.40	0.10	0.20	0.30
	2014	6.50	30.30	8.00	0.10	0.20	0.00
	2015	1.30	28.10	2.60	0.00	0.00	0.00
	2016	1.60	31.00	2.80	0.10	0.20	0.80

Source: Secondary data extracted by this study from annual reports.

Appendix 28: List of Sub Saharan African Countries

S/N	Name of Country	Sub Region
1	Nigeria	West African Sub Region
2	Ghana	West African Sub Region
3	Benin	West African Sub Region
4	Burkina Faso	West African Sub Region
5	Cape Verde	West African Sub Region
6	The Gambia	West African Sub Region
7	Guinea	West African Sub Region
8	Guinea-Bissau	West African Sub Region
9	Ivory Coast	West African Sub Region
10	Liberia	West African Sub Region
11	Mali	West African Sub Region
12	Mauritania	West African Sub Region
13	Niger	West African Sub Region
14	Senegal	West African Sub Region
15	Sierra Leone	West African Sub Region
16	Togo	West African Sub Region
17	Cape Verde	West African Sub Region
18	Tanzania	East African Sub Region
19	Burundi	East African Sub Region
20	Kenya	East African Sub Region
21	Uganda	East African Sub Region
22	Rwanda	East African Sub Region
23	Comoros	East African Sub Region
24	Eritrea	East African Sub Region
25	Ethiopia	East African Sub Region
26	Somalia	East African Sub Region
27	Djibouti	East African Sub Region
28	Seychelles	East African Sub Region
29	Cameroon	Central African Sub Region
30	Central African Republic	Central African Sub Region
31	Chad	Central African Sub Region
32	Congo Republic(Brazzaville)	Central African Sub Region
33	Democratic Republic of Congo	Central African Sub Region
34	Equatorial Guinea	Central African Sub Region
35	Gabon	Central African Sub Region
36	Sao Tome and Principe	Central African Sub Region
37	South Africa	Southern African Sub Region
38	Angola	Southern African Sub Region
39	Lesotho	Southern African Sub Region
40	Malawi	Southern African Sub Region
41	Mozambique	Southern African Sub Region
42	Namibia	Southern African Sub Region
43	Swaziland	Southern African Sub Region
44	Zambia	Southern African Sub Region
45	Zimbabwe	Southern African Sub Region
46	Botswana	Southern African Sub Region

Source: United Nations Classification of Countries in Sub-Saharan Africa