

**Examining the effect of School Development Loans on education capacity  
and quality: Evidence from Ghana and Uganda**

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**Master of Commerce in Development Finance**

by

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## List of Acronyms

ANOVA	Analysis of Variance
BMZ	German Federal Ministry for Economic Cooperation and Development
DFI	Development Finance Institution
DFID	Department for International Development
DIB	Development Impact Bond
ECD	Early Childhood Development
EFA	Education for All
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
ELOM	Early Learning Outcomes Measure
EOF	Education Outcomes Fund
GDP	Gross Domestic Product
GIIN	Global Impact Investing Network
GPE	Global Partnership for Education
IBIF	Impact Bond Innovation Fund
IFC	International Finance Corporation
ILO	International Labour Organisation
IMF	International Monetary Fund
LCPS	Low Cost Private Schools
MDG	Millennium Development Goals
MDB	Multilateral Development Bank
MPL	Minimum Proficiency Level
NASUWT	The National Association of Schoolmasters / Union of Women Teachers
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OI	Opportunity International
PASEC	Programme d'Analyse des Systèmes Éducatifs de la Confemen
PPP	Public Private Partnership
PTR	Pupil-Teacher Ratio
RCT	Randomised Control Trial
REFFA	Regional Education Fund for Africa
SDG	Sustainable Development Goals
SIB	Social Impact Bond
SME	Small and Medium Enterprises
SSA	Sub Saharan Africa
UIS	UNESCO Institute for Statistics
UNDESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WB	World Bank

## Plagiarism Declaration

### Declaration

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## Abstract

Increased investment in education to build capacity and quality is essential if the world is to meet its ambitious targets on Sustainable Development Goal (SDG) 4: Quality Education. There are 258 million school aged children out of school, of which 98 million are in Sub-Saharan Africa (SSA). Low-income countries are experiencing dramatic growth in their populations and have severe limitations on their ability to fund the required infrastructure development. The financing gap is estimated to be US\$ 1.8 trillion to achieve SDG goals (Education Commission, 2016). Low-Cost Private Schools (LCPS), accessible to children from poor families, are growing rapidly in SSA to fill this gap. This study is focused on the potential to increase the use of innovative financing to improve capacity and quality for LCPSs. Most innovative finance schemes utilise some form of a School Development Loan to achieve greater investment in capacity and quality of education. The study evaluates the effect of School Development Loans on several indicators which have been directly associated with capacity and quality, using data from Ghana and Uganda, countries estimated to need a combined 5 million new seats for children by 2023 (7% of their combined population) to account for population growth. Capacity indicators include the *Number of Students* enrolled in the school and the *Number of Classrooms* available for use. The indicators of school quality were *Pupil Teacher Ratios (Lower)*, the *Number of Washrooms*, the *Number of Washrooms Dedicated to Girls* and the *Number of Extracurricular Programmes Offered* by the school. The study leveraged pairwise correlation and regression analysis to identify the most directly linked indicators, followed by a mean difference analysis. The study finds that schools taking out School Development Loans have more classrooms, higher enrolment, greater amounts of washrooms and extracurricular activities on offer, indicating that School Development Loans increase both capacity and quality at LCPSs. Despite the encouraging findings, it is early to assess whether the significance of the increase over time. The study recommends a fully coordinated Randomised Control Trial (RCT) for further research, where data is collected prior to the school receiving its first loan and again at the conclusion of the loan.

## Chapter 1: Introduction

“Education is the great engine of personal development. It is through education that the daughter of a peasant can become a doctor, that the son of a mineworker can become the head of the mine, that a child of farmworkers can become the president of a great nation. It is what we make out of what we have, not what we are given, that separates one person from another.” (Mandela, N., 1994, p. 166). In 2018, 98 million children in Sub-Saharan Africa (UNESCO Institute for Statistics, 2018) of school going age and counting remain out of school, denied their right to personal development. That number is rising – from 86 million in 2013.

### 1.1. Background and Context of the Study

#### 1.1.1. The State of Education in Sub Saharan Africa (SSA)

Education has a significant impact on an individual’s ability to generate income and become productive members of society. At scale, this individual impact can have dramatic economic consequences for a nation. Household studies have repeatedly demonstrated in developing countries that an additional year of education results in increased income generation to the student over the course of their life (Peet, E., Fink, G. and Fawzi, W., 2015). This is more pronounced in Africa (9.6% annual return to a year of education) than Latin America (8.6%), Eastern Europe (6.3%) and Asia (4.4%). These figures have driven governments worldwide to focus their attention on getting more children into school.

Despite rapid improvements over the past 18 years since the United Nations’ Millennium Development Goal (MDG) of “Universal Education for All” was unveiled (United Nations, 2000), over 258 million school aged children worldwide remain out of school, of which 98 million are in SSA (UNESCO Institute for Statistics, 2018). A girl born in Uganda is still more than four times more likely to have her first child than to have completed secondary school before reaching adulthood (Uganda Bureau of Statistics, 2017). Further, just 6% of youths in Uganda between the ages of 15-24 have even completed secondary school (Education Policy and Data Center, 2014). Similar patterns are repeated throughout the continent – only 25% of those who do manage to make it to primary school are transitioning to Secondary School across Sub-Saharan Africa, compared to 91% worldwide (UNESCO Institute for Statistics, 2018).

While enrolling children into school in the first place is a first order challenge across SSA and worldwide, enhancing the quality of those schools’ facilities and enabling them to deliver better learning outcomes and reduced dropouts remains of similar crucial importance. In 2015, the

United Nations adopted Sustainable Development Goal (SDG) 4, “Quality Education.” Recent data shows that over 617 million children worldwide are still not meeting Minimum Proficiency Levels (MPLs), effectively meaning that they cannot read, write nor do maths with proficiency (UNESCO, 2017). Approximately 202 million of those children are in SSA and just 1 out of 10 of the school-aged population in SSA is achieving minimum proficiency levels (UNESCO, 2017). This means that for each of the 98 million children in SSA who are out of school more than two others are in school but failing to learn.

Further amplifying the problem is a rapidly growing population - six of the top ten fastest growing countries in the world in Africa (UNESCO, 2017). Over half of anticipated growth in the global population between 2017 and 2050 is expected to occur in Africa, bringing its share of the global population from 17% to 26% (United Nations 2017), driven by extraordinarily high birth rates. Uganda and Ghana alone are expected to need over five million new seats for children by 2023 to account for this growth – 7% of the countries’ combined population (OI, 2018). The consequential increase in the number of school-age children will require great deals of investment in development – over 14,000 new schools, given an average of 350 pupils per school - just to maintain enrolment levels.

#### 1.1.2. There is a Large Public Funding Gap

Achieving basic education goals requires more than increased national spending. Many low- and middle-income governments lack the capacity to manage their existing levels of spending, often allocating funds in ways that exclude poor and marginalised children (World Bank 2018). While governments seemingly have prioritised education in their agendas and expanded their education budgets, the Education Commission, a major global initiative engaging world leaders, policymakers and researchers, estimates that low- and middle-income countries must increase their education spending by 117% for children to complete primary and secondary education with basic levels of learning (Education Commission, 2016). Such growth would imply that some governments must spend over 10% of their GDP on Education alone. This compares to SSA’s population-weighted tax revenue base of 9.9% of GDP (Figure 3), the lowest of all global regions, where the average is 12.15% (World Bank, 2018). Many countries in SSA are already operating with significant budget deficits, leaving little additional fiscal room (Directorate of Intelligence, 2016-7).

### 1.1.3. Private Schools are Stepping into the Public Funding Gap

With little funding accessible to increase the allocation of resources to public education and the resultant overcrowding or non-existence of government schools nearby, a Low-Cost Private School (LCPS) segment has seen strong growth. Indeed, private schools are expanding rapidly across lower- and middle- income countries, particularly in SSA, where private school enrolment has risen from 12.4% of total enrolment in 2005 to 16.1% in 2017 (UIS, OI, 2018). Families with limited disposable income are sending their children LCPSs so that their children can obtain an education (Tooley & Longfield, 2014). Some estimates suggest that Ga, Ghana and Lagos State Nigeria have as many as 74% and 75% of children attending LCPSs (SABER, 2014).

The children who attend LCPSs are often of low-income families. Due to the absence of local government schools, studies find LCPSs heavily concentrated in low income areas across urban areas in SSA, Asia and Latin America. One such study in Kampala, Uganda found that 94% of schools were private (Härmä et al., 2017). Migrants are major beneficiaries of the increasing availability of LCPSs. Over 40% of migrants in two Nairobi informal settlements were enrolled in private schools between 2003 and 2010 (Abuya, 2018).

### 1.1.4. Innovative Finance Seeks to Address the Need for Additional Financing

A World Bank policy paper (Girishankar, 2009, p. 3) defines Innovative Finance as “non-traditional applications of solidarity, public-private partnership, and catalytic mechanisms that (i) support fundraising by tapping new sources and engaging investors beyond the financial dimension of transactions, as partners and stakeholders in development; or (ii) deliver financial solutions to development problems on the ground.”

The Learning Generation (Education Commission, 2016) came up with two recommendations focusing on the need for increased international financing of education. The report recommends improved effectiveness of international financing and the establishment of a Multilateral Development Bank (MDB) investment mechanism for education. This highlights a building consensus that there is a need to involve innovative finance through engagement with international donors and investors. External capital that is not related to traditional development finance or Official Development Assistance (ODA), which is declining (OECD, 2019), can act as a supplement to the state’s limited resources to provide improved access (capacity) to, and quality of, education. Operators in the Education sector are taking note of this as an opportunity to increase the amount of development finance being made available for the sector.

School Development Loans are repayable loans made to operators of LCPSs. The average loan amounts and tenors vary for School Development Loans by country and community but average US\$ 11,000 for between 24 and 30 months. The loan repayments are structured to match schools' termly revenues and secured against property or other fixed assets for collateral. Their intended purpose is most often for construction of infrastructure, including additional classrooms, washrooms or other facilities. They are also used for improvements such as metal roofs and concrete floors (OI, 2018).

School Development Loans play a significant role in several innovative finance solutions which are shifting from the use of traditional aid grants to returnable loans and equity. Their impact is not well researched to date. A review of the United Kingdom's Department for International Development (DFID) education strategy suggests that "further research is needed on the impact ... for education on access, equity and quality of provision" (NASUWT, 2017, p. 7).

#### 1.1.5. Improved Capacity and Quality in Education

While much work is going into innovative financing solutions for Low Cost Private Schools (LCPS), there is a lack of evidence to demonstrate whether the funding is achieving the stated goals of increased capacity and quality in education. A study conducted by Kitaev (1999) found the primary obstacles facing children in going to school or learning in school are:

- low access to educational facilities given distance
- inability to pay/ cover the remaining costs of education
- low quality of schools (Kataev, 1999)

Other studies have found that students at schools perform significantly better at schools with at least one functioning toilet (Suryadarma, 2006). Given the increased focus on the use of innovative development finance to address these issues, research must assess whether School Development Loans in fact do affect education capacity and quality (as defined in Chapter 2).

#### 1.1.6. Introduction to the Study

This study examines the impact of School Development Loans to LCPS through an analysis of established indicators of school capacity and quality in the years after a loan has been given. In the absence of child learning outcomes being readily available for all levels of schooling, prior studies have uncovered observable variables that are related to both capacity and quality. An overview of these are highlighted in

Table 1 of the Literature Review. In particular, the study will measure the difference in the average number of facilities and children enrolled between schools that have completed a full loan cycle and schools that have not borrowed.

This study utilises cross-sectional, single stage data that has been gathered with the use of tablet-based surveys with over 900 schools in Ghana and Uganda over a two-year period. Data was gathered from schools participating in Opportunity International's Education Quality programme. As of December 2019, Opportunity EduFinance has worked with 53 financial institutions in 22 countries, supporting product design of School Development Loans. Since 2014, these financial institutions have disbursed over US\$ 170 million worth of School Development Loans and US\$ 90 million of those have gone to borrowers in Ghana and Uganda. The portfolios share similar characteristics with those managed by other financial institutions in other countries and represent two of Opportunity EduFinance's largest historical markets, making the countries suited for research.

While the Education Quality programme works primarily with schools that have borrowed from financial institutions, it is not a requirement. Many schools in the programme are not borrowers. The intent of this study is to motivate areas for further academic research in this particular area, which has not received as much attention as the general challenges facing the education sector in low- and middle-income countries.

Restrictions to the accessibility of school data have meant that this particular study was not able to track changes in the variables immediately following the receipt of a School Development Loan. The data was collected at varying times following the receipt of a School Development Loan. The number of students, teachers, classrooms, washrooms and extra-curricular activities were measured, given their established links (

Table 1) to capacity and quality. The studies in

Table 1 highlight how better infrastructure and facilities result in improved quality of a child's education, fostering a better learning environment, increased engagement and reduced time away from school due to lacking infrastructure.

While direct learning outcomes were not able to be observed for this study, other indicators have been demonstrably linked to school quality. School facilities, including basic school infrastructure, such as classrooms, seats, installation of toilets, have been found to result in positive educational outcomes (Suryadarma 2006; Andrabi et al, 2018). Reductions in pupil-teacher ratios (in countries where they are above average) have been shown to lead to increased ability for children to learn. Despite vast resources already being spent on education, it is not generating the required capacity or quality of education required for children to achieve proficiency standards and enrolment rates in line with the rest of the world.

## **1.2. Statement of Research Problem and Questions**

### **1.2.1. Research Problem**

Increased investment in education to build up capacity and quality is a key priority if the world is to meet its ambitious targets on SDG 4: Quality Education, which aims to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (United Nations, 2015). Low-income countries will represent approximately 20% of school aged children worldwide by 2030 and the financing gap is estimated to be US\$ 1.8 trillion to achieve SDG goals: domestic and international annual expenditure will need to rise from US\$ 1.2 trillion to US\$ 3.0 trillion (Education Commission, 2016).

The economic impacts of children being out of school are also significant. The average returns to education there from studies conducted between 1985 and 2012 are high at 9.2% for a year of primary education, 8.2% for a year of secondary education and 11.2% for a year of tertiary education (Peet et al., 2015).

Academics suggest that governments across SSA are looking to address these challenges by funding programmes, additional infrastructure, and facilities for education at all levels. However, there are very few research studies to date which quantify the impact that non-state actors and public-private partnerships have on educational access and outcomes (Rose, P., Downing, P., Asare, S., & Mitchell, R., 2019). Existing practitioner literature agrees that public investment, at least in the medium term, will not be enough to meet these objectives (Education Commission, 2016).

Several responses have been proposed to address the overall investment gap. These include:

- increase traditional ODA
- emerging economies increase aid to education
- increase national education budgets
- increase use of non-traditional and innovative financing (Douste-Blazy, 2014)

Of the four responses, this study focuses on non-traditional financing options for increasing investment into education. There are many non-traditional and innovative financing models currently being implemented or evaluated, including:

- School Development Loans
- Debt Funds
- Social/ Development Impact Bonds
- Social impact Investing, with an equity focus (Bellinger and Fletcher, 2014).

Each of these investment approaches can be undertaken with support from private/ international capital. School Development Loans are one of the key building blocks of several of these non-traditional financing options. They can be taken either in partnership with Governments or without reliance on Governments.

Innovative and non-traditional finance schemes are being developed which seek to leverage a fast-growing pool of impact investment funding from the private sector, DFIs and NGOs/ philanthropists. A survey of impact investors by the Global Impact Investing Network (GIIN) found that growth has averaged 17% per annum since 2014 (GIIN, 2019). Despite their increasing prevalence, there is no known literature to the author providing strong evidence which demonstrates the effectiveness of School Development Loans in countries such as Uganda and Ghana. One intervention in Pakistan (Andrabi, Khwaja and Das, 2013) utilised two financing approaches – a grant model and a pilot micro-loan. This study found that both loans and grants produce desirable effects on quality and capacity (Andrabi, Das, Khwaja, Ozyurt and Singh, 2018) but has not been extended outside of Pakistan. One major participant in SSA highlights that research studies appear to be inconclusive with regard to the effectiveness of particular interventions on quality and capacity in SSA (NASUWT, 2017).

The resulting gap that exists in assessing the effectiveness of these loans and other ODA programmes requires further investigation. Ghana and Uganda are the 6th and 12th largest

recipients of ODA in SSA (OECD 2019), making them broadly representative cases to conduct such research.

### 1.2.2. Research Question

The research question of this paper is to examine what is “the effect of School Development Loans on Education Capacity and Quality?” The analysis seeks to answer whether there is any relation between a school taking a School Development Loan and indicators of the school’s capacity and quality. A positive difference in either capacity (number of children enrolled or number of classrooms) or quality (PTR, number of washrooms, extracurricular programmes offered) could serve as a catalyst for further expansion of the innovative finance sector for Education. Inconclusive results regarding a change in capacity or quality would imply that the innovative finance sector must reassess and evaluate other means with which to address the gap in education capacity and quality.

## 1.3. Research Objectives and Hypothesis

Based on the defined research question and analysis of the literature, the research objectives of this paper are:

### 1.3.1. Research Objectives

**Objective 1:** Examine the use of School Development Loans as a mechanism to increase capital flows to education.

This is an emerging field with a limited body of evidence to support it. As the sector expands rapidly and more financial institutions develop loan products for private schools, the literature may also expand. New financial institutions such as EdFin in Nigeria, Taleem Finance Company in Pakistan and Indian School Finance Company in India (Joynes, 2019) are forming to cater towards the growing LCPS sector. Understanding their ability to increase access to finance for schools is crucial. Surveys across five African cities showed 84% of schools interviewed had not accessed a loan before, but more than half were seeking loans to expand and upgrade their schools (Capital Plus Exchange, 2017).

**Objective 2:** To determine whether there is a relationship between a school taking a School Development Loan and the school’s capacity to educate pupils.

Many borrowers take out School Development Loans with the intention of increasing the school’s capacity to educate pupils. Out of 136 schools questioned by the International Finance

Corporation (IFC), 80% of schools said they required funds to support infrastructure expansion in Ghana (CDC Consult, 2010). The following metrics are used as outputs, measuring whether or not the School Development Loan results in an expansion of the school's infrastructure (i.e. classrooms, bathrooms, desks, teachers), using the bank funding to build or purchase assets and educate more pupils:

- number of children enrolled in the school
- number of classrooms in the school

Schools that have completed one full School Development Loan cycle will be compared with schools that have not taken a loan.

The **hypothesis** resulting from the above **Objective 2** is:

**H0:** The relationship between taking a School Development Loan and school capacity is not statistically significant and different from zero.

**H1:** The relationship between taking a School Development Loan and school capacity is statistically significant and different from zero.

**Objective 3:** To determine whether there is a relationship between a school taking a School Development Loan and the school's quality of education provision.

A secondary purpose of the School Development Loan is to enable school proprietors to increase the quality of education being offered. The study determines whether there is a relationship between a school taking a loan and a change in its quality. The indicators of quality used to meet this objective include:

- pupil to teacher ratio (PTR) in the school
- number of washrooms in the school
- number of washrooms specifically for female use in the school
- number of extracurricular programmes offered at the school

Schools that have completed one full School Development Loan cycle will be compared with schools that have not taken a loan.

The **hypothesis** resulting from the above **Objective 3** is:

**H0:** The relationship between taking a School Development Loan and school quality is not statistically significant and different from zero.

**H1:** The relationship between taking a School Development Loan and school quality is statistically significant and different from zero.

#### 1.4. Significance of Research Findings

The intent of this study is to motivate further academic research in this particular area, which has not received as much attention as other challenges facing the education sector in low- and middle-income countries. This study contributes to the field of research into LCPS development, examining what impact School Development Loans have on capacity and quality of education in Ghana and Uganda specifically.

There is a well understood need, grounded in human rights through the Universal Declaration on Human Rights (United Nations, 1948) and economics (Peet, E., 2015), for greater capacity and quality education in Sub-Saharan Africa. Ghana and Uganda's challenges are representative of many of the challenges facing other countries in the region as they strive to improve educational achievement amongst their population. However, most lack the domestic resources to do so alone. Access to quality education remains scarce, harmed by factors, including strong population growth, poverty, long distances and poor infrastructure make the challenge going forward even greater (Unesco 2017). The development world is looking for a sustainable solution to improve the quality of education.

The use of innovative finance through development loans is a potentially scalable solution to facilitate improvements in capacity and quality. Establishing a link between capacity, quality and School Development Loans would help bolster many DFI claims that the financing of schools through this type of loan is a sustainable solution. Over the longer term, it may bring greater opportunities to increase the flow of all forms of capital into the sector.

#### 1.5. Organisation of the Research

This section provides a high-level overview of the structure and organisation of the research. The remainder of this study is divided into four additional chapters:

The Literature Review in **Chapter 2** provides an overview of the state of the education sector in SSA in general. While individual countries in SSA have their own specific challenges, the common themes of lack of capacity (abundance of out of school children) and low quality (children failing to achieve proficiency standards) are repeated throughout the continent. This chapter demonstrates the similar challenges that both Ghana and Uganda have faced and the

funding gap for education that exists in many SSA contexts. This is followed by a discussion of how private schools are filling the gap left by the public sector and how development finance can be applied to help finance further expansion. The subsequent discussion of innovative financing schemes for schools in the region demonstrates stakeholders' attempt to address the lack of affordable finance. There is then a discussion of how improvements in school infrastructure have been found to result in improved capacity and quality in other studies.

**Chapter 3** is a discussion of the research methodology – it highlights the quantitative nature of the research, data used to conduct the analysis, data collection and the sampling approach. Schools have been categorised into two groups, those that have completed one or more School Development Loan cycles from a financial institution and those that have not taken any financing. Finally, the chapter describes the analytical framework, specifying the statistical analysis and models used, including the description and measurement of variables.

The outputs and findings are reviewed in **Chapter 4**, presenting descriptive statistics for each variable analysed. The findings and discussion of the statistical significance that is observed through the analysis follows, with findings compared to the literature and previous studies described in Chapter 2.

The document closes with **Chapter 5** with a discussion of the conclusions that have been reached from the analysis, including recommendations for future analysis and how a future study may be designed which could strengthen the findings.

## **Chapter 2: Literature Review**

### **2.1. Introduction**

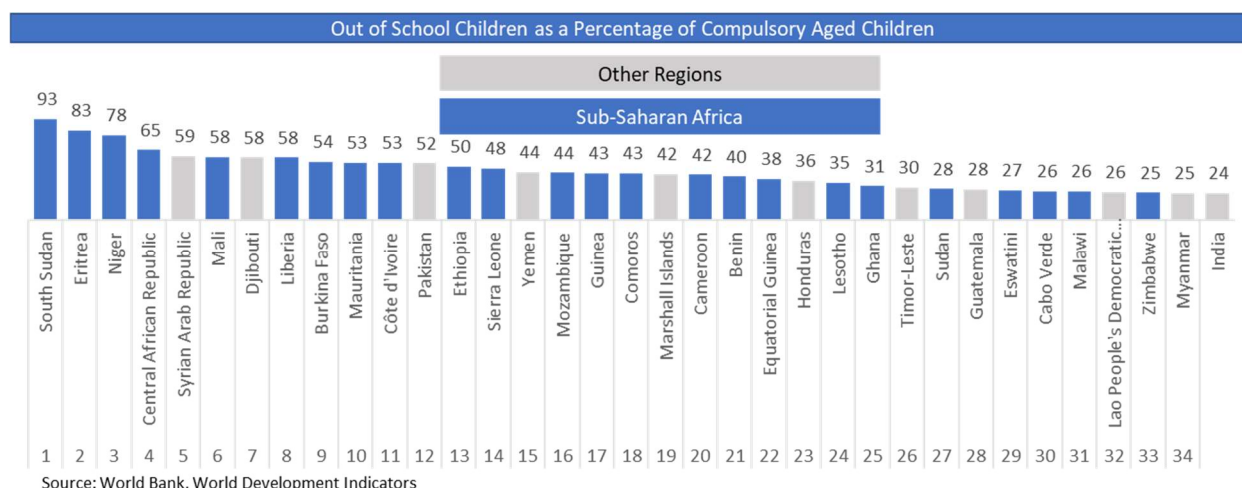
This chapter provides a review of existing practitioner and academic literature on the state of the education sector in SSA as well as an overview of the funding situation for public schools which has led to a shift to LCPSs. It also discusses innovative financing schemes which are being developed in the sector to address the issues of low-capacity and low-quality education. One of those solutions, School Development Loans, is discussed in greater detail as it is a common theme across many of the innovative finance solutions. There are several existing theories discussed regarding School Development Loans and their basis in literature. The chapter finally discusses the indicators used to measure school capacity and quality in the study, their definitions, and links with literature.

### **2.2. Overview of Education Sector in SSA**

#### **2.2.1. Education in SSA**

The United Nations' UNESCO Institute for Statistics (UIS) shows that Sub-Saharan Africa (SSA) is the region with the lowest adjusted net enrolment rate for primary education at 79.52% (UIS, 2017). The next lowest region is the Arab States at 88.46%, compared to North America and Western Europe's 97.44%. The UIS data also demonstrates that 34.2 million children of primary school age in SSA remain out of school, 53.8% of the world total. Of the 35 countries with the greatest proportion of children out of school, 24 are in Sub-Saharan Africa (World Bank, 2018).

Figure 1 Out of School Children, % of Compulsory Age



Not only are the majority of the world’s out of school children in Africa, but the United Nations Department of Economic and Social Affairs (UNDESA) predicts that Africa’s population will swell by 42% between 2015 and 2030. This results in an estimate that the number of children turning five in that time period will be “25 per cent greater than the number who turned five over the previous 15 years, portending massive increased demand on school systems in the region.” (UNDESA, 2015).

Those children who are in school across the continent are also failing to achieve basic literacy and numeracy skills. Studies have consistently shown that children in poor communities are amongst the lowest scorers, given this lack of access to affordable education. A 2014 study conducted by the Programme d’Analyse des Systèmes Éducatifs de la Confemen (PASEC) confirmed that less than 45% of children in Francophone countries across SSA achieved competency levels in literacy and numeracy (PASEC, 2015). Additional data shows that there are over 617 million children worldwide who are not meeting Minimum Proficiency Levels. This means that they are unable to read, write or do maths with proficiency (UNESCO, 2017). Approximately 202 million of those children are in SSA and just 1 out of 10 of the school-aged population in SSA is achieving minimum proficiency levels (UNESCO, 2017).

These startling figures come more than 15 years after 189 countries adopted the Education for All (EFA) initiative, which included a pledge of free and compulsory primary education to be paid by the state (World Bank Group, 2014).

### 2.2.2. There is a Large Public Funding Gap

In order to achieve the aims of EFA, large scale investment will be required to build capacity for children to attend school and improve the quality of education that they receive. Expenditures in education need to rise from US\$1.2 trillion per year today to US\$3 trillion across all low- and middle-income countries (Education Commission, 2017). In order to do so, massive amounts of money clearly need to be raised.

The Incheon Declaration of 2015 stated that governments should target spend of 4-6% of GDP and 15-20% of overall budgets on Education (World Education Forum, 2015). In large part, SSA governments are meeting these objectives, however the outputs are still falling short as illustrated by the high number of children who remain out of school and the lack of learning that is taking place.

The financing of that investment presents itself as another significant obstacle. African governments spend on average 4.6% of GDP (2015) and 17.5% of total government expenditure on education. This compares to the global average of high-income nations' 5.3% (2015) and 12.7%, respectively. Out of the top 35 highest spending countries, as a percentage of total government expenditure, 31 of those countries are low- and middle-income (Figure 2).

Figure 2 Government Expenditure on Public Education

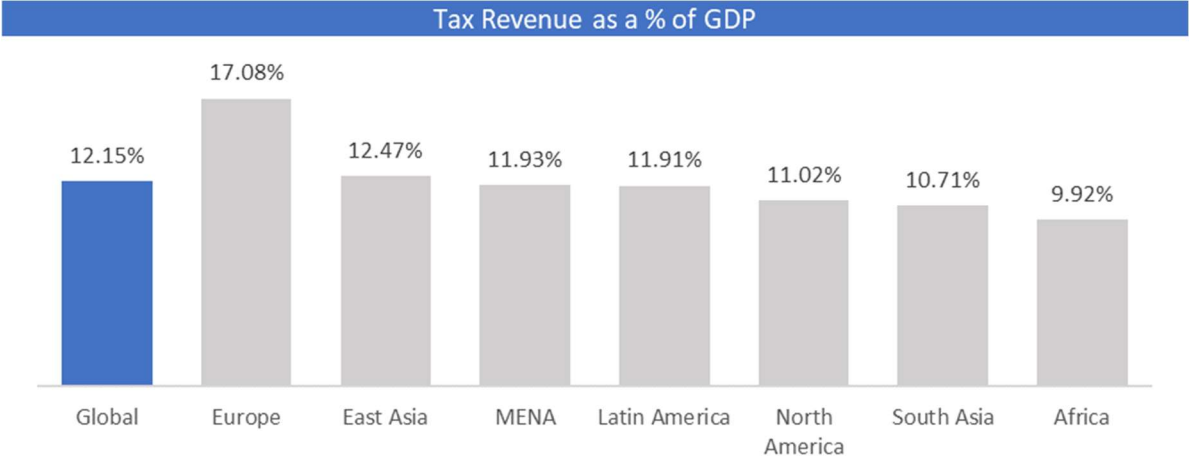


This suggests that the scope is limited for African governments to organically increase spending in a meaningful way. Public expenditure on education is not being allocated to school expansion in large part. The Education for All Global Monitoring Report in 2015 highlighted trends in Government Expenditure for Public Education, finding that 85% of all expenditure for Education

is recurring in nature (wages and maintenance), leaving little additional funding for the much-needed expansion in capital expenditure (Development Finance International, 2014).

Estimates suggest that low- and middle-income countries must increase their education spending by 117 percent for children to complete primary and secondary education with basic levels of learning (Education Commission, 2016). Such growth would imply some governments must spend over 10% of their GDP on Education alone. This compares to the fact that the average person in SSA lives in a country with a tax revenue base of 9.9% (Figure 3), significantly lower than other global regions. It is therefore mathematically impossible for African governments to achieve the required spend while being fiscally responsible.

**Figure 3 Regional Tax Revenue, % GDP (weighted by population)**



Source: Author's calculations based on World Development Indicators (2018)

In addition to low tax bases, many countries already operate with significant budget deficits, leaving little fiscal room. Ghana and Uganda, for example, have an existing budget deficit of 6.9% and 4.7% respectively as a proportion of GDP (Directorate of Intelligence, 2016-7). The ability of African countries to leverage their balance sheets further and pour already scarce financial resources into public education is clearly limited. Data in 2017 suggests that 19 countries' debt-to-GDP levels meet or exceed the 60% threshold set by the African Monetary Co-operation Program (Brookings, 2019). Just two countries, out of 18 analysed by Moody's, a credit rating agency, were classified as "Low or Moderate Credit Risk". The rest were "Substantial", "High" or "Very High" Credit Risk (Moody's, 2019).

Support for low- and middle-income countries' domestic education spending has historically been bolstered by ODA. In 2012, ODA accounted for 20% of domestic basic education spending for low income countries (USAID, 2019). However, this traditional external source of financing

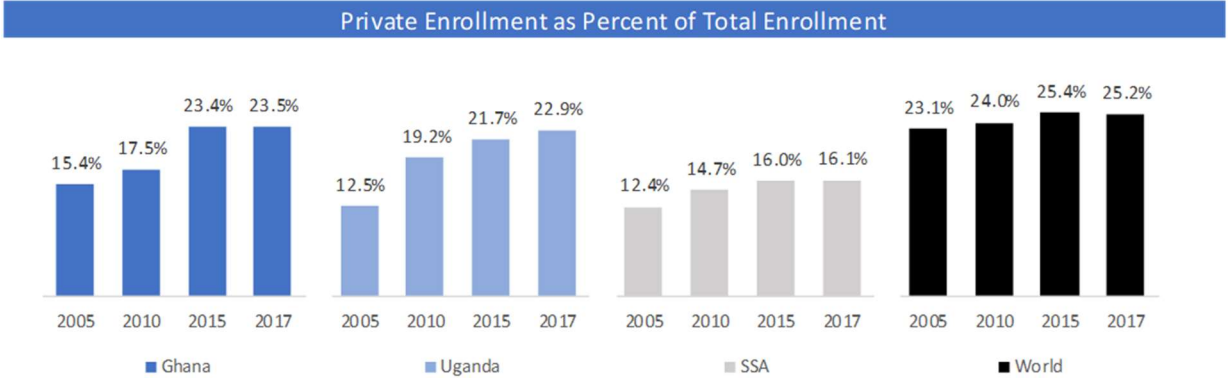
for education has declined for two straight years in 2017 and 2018 (Organisation for Economic Co-operation and Development, OECD, 2019).

Development Finance Institutions (DFIs), such as the United Kingdom’s (UK) Department for International Development (DFID) and the United States Agency for International Development (USAID) are also shifting from the use of traditional ODA grants to returnable loans and equity (USAID, 2019; DFID, 2014), reducing the potential for expanded public education budgets.

2.2.3. Private Schools are Stepping into the Public Funding Gap

Private sector growth has responded to such formidable challenges facing local governments., expanding rapidly across lower- and middle- income countries. Growth is particularly strong in SSA, where private school enrolment has risen from 12.4% of total enrolment in 2005 to 16.1% in 2017 (UIS, OI, 2018).

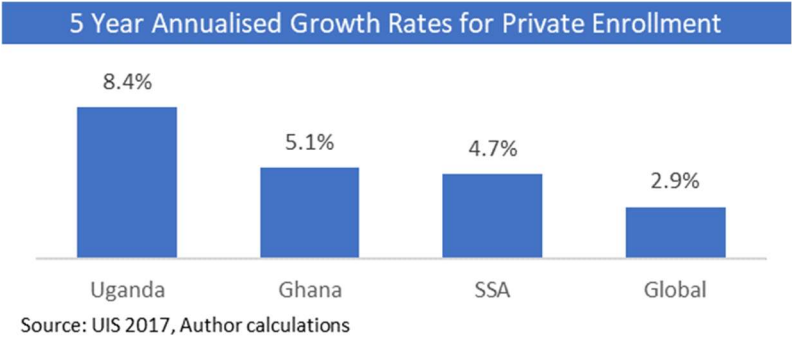
Figure 4 Private Enrolment as Percent of Total



Source: UIS

Private school enrolment in Ghana rose from 15.4% of total registered enrolments in 2005, to 23.5% by 2017. In Uganda, private enrolment similarly rose from 12.5% to 22.9% during that same time period. The trend has been slower across other lower- and middle-income countries, from 23.1% to 25.2%, however this is largely driven by the fact that already 41.2% of children in South Asia already attended private schooling (UIS, OI, 2018).

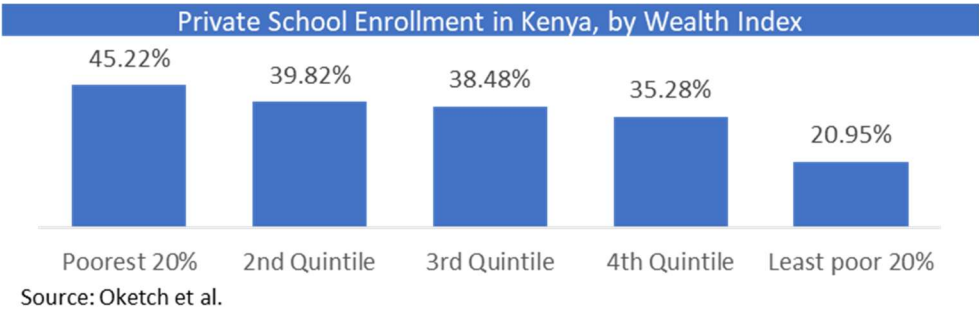
Figure 5 Private School Enrolment Growth, 2012-2017



As private schooling grows, the beneficiaries are often not those of middle- to high-income. One study found that private schools are heavily concentrated in low income areas across Kampala, Uganda. The study found that 94% of schools were private, accounting for 84% of pre-primary to secondary enrolment (Härmä et al., 2017). Migrants are also major beneficiaries of low-cost private schools – over 40% of migrants in two Nairobi informal settlements were enrolled in private schools between 2003 and 2010 (Abuya, 2018).

There are traditional reasons for parents to send their children to private schools. The most frequently cited one is perception of better quality (Heyneman, S., Stern, J., Smith, T., 2011). One of the less cited reasons however is that without private education, there would be no education accessible to the child at all. An inadequate supply of spaces available to children in public schools has led to a burgeoning private education system, with low-cost private schools filling a gap in the supply of public education (Oketch, M. et al, 2010).

Figure 6 Private School Enrolment, by Wealth – Oketch et al. (2010)



2.2.4. Development Finance

Finance plays a crucial role in economic development. The role of Development Finance has traditionally been to mitigate governance failures and correct for market failures through the provision of public goods and improvement of resource allocation (Girishankar, 2009). The development of infrastructure and mitigation of market failures to create a better quality of life

is key to sustainable development. Imperfectly developed credit markets are common in low- and middle-income economies and lead to high transaction costs, limiting economic growth and development (Rao, 2003). Traditional development finance, coming through budget outlays from sovereign donors or bonds issued by DFIs can lead to greater liquidity, capital inflows and the creation of more efficient markets. This encourages greater levels of development and enables borrowing costs to come down, resulting in increased savings for borrowers and greater capacity to invest. For this reason, Education has become a focus sector of DFIs to increase access to affordable capital (USAID, 2019).

### 2.2.5. What is Innovative Finance?

A rapidly growing private education sector requires financing to ensure quality and capacity are developed accordingly. With the lack of available traditional development finance from governments, alternative sources of funding for education are receiving attention from policy makers and international development experts. A World Bank policy paper (Girishankar, 2009, p. 3) defines Innovative Finance as “non-traditional applications of solidarity, public-private partnership, and catalytic mechanisms that (i) support fundraising by tapping new sources and engaging investors beyond the financial dimension of transactions, as partners and stakeholders in development; or (ii) deliver financial solutions to development problems on the ground.” Another definition suggests that innovative financing is a way to generate public and private funds to provide public goods (Douste-Blazy, 2014) or to find novel ways to generate predictable, additional and sustainable finance (Filipp, 2013). The World Bank definition incorporates both the spirit in which the new funding is raised as well as the pragmatic and novel approaches needed to stakeholder engagement in the tapping of new financial resources.

The Education Commission (2016) highlighted the need for improved effectiveness of international financing and the establishment of a Multilateral Development Bank mechanism for education. Some of the innovative financing models currently being implemented in the education sector include:

- **School Financing through School Development Loans:** Financial intermediaries disburse loans to Low Cost Private Schools (LCPSs) to finance infrastructure projects and asset purchase. The loan carries characteristics that are similar to collateralised loans to Small and Medium Enterprises (SMEs);

- **Debt Funds:** Pooling of lower cost capital from socially minded investors or DFIs into a fund that disburses debt to financial intermediaries for the purposes of increasing financing for LCPSs. The financing to LCPSs takes the form of School Development Loans;
- **Social/ Development Impact Bonds:** A contract which includes several parties, which can include a public or private sector entity, a social impact investor, an NGO implementing organisation, financial intermediaries and an evaluator. The “issuer” of the bond (which can be public or private) pays the investor for outcomes that are linked to social/ development outcome objectives, while the investor provides the up-front capital and start-up costs.
- **Social Impact Investing (equity focus):** Long term equity capital made available for growth companies at below-market returns;

Other forms of innovative finance are also being explored by many for the purposes of education, including: Social Yield Notes, Debt for Education Swaps, Debt Conversion Development Bonds, Diaspora Bonds, amongst others, though they are more relevant for public sector financing of education (Bellinger and Fletcher, 2014).

What is clear is that DFIs, private investors, non-government organisations (NGOs) and governments are actively searching for solutions to the challenge of financing education, increasing access and quality. For the world to meet the ambitious SDGs, and Education for All commitments, scalable solutions to the financing of infrastructure development for the LCPS sector will play a role. The major financing models currently being used are described in greater detail as follows:

**School Financing through Loans:** Private education has been on the rise, from 19.9% of total enrolment to 23.8% in low- and middle-income countries (UNESCO UIS, 2018). LCPSs require loans that are too big to fall within traditional micro-finance models, but they are different from standard small and medium sized enterprises in that they sometimes struggle to obtain financing (Wheeler and Egerton-Warburton, 2012). This has created a market segment of its own and numerous financial institutions have developed lending products for this type of school. These loans come directly from the financial institution and can be financed by the balance sheet of that financial institution, a combination of equity, commercial bonds, wholesale funding and deposits. Sinapi Aba Savings & Loans in Ghana, Opportunity Bank in Uganda and Indian School Finance

Company in India are often cited examples of financial institutions who have specifically tailored loan products for these schools (Global Partnership for Education, 2018).

The maximum term offered on a School Development Loan is typically 3 years for the first loan cycle (OI EduFinance, 2019). The products can be designed to fit the local market context through a market research study to understand the intended or perceived need for financing by schools, the appropriate duration of the loans, suitable collateral and the affordable payback profiles. Financial institutions need access to school financial accounts to model cash flows and ensure that the payback is affordable. They must also consider reputation risk that comes with seizure of collateral from schools (TSI, 2018).

The prevalence of private schools is expected to continue given the supply-side challenges coming from governments. Meanwhile, the majority of private school resources comes from domestic sources (households), which means that they are also limited by the means of the community. Low- and middle-income countries have fewer domestic resources to draw upon, which is why private schools are often limited by financing capabilities (USAID, 2019).

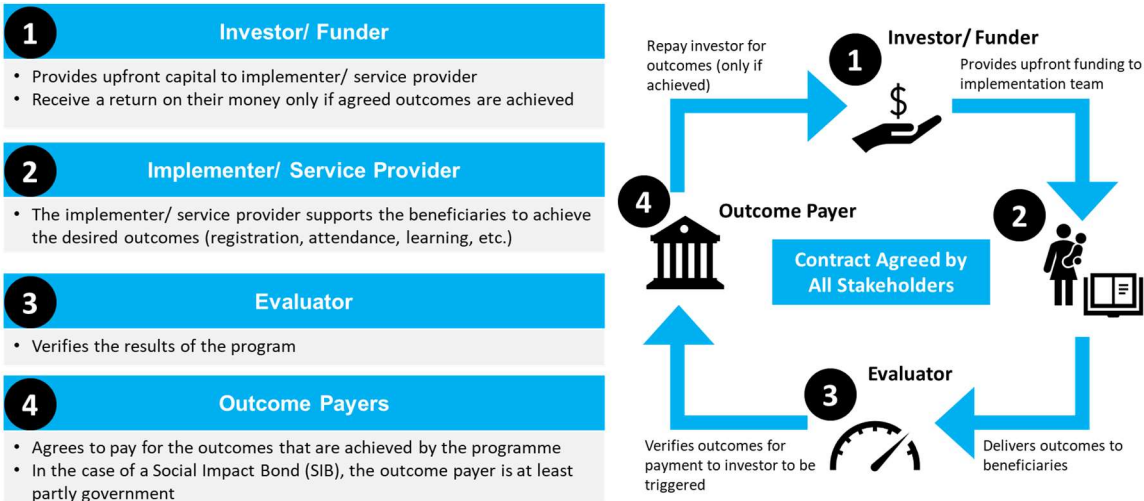
**Debt funds:** The creation of a debt fund can raise large amounts of funding from impact and socially minded investors, to be distributed (as wholesale debt) to financial institutions, similar to the ones mentioned previously. The purpose of this wholesale debt offering to the financial institution is to catalyse investment into the education sector for on-lending of School Development Loans and to reduce the cost of borrowing. The Regional Education Fund for Africa (REFFA, 2019) is one of the early examples of such a funding structure. REFFA commenced under KfW Development Bank and is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ). It also provides technical assistance to the financial intermediaries to improve the quality of their lending. REFFA is an example of how a Public Private Partnership (PPP) can be set up to leverage and blend capital from DFIs and private investors for greater impact. The DFIs can take a higher level of risk to unlock greater private investment.

**Social/ Development Impact Bonds:** Often viewed as a subset of Social Impact investing, Results-Based Financing intends to allocate capital efficiently by ensuring that Government and taxpayers (known as the “outcome payer”) contribute on the basis of a desired social impact being achieved. The contracts are set up whereby an investor puts capital at risk by investing in an implementing partner (often an NGO) to deliver the desired impact. The investor receives payment from the government or private outcome payer only once the contracted outcomes are

achieved. The objective of such schemes, often called Social or Development Impact Bonds (SIB/ DIB) therefore are outcomes based contracts which can provide a return to the up-front cost investors, while delivering positive social impact for the outcomes payers upon successful achievement of the predetermined outcomes (Instiglio, 2018).

The benefit to the “borrower” of the funds (the outcome payer), whether it is a government or a private entity, is risk limitation afforded by paying the investor only when the outcomes are delivered by the specified intervention or set of interventions. Rather than a straight equity or debt stake, the returns are linked to the social outcome meeting its objective. The difference between SIBs and DIBs is typically determined by the outcome payer: in the case of SIBs, it is often the public sector, while in the case of DIBs, it is often a DFI. An example of a DIB would be a DFI funded project to build, operate and manage a chain of schools, with the outcomes measured being the number of new places in school or other metrics (Bellinger and Fletcher, 2014).

Figure 7 Stakeholders in Impact Bond Schemes



Source: Instiglio, Opportunity International

SIBs for education are being tested out in multiple markets, but still on a relatively small scale. For example, the Impact Bond Innovation Fund (IBIF) in the Western Cape province of South Africa (University of Cape Town, 2018) targets getting children aged 3-5 into Early Childhood Development (ECD) centres. The desired outcomes are improved education performance, better careers and earnings potential in the children impacted. The Investor/ Funder for the IBIF included Standard Bank Tutuwa Community Foundation, Futuregrowth Asset Management and LGT Venture Philanthropy. These investors put forward the upfront costs to the Implementer/ Service Provider, the Western Cape Foundation for Community Work, alongside

mothers2mothers and Volta Capital as intermediaries. The evaluator for the SIB is Creative Consulting & Development Works. If the key outcomes are achieved, the Outcome Payers will be the Western Cape Department of Social Development (DSD) and ApexHi Charitable Trust. The IBIF outcome payments will be triggered by the measurement against three key outcomes: 1) Recruitment and retention; 2) Attendance; and 3) Early Learning Outcomes Measure (ELOM).

The world's first DIB related to Education was concluded in 2018, with a focus on enrolling out-of-school girls and improving quality education for children in rural, remote and marginalised communities of Rajasthan, India (UBS, 2018).

More results-based finance, much in the form of SIBs and DIBs, is expected to be raised and implemented in the near future with the 2018 launch of fundraising for the Education Outcomes Fund (EOF) and subsequent launch of first programmes in 2019 (EOF, 2019). In early 2020, the UK government announced a GBP 79 million package to support DIBs across Africa (UK Government, 2020).

**Social Impact Investing (equity focus):** According to the GIIN, impact investments are made with the objective of generating positive financial returns alongside measurable social and/ or environmental impact. The GIIN estimates that organisations manage over US\$502 billion of impact investing assets worldwide (GIIN, 2019). An example use of impact investing for education is the Acumen Fund, which provides long term capital to growth companies for a below-market return. The Acumen fund invests in educational services companies rather than directly into schools (Acumen, 2019).

#### 2.2.6. Analysis of Key Stakeholders in Innovative Finance for Education

The key stakeholders in education finance and School Development Loans are governments, providers of international finance (DFIs, corporate foundations, philanthropic foundations, impact investors), local financial institutions, schools, parents, children and society, who all have a vested interest in the education and development of today's youth.

Governments use taxes to provide education opportunities and many country education systems are strained under the pressure of scarce financial resources, demographic changes and growing enrolments (USAID, 2019). They are therefore incentivised to find ways to leverage private sector financing to bring resources into the economy. Governments can do this by allowing international finance to inject capital into the system and those financiers will do so in exchange for a return on investment (REFFA, 2018).

Financial institutions lend to the SME sector already and can be a key stakeholder in the success of a private school system (USAID, 2019). Many local banks are working with NGOs and DFIs such as IDP Foundation, Opportunity EduFinance and Capital Plus Exchange to better understand the needs in the sector and how to successfully service school demand (Global Partnership for Education, 2018). While parents are paying school fees, these fees are generally insufficient to leverage for expansion. Hence, private schools have turned to banks for loans to expand operations. From the perspective of NGOs, it is not only the access to finance that is important, but also whether the finances are used to increase the capacity and quality of education.

Another challenge to providing finance to private schools is registration. Most countries officially require private schools to be registered with the local Ministry of Education. The technical expertise offered to schools from local financial institutions can also be of benefit to LCPSs as they are able to assist in registration (OI, 2018). One such study (Capital Plus Exchange, 2017) in Kampala, Uganda found that 36% of the private schools interviewed were not registered. School owners find it expensive to register or they find that the office is too far away. This makes it very challenging for some schools to be banked. While 52% of registered schools in Kampala had a bank account, just 22% of unregistered schools did. The need for a loan to expand school infrastructure therefore forces a school to engage with a bank, incentivising the school to register. An additional layer of monitoring, by the bank, will also help the school to arrange its finances and become more efficient (Capital Plus Exchange, 2017). Despite this fact, many studies are still finding that LCPSs can provide better teaching and learning outcomes than their respective government schools (Day et al, 2014 and Tooley et al, 2001).

For the schools, numerous studies have pointed to over half of individual school owners desiring a loan to increase investments (Andrabi et al, 2018; Global Partnership for Education, 2018; Capital Plus Exchange, 2017). For students and parents, there are also common barriers that private schools can help to alleviate. Several studies have found that the nearest government schools are too far away, classes are overcrowded, teachers are untrained and lack textbooks. As a result, low-cost private schools rise up organically to fill this gap. Parents are willing to use what little disposable income they have to send their children to LCPSs, who are able to pay their teachers on time and are generally more cost-effective than government counterparts (Tooley & Longfield, 2014). These schools are closely monitored by parents initially but require supervision or support from other community members (Kitaev, 1999; Global Partnership for Education 2018).

### 2.2.7. Defining Indicators of School Capacity and Quality

To assess whether or not School Development Loans are having an effect on capacity and quality, the metrics that are used to make that assessment are defined below:

#### 2.2.6.a. Capacity

School capacity can be measured in many ways with no consistently agreed method of measurement (Beaver, Weinbaum, 2012). Definitions range from the discrete characteristics that enable a school to bring about effective change (Spillane & Thompson, 1997) to the optimal amount of production that can be obtained from a given set of resources and organisational arrangements (Corcoran & Goertz, 1995). Taking a more simplistic definition, capacity is the maximum amount that something can contain or produce (“Capacity”, 2019) and similarly the United Kingdom government defines capacity in a school as the number of filled and unfilled school places (Department for Education, 2019). Thus, for the purposes for this analysis, capacity is defined by the number of school places currently occupied in a given school by children and number of classrooms, as these figures are simple to observe and well understood by school owners.

#### 2.2.6.b. Quality

Sustainable Development Goal 4 on “Quality Education” measures quality as the percentage of children and young people in Grade 2 or 3 of primary education, at the end of primary education and at the end of lower secondary education achieving at least a minimum proficiency level in (i) reading and (ii) mathematics (UIS, 2018). In practice, there is limited data available in LCPSs for a multitude of reasons. The first being that many private schools do not have current groups of children taking national exams (Zawedde, 2019). Even so, they are only a small number of the classroom population. In Uganda, the national exams are only administered to the top class of children that are transitioning, limiting the population.

Available literature points to other indicators which can be used to measure school quality, without evidence of child level learning outcomes. Reductions in pupil-teacher ratios (PTR) lead to increased ability for children to learn. Multiple studies, (Bayo, 2005; Koc and Celik 2015) found specifically that a reduction in PTR resulted in improved education outcomes. School facilities, including basic school infrastructure, such as installation of toilets, have also been found to result in positive educational outcomes (Suryadarma 2006; Andrabi et al, 2018).

### School Infrastructure Investment

Another variable that has been proven to have a substantial impact on student achievement is the quality of school infrastructure. A study conducted by Suryadarma (2006) in Indonesia demonstrates the importance of school infrastructure on student performance. Students at schools were found to perform significantly better if the school had at least one functioning toilet. This evidence was drawn from the public sector in Indonesia but transcends globally and finds that the relationship is most significant with girls. Afridi (2011) found that availability of gender specific toilets is particularly important for enrolment of and educational attainment of girls in rural India.

Other research to date which has looked at facilities and infrastructure investment includes Andrabi et al (2018), where investment in libraries, sports facilities and other infrastructure was connected to positive quality improvements. Students perform better when they have access to functioning toilets, and extracurricular activities have also been linked to better attendance, behaviour and academic performance (Reeves, 2008).

### Pupil-Teacher Ratios

A pupil-teacher ratio (PTR) is an often-used indicator of measuring education quality. There is a significant body of research showing a strong link between low PTR and increased academic achievement (Koc and Celik, 2015, Ajani and Akinyele, 2014). Koc and Celik (2015) found there to be a moderate negative correlation between the number of pupils per teacher and student achievement, showing that schools with a higher PTR had a lower performance on the national standard examination. The study suggests that reducing the PTR is critical to improving teachers' effectiveness and student achievement. A study conducted by Finn (2003) found that students become more academically and socially engaged in small class sizes, which leads to higher academic achievement.

Bayo (2005) found that smaller PTRs allow pupils to perform better because of the individual attention provided by teachers, which prevents students from drifting off compared to when students are in large classes, because pupils cannot drift off as easily in small classes. Bayo also found that there are long-term benefits to low PTRs, with students reaping the benefits of being in small classes during primary school, in secondary school.

A study by Ajani and Akinyele (2014) in Port Harcourt, Nigeria demonstrated a significant relationship between a student's perception of PTR and academic achievement in mathematics, showing that when students perceive that they are in a smaller class and are able to get more

attention, their academic achievement also increases. There are many benefits to maintaining a low PTR, including long-term benefits on student achievement; strong improvement rates for low performing students, individualised student attention, and increasing students' focus.

The studies mentioned here demonstrate evidence of a correlation between PTR and student achievement, however they do not make the connection to increased investment or financing of the schools. It is therefore this correlation which helps to make a link between financing and quality.

### **2.3. Prior Studies Related to School Development Loans**

Development Finance Institutions such as the World Bank (2013) and IFC (Smith, W. & Baker, T., 2017) are among the body of institutions that have promoted economic growth through greater financial deepening and inclusion for poverty reduction. DFIs believe that financial inclusion allows poor people with limited savings to invest in their education and become entrepreneurs. Limited access to finance results in a major constraint for entrepreneurs in low- and middle-income countries. Fewer than 30% of Small and Medium Enterprises (SMEs) in these countries utilise external financing, and half of them are underfinanced (World Bank, 2013). There is not a universal definition for what constitutes an SME and one study by the International Labour Organisation (ILO) cited over 50 definitions in 75 countries (Pobobsky, 1992).

The World Bank Group definition for what qualifies as an SME is commonly used in Development Finance, which defines an SME according to three quantitative criteria: Number of Employees, Total Assets and Total Annual Sales. According to this definition, businesses with 10-50 employees and Total Assets or Total Annual Sales of US\$100,000 – US\$3,000,000 are classified as an SME. This means that the majority of LCPSs are classified as SMEs or Micro SMEs.

Andrabi, Khwaja and Das (2013) set out to quantitatively examine different financing models for LCPSs in Pakistan, how schools can expand beyond primary education and how to encourage them to make further investments to increase the education they offer. The intervention utilised two financing approaches – a grant model and a pilot micro-loan intervention to allow researchers to better create and target loan products.

Schools that received grants as part of the randomised control trial received a direct cash grant of US\$525, provided they could create and submit an investment plan for the money. For the microloan pilot, the team of researchers partnered with a microfinance institution to pilot new

financial products that complied with the government's lending and regulatory policies. They offered various loan products to 50 private schools, to understand financial need, interest, repayment behaviour, and logistical requirements.

Some of the results of the intervention have been published, and the authors found that both loans and grants produce desirable effects on quality and capacity (Andrabi et al, 2018). The study looked at school investments and differentiated them between "high quality" investments and "low quality" investments. The study found that both grants and loans have the potential to spur investment in both high- and low- quality investments in rural Pakistan. It did not use student achievement as an indicator quality, given that it is difficult to directly measure achievement compared to receiving loans.

Qualitative studies have also been conducted to examine the impact of School Development Loans and to understand whether or not schools are utilising them to improve infrastructure and drive child level improvements (Three Stones International, 2018). The appreciative inquiry study conducted by Three Stones International found that schools utilised their loans for infrastructure investment. The qualitative benefits of School Development Loans were subject to conditions:

- 1) The finance is affordable (interest rate is low enough and the school is not overburdened)
- 2) The funds are utilised appropriately (for building extra classrooms, washrooms and other physical improvements to infrastructure)

The qualitative study by Three Stones International (TSI, 2018) interviewed 15 schools, 76 teachers, 103 students and 63 parents across Ghana and Uganda. The study highlighted that the School Development Loans were used almost exclusively for infrastructure improvements as intended, adding classrooms, additional stories to existing buildings, paving school grounds and painting buildings. The study was unable to observe increased enrolment as a result as the sample size was too small to be conclusive. The focus group discussions reported that the School Development Loans had helped to improve academic performance among students (TSI, 2018).

Finally, the IFC has invested heavily in providing risk sharing to financial institutions that lend money to schools through the Africa Schools Program (Mundy, K. & Menashy, F., 2014). This was initially done in Ghana and Kenya and later extended to Rwanda, where IFC provided funding and advisory support to financial institutions.

**Table 1 Prior Studies on Capacity Indicators, Quality Indicators and School Development Loans**

Sample Country(ies)	Author(s)	Year	Key Findings
<b>Capacity Indicators</b>			
India	Afridi	2011	Gender specific toilets lead to greater enrollment of girls and learning achievement
United States (Generic)	Beaver & Weinbaum	2012	There are many ways to measure school capacity, none of them a gold standard, consistently agreed upon
United States (Generic)	Spillane & Thompson	1997	Characteristics of a school that enable it to bring about effective change
United States (Generic)	Corcoran & Goertz	1995	Capacity is the optimal production that can be gained from limited resources
United Kingdom (Generic)	Department for Education	2019	The number of filled and unfilled school places
<b>Quality Indicators</b>			
Indonesia	Suryadarma	2006	School infrastructure affects the attainment of students
India	Afridi	2011	Gender specific toilets lead to greater enrollment of girls and learning achievement
Nigeria	Ajani & Akinyele	2014	Smaller pupil teacher ratio (PTR) leads to improvements in academic achievement
Turkey	Koc & Celik	2015	Smaller pupil teacher ratio (PTR) leads to improvements in academic achievement
United States	Finn	2003	Students become more actively engaged in classes with smaller pupil teacher ratio (PTR)
United States	Reeves	2008	Students with access to extracurricular activities have greater attendance, behavior and learning outcomes
Pakistan	Andrabi, Das, Khwaja, Ozyurt & Singh	2018	Investment in libraries, sports facilities and other infrastructure lead to positive quality improvements
<b>School Development Loans</b>			
Pakistan	Andrabi, Das, Khwaja, Ozyurt & Singh	2018	Grants and loans enable schools to invest in school infrastructure
Ghana, Uganda	Three Stones International	2017	School development loans enable schools to invest in infrastructure
Kenya, Uganda	CapitalPlus Exchange	2017	Low cost private schools abound in urban slums where there are no government schools and are lacking accessible finance
Global	World Bank	2013	SMEs lack access to finance.
Global	Smith, W. & Baker, T.	2017	IFC investments in schools through financial institutions has expanded.
Africa	Mundy, K. & Minashy, F.	2014	IFC expanded provision of risk sharing agreements with financial institutions from Ghana and Kenya to Rwanda.

Source: Author, 2020

## 2.4. Conclusion

With 98 million children out of school and even more not learning in SSA, increased funding to education is an imperative in order to meet SDG 4 on Quality Education. Governments are capacity constrained and unable to allocate the required funding to public schools, resulting in a shift of attention to LCPSs, which are attended by children from lower-income backgrounds. The shift to the private sector has also necessitated additional external financing and given rise to innovative finance for development of LCPSs. Where learning outcomes are not directly observable, other research studies have found significant links to drivers of education quality and capacity. School Development Loans are being used to provide LCPSs with financing to

invest in classrooms and other school infrastructure, but a gap in the literature remains: whether or not a clear connection can be identified between 1) School Development Loans and capacity and 2) School Development Loans and quality.

## **Chapter 3: Methodology**

### **3.1. Introduction**

This chapter presents the research methodology behind the study. It includes a description of the type of research, data, collection methodology and sampling approach. The end of the chapter describes the analytical framework and its validity, specifying the quantitative models used.

### **3.2. Type of Research**

Given the question of “examining the effect of School Development Loans on education capacity and quality”, the research approach takes on a deductive approach, being explanatory and quantitative in nature. Quantitative research is defined as an approach for testing objective theories by examining the relationship among variables (Cresswell, 2014). There are no known academic studies to the author that attempt to measure linkages between School Development Loans and measures of capacity and quality in SSA at present. The research utilised access to Opportunity International’s Education Finance database, which includes a data set of surveys taken by over 900 school recipients of development loans in Ghana and Uganda. A quantitative research approach is appropriate for this study as the objective is to observe whether there has been any observable quantitative change in capacity and quality. Both indicators have been constructed in a manner that is objective and observable.

### **3.3. Description of Data**

Several indicators have been collected by Opportunity International that have potential to demonstrate differences and changes in the capacity and quality of education provision at the respective schools. According to Creswell (2014), surveys offer a ‘numeric description of trends, attitudes or opinions of a population by studying a sample of that population.’ An experimental design is used to test the impact of an intervention. The purpose of this research is to measure the impact of School Development Loans, based on a survey administered to schools by a third-party (not connected to the bank administering the loan).

## Summary of the Data

The analysis is based on secondary data that has been collected from schools in Ghana and Uganda. The data consists of vectors of continuous numerical values (e.g. Number of Classrooms, Number of Washrooms) and one binary vector (defining whether the school has completed a full loan cycle or has not obtained financing), collected in a tablet-based survey, conducted by Opportunity International's Education Finance department.

The survey is cross-sectional and single stage, collected between 2018 and 2019. Schools received financing over the course of multiple years, which helps to generalise the results. Opportunity EduFinance manages a list of all schools that are enrolled in the programme and has sent a team of 14 trained data coders to collect the data on a visit to each school.

On average, 80% of the schools covered have received a School Development Loan, whilst the other 20% have not. Of those schools with loans, 72.9% of them have already completed one loan cycle, meaning they have had multiple years to utilise the financing for school development purposes. Schools that have not already completed one loan cycle have been removed from the sample. The loan purpose is often mixed as budgeting can enable the same loan funds to be used to build classrooms and add other infrastructure such as washrooms. All schools are enrolled in the Education Quality program with Opportunity International, however those without loans are not receiving any financial support.

## Method of Data Collection

The survey is collected using a tablet, which minimises risk of losing pages and is automatically uploaded to an online survey database. The Survey instrument is called the School Profile. The survey was first created in 2017 by Opportunity International. Opportunity International agreed to allow use of this data for completion of the study.

## Population and Sample of the study

The total population of private schools in Ghana and Uganda is notoriously difficult to estimate as many schools remain unregistered with their respective Ministries of Education. However, Opportunity International's report *The \$24 billion Opportunity* (OI, 2018) uses available enrolment data, pupil teacher ratios from UNESCO (2018) and other available information for average number of pupils per school to triangulate an estimate of c.6,000 private schools in Ghana and c.5,000 schools in Uganda. Other reports by CapPlus Exchange (2017) and *Beyond the Mirage* (2019) highlighted that many private schools remain unregistered with their local government ministries.

Opportunity EduFinance works with 756 schools in Uganda and 407 in Ghana, through the Education Quality programme. This is the sample from which all data has been collected. Opportunity EduFinance now has data on the majority of these schools and this study covers over 900 of them across Ghana and Uganda, representing approximately 77% of the schools that are currently engaged in the programme in those two countries. Approximately 85% of the schools offer Primary level education. It is equivalent to approximately 7% of the estimated total population of private schools in Ghana and Uganda (OI, 2018).

The sample was cleaned to include only schools that have never received a loan, as well as schools that have completed at least one loan cycle. The two groups in the sample were thus schools that have completed one full loan cycle and schools that have not received a loan. The overall proportion of the two groups in the end sample was 79.3% loan clients and 20.7% non-loan clients. With a sample size in excess of 900, the sample holds significant statistical power. For regression analysis, this sample easily meets rules of thumb, such as 50 cases plus 8 times the number of independent variables (114) or 50 cases per independent variable (400) (Vogt, Vogt, Gardner, Haeffele, 2014). Thus, the sample size is large enough to uncover statistical relationships with a 95% confidence level (5% alpha) (Vogt, Vogt, Gardner, Haeffele, 2014).

### **3.4. Units of Analysis**

The variables which have been identified for the sample enable a description of the relationship between receiving a loan and not receiving a loan, included in Table 2 below. In 2009, the GIIN launched IRIS, a catalogue of metrics that can be used by organisations seeking to demonstrate and track impact (GIIN, 2019). Where relevant, these metrics are collected in line with those guidelines. The reason for this is so that in future, innovative finance schemes will be able to utilise and compare these results and it creates a database for Opportunity EduFinance that is in accordance with international standards.

The study examines whether private schools have used loan funding to hire additional teachers, enrol more students and expand facilities. These are all previously mentioned indicators demonstrated by research to contribute to increased student achievement and school capacity to intake more students. Extending this research to two countries in SSA helps understand whether this dynamic also holds and with a stronger focus on loans.

**Table 2 Variables Used and Sample Size**

Variable	Description	Type	IRIS+ Metric Code	Observations with Loan	Observations without Loan
Has the school received a loan? **	The school is asked whether or not it has received a loan.	Binary (Yes/No)	NA	NA	NA
<b>Capacity Indicators</b>					
Number of classrooms	A measure of the number of classrooms	Continuous		722.00	162.00
Change in number of classrooms	A measure of the change in the number of classrooms	Continuous	PI5501	419.00	120.00
Number of students	A measure of the number of students	Continuous		658.00	134.00
Change in number of students	A measure of the change in the number of students attending the school	Continuous	PI2389	288.00	60.00
<b>Quality Indicators</b>					
Pupil/ Teacher Ratio	A measure of the ratio of pupils to teachers at the school	Continuous	PI5110	651.00	147.00
School washrooms	A measure of whether or not the school has separate toilets available for use by pupils	Continuous	PI4243	639.00	152.00
School washrooms - Female Only	A measure of whether or not the school has gender separate toilets available for use by pupils	Continuous	PI4243	656.00	143.00
Pupils per washroom	A measure of the number of washrooms available for use by pupils, in relation to the number of pupils	Continuous		605.00	137.00
Extracurricular programmes offered	A measure of whether or not the school has extracurricular facilities available for use pupils	Continuous	PD9759	425.00	118.00

\*\*Independent Variable

Source: Author, 2020

### 3.4.1. Description of Variables

The standard uses of School Development Loans are for investment in infrastructure to increase either capacity or quality for the school (TSI, 2018). Studies from sources included in Finally, the IFC has invested heavily in providing risk sharing to financial institutions that lend money to schools through the Africa Schools Program (Mundy, K. & Menashy, F., 2014). This was initially done in Ghana and Kenya and later extended to Rwanda, where IFC provided funding and advisory support to financial institutions.

Table 1 have established a link between indicators of school capacity and quality which are measured and compared to the school having a loan or not with Opportunity International's data. The indicators analysed include number of classrooms, number of students enrolled, PTR, number of school washrooms, number of school washrooms specifically for girls and number of extracurricular activities offered by the school.

### Independent Variable

- **Loan client:** The independent variable analysed refers to whether or not a school has taken out a School Development Loan from a financial institution that is in partnership with Opportunity International. The population has been segmented according to this variable. To be included in the sample, loan clients must have completed at least one School Development Loan cycle.

### Dependent Variables - Capacity

- **Number of Classrooms:** The number of classrooms is indicative of school capacity as it relates to the number of filled and unfilled school places (Department for Education, 2019). The variable is defined as the count of classrooms at the school during the current academic year.
- **Change in Number of Classrooms:** The change in number of classrooms is defined as the percentage difference between the number of classrooms at the school during the current academic year, compared to the number of classrooms at the school during the previous academic year.
- **Number of Students Enrolled:** The number of students enrolled is indicative of school capacity as it relates to the number of filled school places (Department for Education, 2019). It is defined as the number of students observed to be enrolled at the school during the current academic year.
- **Change in Number of Students Enrolled:** The change in number of students enrolled is defined as the percentage difference between the number of students enrolled at the school during the current academic year, compared to the number of students enrolled at the school during the previous academic year.

### Dependent Variables - Quality

- **Pupil Teacher Ratio (PTR):** The number of students per teacher is indicative of school quality as it relates to the amount of individual attention that a student regularly receives. Lower PTRs have been linked with higher academic achievement in numerous studies (Ajani & Akinyele, 2014; Koc & Celik, 2015). Students have been shown to be more

engaged in class, leading to higher academic achievement as well in smaller classrooms (Finn, 2003). The variable is defined as the number of students enrolled at the school during the current academic year, divided by the number of teachers in the current academic year.

- **School Washrooms:** Having washrooms available at a school is indicative of school quality as it relates to children's ability to maintain hygiene. Afridi (2011) has shown that students achieve better learning outcomes when they are able to use washrooms. The variable in this study is defined as the number of washrooms available for use by students at the school.
- **School Washrooms (Female only):** Gender segregated washrooms available for use by girls has been positively linked with enrolment of girls (including fewer days of school missed) and better-quality learning outcomes (Afridi, 2011). The variable in this study is defined as the number of washrooms available for use by girls at the school.
- **Extracurricular Activities:** Investment in libraries, sports facilities and other infrastructure have been linked to positive quality improvements (Andrabi et al, 2018), producing desired benefits such as increased attendance, better behaviour and greater learning outcomes (Reeves, 2008). The variable is defined as the number of the following activities offered by the school: Debate; Sports; Music, Dance and Drama; Culture Clubs; Volunteering; and Other.

### 3.5. Analytical Framework

The study followed a quantitative observational research approach as data has been recorded onsite based on a pre-coded survey by Opportunity International (Vogt, Vogt, Gardner, Haeffele, 2014). The study uses analysis of variance (ANOVA) to identify whether there were differences between the means of dependent variables based on the independent variable of whether or not a school had taken a School Development Loan. It utilised statistical analysis to ascertain whether the existence of a loan results in a significant difference in the identified indicators. The data is in Microsoft Excel (Microsoft, 2020) and all viable data has been identified and utilised. The analysis itself is conducted in Stata, which achieves the stated objectives. Stata is able to perform complex data analysis, including ANOVA, Correlation, Covariance Analysis, Descriptive Statistics, t-Test and z-Test (Stata, 2020). F-Statistics calculated in the ANOVA are used to estimate "the effect of any treatment ... by taking the difference between the mean of the observations which receive the treatment and the general mean" (Cochran & Cox, 1992). Together, these analyses identify differences that exist between the independent variable of

whether or not a school has a loan and the dependent variables of student enrolment, pupil-teacher ratio, number of teachers, toilet facilities and presence of other facilities.

### Estimation Approach

With the data collected, the schools are classified into two groups: those who have completed more than one loan cycle and those without loans. This variable is then tested pairwise against the six dependent variables individually: number of classrooms, total student enrolment, pupil-teacher ratio, number of washrooms, number of female-specific washrooms, the presence of other quality facilities and number of classrooms.

Using Vogt, Vogt, Gardner, Haeffele (2014) criteria for choosing statistical tests, the study utilised correlation analysis, multiple regression and the *t-test* to assess the differences in the data. Multiple regression is well suited to survey research, given that it collects data on multiple variables from large samples (Vogt, Vogt, Gardner, Haeffele, 2014).

### Correlation Analysis

A correlation analysis is conducted in order to identify whether or not there is a relationship amongst the variables. The correlation matrix identifies which variables are dependent or have a strong relationship and which variables are best suited for regression analysis. A good variable is correlated with the outcome/ dependent variable (whether the school has a loan or not) but not highly correlated with the other independent variables (number of classrooms, number of students enrolled, PTR, number of school washrooms, number of school washrooms specifically for girls and number of extracurricular activities offered by the school). The correlation is between -1 and +1, and the closer it is to either of those extremes indicates greater strength in the relationship. The correlation coefficient formula is displayed below in Equation 1, demonstrating that the more similar the two variables are, the closer they are to 1. Effort is taken to ensure that predictor/ independent variables are not highly correlated with each other to reduce the potential for collinearity.

#### Equation 1 Correlation Coefficient Formula

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Source: Vogt, Vogt, Gardner, Haeffele, 2014

## Multiple Regression

Following the correlation analysis, a subset of variables is chosen for a multiple regression analysis. Analysis is then conducted in order to identify whether a good regression model can be constructed. The correlation matrix identifies which variables are dependent or have a strong response relationship and which variables are best suited for regression analysis. A good predictor/ independent variable is highly correlated with the response/ dependent variable (Vogt, Vogt, Gardner, Haefele, 2014). The sample size of 269 for the initial regression analysis was smaller than the original data set, owing to missing data for some categories. Eliminating some of the variables helps to reduce the potential for collinearity, which happens when independent variables are highly correlated with each other.

## Mean Difference Testing

The sample sizes were large, ranging from 60 to 764, indicating the potential to use the *z-Test*, which requires the population and the sample dependent variables to be normally distributed. The *t-Test*, a more conservative measure, has been chosen as the sample may not be normally distributed (Vogt, Vogt, Gardner, Haefele, 2014). The samples were grouped to have one independent variable and one dependent variable for each test. The independent variable (having a loan versus not having a loan) is categorical and the dependent variables are continuous. This makes the *Standard Mean Difference t-Test* methodology appropriate, where Correlation and Regression analysis are better suited when both independent and dependent variables are continuous.

When conducting t-Tests, there is a process which must be followed to ensure that the correct test has been chosen (Vogt, Vogt, Gardner, Haefele, 2014). First, the researcher must determine whether the test is non-directional (two-tailed) or directional (one-tailed). Given the Null hypotheses set out in Chapter 1 are that there is no difference when a school has a loan and when a school does not have a loan, the test undertaken is non-directional in all cases. There is a possibility that there is no difference between a school having a loan compared to not having a loan and there is also a possibility that the schools with loans have greater or lower averages than the schools without loans.

The next decision that must be made regarding t-Tests is whether or not the sample is a paired sample (two-dependent-sample) or two-independent-samples. The paired sample t-Test compares the means from the same group at different times. The two-independent-samples test compares two groups that are independent of each other. For this study, which is looking at

different subjects based on whether they have a loan, the correct test is the two-independent-samples test, assuming equal variance.

The formula for the independent samples t-Test is shown below.

#### Equation 2: T-Statistic formula

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}}$$

Source: Vogt, Vogt, Gardner, Haefele, 2014

#### Model Validation

One of the key output statistics for regression is the R Square value, which measures the proportion of variance of the dependent variable that is explained by all of the independent variables in a regression model (Vogt, Vogt, Gardner, Haefele, 2014). If the R Square is 0.5, approximately half of the variation in the dependent variable can be explained by differences in the independent variables. A low R Square indicates a low level of significance coming from the independent variables.

Second, the F statistic from the ANOVA table validates the significance of the overall model, or whether the group of independent variables can help to identify a joint significance. To confirm a reliable model, the general guideline is that the “Significance F” should be below 0.05, for 95% confidence (Vogt, Vogt, Gardner, Haefele, 2014). Similar to the F statistic, the P-value for the t statistic should be lower than 0.05 in order to identify the variable as having a strong predictive power.

The key output statistics of interest are the means for each variable, the average value of all data points for each variable in the sample. For the test, the researcher must set the hypothesised mean difference. For the purposes of this study, all Hypothesised Mean Differences are set to 0, indicating that the Null Hypothesis does not have any expectation for the result to be different from 0. Another important statistic is the degrees of freedom (“df”). Degrees of freedom are directly related to the number of observations and variables in the study. It is used to calculate the critical t-Stat at which the difference is deemed to be significant. Since the study is using a two-tail hypothesis, the “Pr(T!=t)” variable from the Stata output tells the researcher the level of significance. If it is lower than 0.05 the Null hypothesis, that the two means are not different

from each other, can be rejected. The outputs and analysis for each of these variables are included in Chapter 4.

### Estimation Tool

The study is conducted using Stata, which is suitable for this type of analysis (Keller, 2014). All of the variables that are tested are presented in the analysis of discussion and findings in Chapter 4.

## 3.6. Data Validity and Reliability

The study uses data that has been collected by Opportunity International between 2018 and 2019 from over 900 schools across Ghana and Uganda out of 1,163 schools that are engaged in Opportunity International's Education Quality programme and in the Education Finance database. As explained in section 3.3, this gives the study a representative sample with which to study differences in capacity and quality of schools and compare schools that have received a loan with those that have not (Vogt, Vogt, Gardner, Haefele, 2014).

Extensive training has been conducted for data enumerators to align understanding and the steps that have been taken in piloting the survey, including ensuring that questions are asked in a clear and consistent manner which is easily interpretable by the school. Despite this and despite enumerators visiting schools in person to validate the data, there are a few drawbacks to the approach. The drawbacks are minimised and mitigated for as much as possible.

- **The survey is not randomised** – it is administered to all of the schools who voluntarily enrol in Opportunity International's Education Quality program. This implies that the school does have at least some interest in improving the quality of the school, since participation requires the school leaders to sign a charter, attend professional development training, participate in leader meetings with other schools and other activities. Given the voluntary nature of the Education Quality program, the study may find quality improvements (or otherwise) to be the same, or similar, across all schools.
  - **Mitigation:** Mitigating this, the study uses data from over 900 schools and the binary response as to whether the school has a loan or not isolates other impacts coming from the Education Quality program. Schools participating in the Education Quality program are not required to have a loan with a partner financial institution (although Opportunity EduFinance requires that at least 60% of them do).

- **Clients and potential clients of a bank** - The survey is limited to schools that are clients or potential clients of the financial institutions that work with Opportunity International.
  - **Mitigation:** The study mitigates this by covering schools that have loans with 7 financial institutions in Uganda and Ghana, to maximise the ability for it to be representative. The sample only includes loan clients that have completed at least one loan cycle.
- **Loan purpose and use** - The purpose of the loan cannot easily be verified due to limitations of some of the financial institution's data collection capability. Therefore, some loans may be used for working capital rather than direct investment in a school development project. Also, while the financial institutions inspect schools and work actively with them to budget for projects, purchase supplies and employ contractors, it is sometimes difficult to avoid the diversion of funds from the project. This may result in a lower impact per dollar invested.
  - **Mitigation:** The study aims to mitigate this by verifying with the school that it indeed has a loan.
- **Length of study** – School Development Loans typically have a duration of two or more years. The change figures gathered for this study were not captured at the beginning or at the end of the loan necessarily and all schools were at different stages in their progress with the loan. Of the schools in the population with loans, 72.9% of them have already completed one loan cycle.
  - **Mitigation:** The study aims to mitigate this by excluding schools that have yet to complete a full loan cycle from the loan client group sample. All schools in the overall sample are participants in Opportunity EduFinance's Education Quality programme and those schools with loans and without loans are part of the same communities and populations. Including only loan clients that have completed one loan cycle or more, the time for the effects may be enough to be measurable. While it is a cross-sectional study, the loans were taken out at varying points in time and therefore assessed at different points in time relative to the disbursement of the loan.
- **Generalizability of the study** – The study concerns schools located in Ghana and Uganda while each country in SSA faces its own unique set of challenges.
  - **Mitigation:** The countries studied have similar challenges when it comes to financing and scaling improvements in capacity and quality of schools. Access to

quality education remains scarce, harmed by strong population growth, poverty, long distances and poor infrastructure (Unesco, 2017).

#### Other Limitations

- **Private vs Public Schools** - It is important to note that this study intentionally does not discuss education as a public vs. private good, highlighting the vast number of children who remain out of school, the public funding gap and extensive amount of public finances that are already being directed towards education across the continent.

### 3.7. Conclusion

This chapter has provided a detailed and comprehensive review of the research methodology that has been employed in the study. It has demonstrated the basis for employment of a quantitative approach to identifying key variables of study, an overview of the type of data, and data collection methodology. It included a description of the units of analysis, the sampling approach and the analytical framework that was utilised. The chapter concluded with a discussion of the potential drawbacks and limitations to the data.

## Chapter 4: Findings and Discussion

### 4.1. Introduction

The chapter which follows includes a description of the data, findings from the analysis with overview and profile of the dataset. The second section details the number of schools from Ghana and Uganda that were covered in the sample. It includes the descriptive statistics for those schools which did and did not receive loans and the resulting characteristics of each. The third section reviews the findings and outputs that were uncovered in the analysis, linking them directly with the literature. It concludes with a discussion of the validity and reliability of the findings.

### 4.2. Description of Units of Analysis

#### Descriptive Statistics

The data in Table 3 shows the key characteristics and outputs of all variables that have been tested. It highlights the number of pairwise observations for each sample (both with and without a loan) and the mean value of each statistic. As evidenced in the table, schools that have completed one loan cycle in the sample are larger in terms of number of classrooms and students. They appear to be growing classroom size more rapidly but not enrolling students more rapidly. With regard to the Quality Indicators, the Pupil/ Teacher Ratio is slightly lower for loan clients, but loan clients also have more washrooms and more female only washrooms on average. The schools that have completed one loan cycle also offer more Extracurricular programmes to students than schools that have not taken a loan. The statistical tests to confirm the validity of these outputs are conducted in section *4.3 Findings from the Analysis*.

**Table 3 Sample Data - Descriptive Statistics**

Variable	Observations with Loan	Observations without Loan	% with Loan	Mean Value with Loan	Mean Value without Loan
Has the school received a loan? **	NA	NA			
<b>Capacity Indicators</b>					
Number of classrooms	722.00	162.00	81.7%	11.35	9.69
Change in number of classrooms	419.00	120.00	77.7%	5.92%	4.59%
Number of students	658.00	134.00	83.1%	355.08	266.65
Change in number of students	288.00	60.00	82.8%	7.95%	8.51%
<b>Quality Indicators</b>					
Pupil/ Teacher Ratio	651.00	147.00	81.6%	19.11	19.29
School washrooms	639.00	152.00	80.8%	7.18	5.99
School washrooms - Female Only	656.00	143.00	82.1%	3.38	3.23
Pupils per washroom	605.00	137.00	81.5%	68.68	62.55
Extracurricular programmes offered	423.00	118.00	78.3%	3.28	3.02

\*\*Independent Variable  
Source: Author, 2020

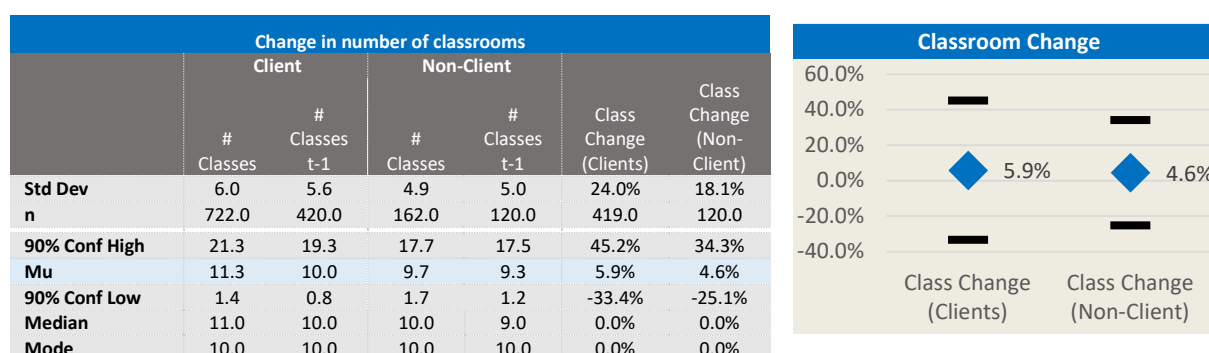
### Capacity Indicators

The following section contains the output from the four Capacity Indicators that were tested for in the study.

#### Number of Classrooms and Classroom Change

Table 3 above and Figure 8 below highlight that the average *Number of Classrooms* for schools with a loan is higher (11.35) than the average number of classrooms without a loan (9.69). Further, the *Change in Number of Classrooms* over the previous year was higher (5.92%) for schools with loans than for schools without loans (4.59%). This output would suggest that even if the analysis were to find there to be a statistically significant difference in classroom change, it is a marginal difference at least over the span of a single year. Change in classrooms for loan clients may be concentrated towards the end of the first loan cycle as a classroom becomes available for use only upon completion.

**Figure 8 Change in Number of Classrooms**



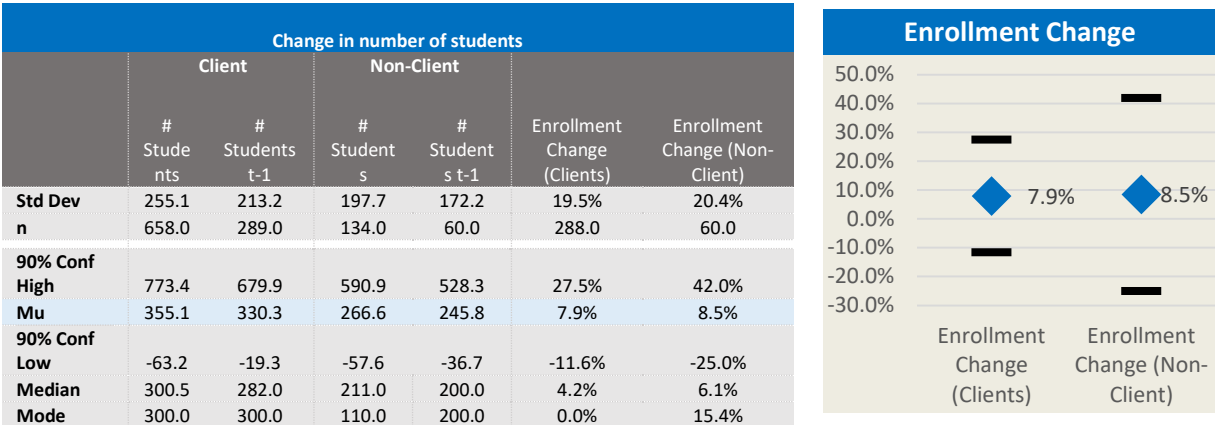
Source: Author, 2020 (t-1 = one year ago)

### Number of Students and Change in Number of Students

Table 3 above and Figure 9 below highlight that the average *Number of Students* for schools with a loan is higher (355.1) than the average *Number of Students* at schools without a loan (266.6). However, the *Change in Number of Students* over the previous year was greater (8.5%) for schools without loans than for schools with loans (7.9%).

The standard deviations of 255.1 and 197.7 in the *Number of Students* indicate a high variance in the size of the schools and the proportionate standard deviation for the *Growth in Number of Students* of 19.5% and 20.4% for schools with and without loans (respectively) indicates the same. Driving the variance is that there is not a minimum size of school that most financial institutions lend to. Nor is there a minimum size requirement for a school to be a participant in the Education Quality programme. Many schools have not been around long enough to have reached full progression from Pre-Primary to Secondary school, while others have been in existence for many years.

Figure 9 Change in Number of Students



Source: Author, 2020

### Quality Indicators

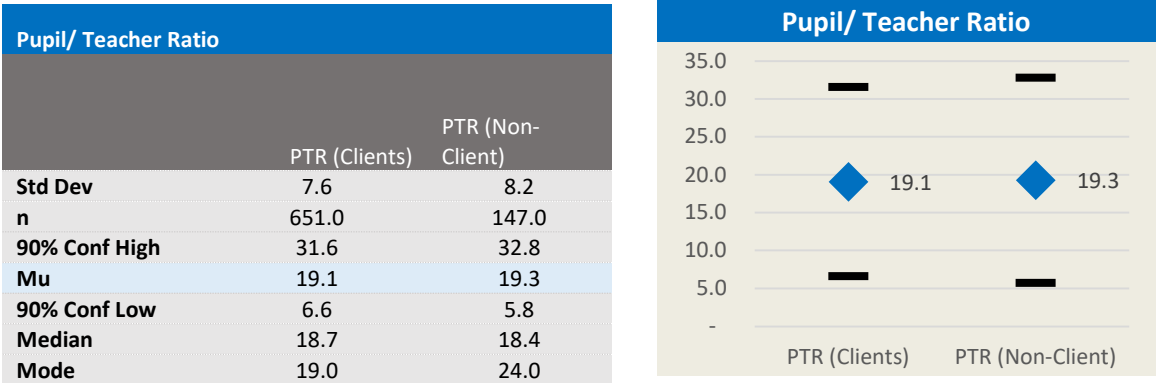
The following section contains the output of descriptive statistics for the four Quality Indicators that were tested for the study, including *Pupil/ Teacher Ratio (PTR)*, *School Washrooms*, *School Washrooms (Female Only)* and *Extracurricular Programmes Offered*.

### Pupil/ Teacher Ratio (PTR)

Table 3 above and Figure 10 below highlight that the average *PTR* for schools with a loan is lower (19.1) than the average *PTR* for schools without a loan (19.3). As has been seen with the previous indicators, there is a high variation amongst schools in terms of the average *PTR*. The standard deviations of 7.6 students for schools with a loan and 8.2 for schools without a loan.

The similarities in averages indicate that schools with loans are in fact hiring more teachers as they expand. Thus, schools are not increasing PTR in an effort to pay off loans or to fit more children in school without increasing the number of teachers. The inference in the following section will demonstrate whether or not the difference is statistically significant.

Figure 10 Pupil/ Teacher Ratios



Source: Author, 2020

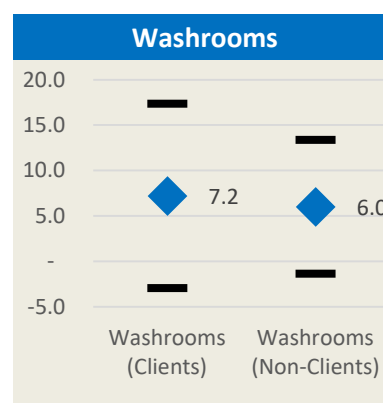
### School Washrooms

Table 3 above and Figure 11 below highlight that the average *Number of School Washrooms* for schools with a loan is higher (7.2) than the average for schools without a loan (6.0). Similar to previous indicators, there is a high degree of variation amongst schools in terms of the average *Number of School Washrooms*. The standard deviations of 6.2 washrooms for schools with loans and 4.5 washrooms for schools without loans is indicative of this variance. The median *Number of School Washrooms* for schools with loans is 5.0 and 4.5 for schools without loans, however the mode is 2.0 for both types. It is possible that this is driven simply by the larger number of pupils on average at schools with loans than schools without loans. This is evaluated when analysing the *Number of Pupils per Washroom*.

Figure 11 School Washrooms

School washrooms		
	Washrooms (Clients)	Washrooms (Non-Clients)
Std Dev	6.2	4.5
n	639.0	152.0
90% Conf High	17.3	13.4
Mu	7.2	6.0
90% Conf Low	-3.0	-1.4
Median	5.0	4.5
Mode	2.0	2.0

Source: Author, 2020



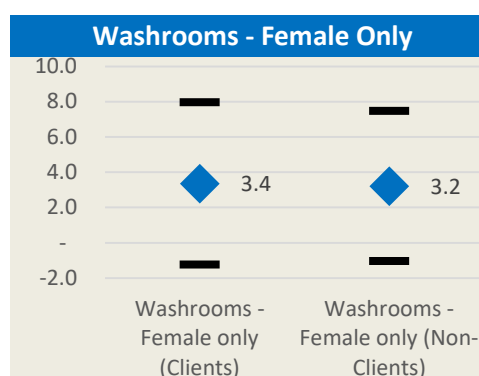
### School Washrooms (Female Only)

Table 3 above and Figure 12 below highlight that the average *Number of Female Washrooms* for schools with a loan is higher (3.4) than the average for schools without a loan (3.2). Similar to previous indicators, there is a high variation amongst schools in terms of the average number of washrooms for females only. The standard deviations of 2.8 and 2.6 washrooms, respectively, indicates a fairly high variance amongst the schools. Compared to the medians, both groups of schools had less than 50% washrooms allocated to females on average (40.0% and 44.4% respectively). The median *Number of Female Washrooms* for schools with loans was 2.0 for schools with and without loans, however the mode is 1.0 for both types. The reason for the mode being 1.0 is that there are many schools who actually only have one washroom available for female use. In most cases, these will be the smaller schools, however it does highlight a general continued deficit of washrooms available in schools.

Figure 12 School Washrooms (Female Only)

School washrooms - Female Only		
	Washrooms - Female only (Clients)	Washrooms - Female only (Non-Clients)
Std Dev	2.8	2.6
n	656.0	143.0
90% Conf High	8.0	7.5
Mu	3.4	3.2
90% Conf Low	-1.2	-1.0
Median	2.0	2.0
Mode	1.0	1.0

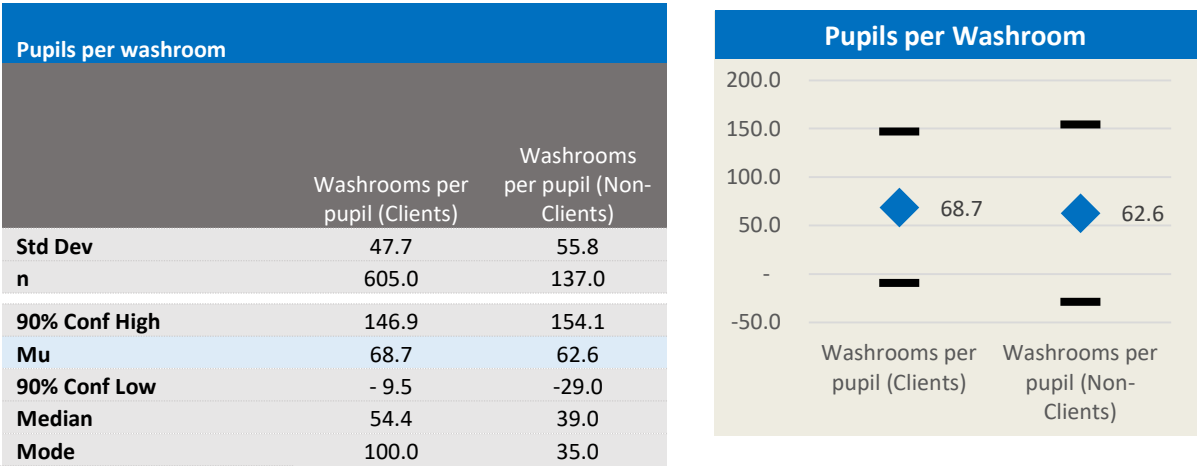
Source: Author, 2020



### Pupils per Washroom

Table 3 above and Figure 13 below highlight that the average number of *Pupils per Washroom* for schools with a loan is higher (68.7) than the average for schools without a loan (62.6). The standard deviations of 47.7 pupils per washroom for schools with loans and 55.8 for schools without loans is indicative that the variance is similar. The median number of *Pupils per Washroom* for schools with loans is 54.4 and 39.0 for schools without loans, and the mode is highly divergent at 100 for schools with loans and 35 for schools without loans. While the data indicates that there are more pupils per washroom at schools with loans than those without, tests in the following section examines whether this difference is significant. There is a not-insignificant denominator effect, in that many schools have just one washroom for boys and one for girls. The moment that they add an additional two washrooms cuts the Pupils per Washroom indicator in half.

Figure 13 Pupils Per Washroom



Source: Author, 2020

### Extracurricular Programmes Offered

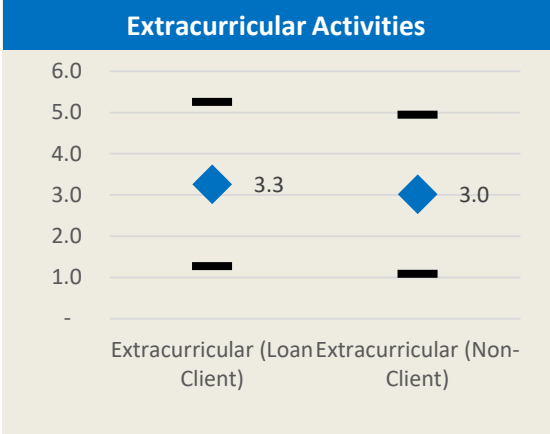
Table 3 above and Figure 14 below highlight that the average number of *Extracurricular Programmes Offered* for schools with a loan is higher (3.3) than the average for schools without a loan (3.0). The standard deviation of 1.2 programmes offered was the same for both groups and many schools offered several of the extracurricular programmes. Schools with a loan indicates a high variance amongst the schools. The median number of *Extracurricular Programmes Offered* for schools with loans was 3.0 for both groups of schools and the mode is 4.0 for both types. The maximum number of extracurricular programmes offered in the survey was 5: Library, Computer Lab, Athletic Facilities, Arts and Other. The majority of schools therefore have at declared at

least 3 of the 5 extracurricular programmes to be offered, however those schools with loans are averaging more. The section that follows will determine whether the difference was statistically significant.

Figure 14 Extracurricular Programmes Offered

Extracurricular programmes offered		
	Extracurricular (Loan Client)	Extracurricular (Non-Client)
Std Dev	1.2	1.2
n	423.0	118.0
90% Conf High	5.3	4.9
Mu	3.3	3.0
90% Conf Low	1.3	1.1
Median	3.0	3.0
Mode	4.0	4.0

Source: Author, 2020



### Correlation Analysis

A correlation matrix was constructed to identify any significant relationships that exist between the independent and dependent variables. As previously mentioned, independent variables are ideally not correlated, though a strong relationship between independent and dependent variable is desirable (Vogt, Vogt, Gardner, Haeffele, 2014).

The correlation matrix below in Table 4 demonstrates that none of the independent variables are particularly highly correlated between the desired dependent variable of whether or not the school has a loan. The correlation matrix does show that the relationship is strongest between *Extracurricular Programmes Offered* (0.11) and *Number of students* (.08).

None of the pairwise correlations analysed were significantly negative, that between *Extracurricular Programmes Offered* and *Number of Classrooms* being most negative at -0.04.

Table 4 Correlation Matrix

<i>Correlation Matrix - All Variables</i>	Has the school received a loan?***	Number of students	Number of classrooms	School washrooms	School washrooms - Female Only	Pupil/Teacher Ratio	Extracurricular programmes offered
Has the school received a loan?***	1.00	0.08	0.04	0.01	0.01	0.01	0.11
Number of students	0.08	1.00	0.51	0.28	0.27	0.40	0.18
Number of classrooms	0.04	0.51	1.00	0.05	0.00	0.05	-0.04
School washrooms	0.01	0.28	0.05	1.00	0.94	-0.00	0.30
School washrooms - Female Only	0.01	0.27	0.00	0.94	1.00	-0.00	0.28
Pupil/Teacher Ratio	0.01	0.40	0.05	-0.00	-0.00	1.00	0.09
Extracurricular programmes offered	0.11	0.18	-0.04	0.30	0.28	0.09	1.00

Source: Author, 2020

### Multiple Regression

While low correlations between the dependent variable and the independent variables in the analysis above provides little evidence or signals that a strong predictive model is feasible, regression is useful for exploratory data analysis. The number of observations used for the first regression was reduced from the full sample of variables given a need for completeness of data and removal of significant outliers. For further iterations, some independent variables need to be removed to find the model of best fit, because of high correlation which could suggest multicollinearity (Vogt, Vogt, Gardner, Haeffele, 2014).

The analysis starts with the first regression, which makes use all of the independent variables as seen in Table 5. This table highlights an R Square of 0.0203, indicating low predictive power. The F-Statistic significance value, at 0.5889, also highlights that there is a low predictive power in this model. The only variable which was significant at 5% confidence level was the constant. The constant (intercept), which is linearly the value of the output when all independent variables are equal to zero, is often misleading to interpretation, particularly as the dependent variable will be either 0 or 1 in this analysis (Keller, 2014). However, it shows that the coefficient is 0.6689019, indicating a bias closer to 1. Guiding the next iteration, the model points to *Number of Students*, *Extracurricular Programmes Offered* and *Number of Washrooms* as the variables with the most promise for significance.

**Table 5 Regression 1 - All Variables**

	Regression 1		Regression 2		Regression 3	
	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]
<b>Constant</b>	0.6689019 [0.1542346]	4.34 [0.000]				
<b>Extracurricular</b>	0.0431892 [0.0275073]	1.57 [0.118]				
<b>Enrolment</b>	0.0002352 [0.0002349]	1.00 [0.318]				
<b># Washrooms</b>	-0.0083652 [0.0161465]	-0.52 [0.605]				
<b># Classrooms</b>	0.0008219 [0.0081518]	0.10 [0.92]				
<b># Female Washrooms</b>	0.0290251 [0.07]	0.07 [0.941]				
<b>PTR</b>	-0.001704 [0.0044602]	-0.38 [0.703]				
<b>F</b>	0.78					
<b>F Probability</b>	0.5889					
<b>R-squared</b>	0.0203					
<b>Observations</b>	232					

Source: Author, 2020

Some of the variables with the least predictive power were removed for Regression 2, including variables which appeared to have potential for multicollinearity. The second model removed *Number of Classrooms*, *School Washrooms – Female Only* and *Pupil-Teacher Ratio*. The remaining variables included *Number of Students*, *School Washrooms* and *Extracurricular Programmes Offered*. The R Square was reduced slightly from an already low value to 0.0194, while the Significance F was slightly improved to 0.2137. After removing half of the variables, none of the remaining variables retained a significant t-statistic or P-Value.

**Table 6 Regression 2 - Reduced Variables**

	Regression 1		Regression 2		Regression 3	
	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]
<b>Constant</b>	0.6689019 [0.1542346]	4.34 [0.000]	0.6492519 [0.1064545]	6.10 [0.000]		
<b>Extracurricular</b>	0.0431892 [0.0275073]	1.57 [0.118]	0.0422027 [0.0270791]	1.56 [0.121]		
<b>Enrolment</b>	0.0002352 [0.0002349]	1.00 [0.318]	0.0002133 [0.0002133]	1.27 [0.205]		
<b># Washrooms</b>	-0.0083652 [0.0161465]	-0.52 [0.605]	-0.0069286 [0.0061323]	-1.13 [0.260]		
<b># Classrooms</b>	0.0008219 [0.0081518]	0.10 [0.92]				
<b># Female Washrooms</b>	0.0290251 [0.07]	0.07 [0.941]				
<b>PTR</b>	-0.001704 [0.0044602]	-0.38 [0.703]				
<b>F</b>	0.78		1.51			
<b>F Probability</b>	0.5889		0.2137			
<b>R-squared</b>	0.0203		0.0194			
<b>Observations</b>	232		232			

Source: Author, 2020

Regression 3 is the final regression, which was conducted between Extracurricular Programmes Offered. This variable had carried the lowest P-Value (and therefore most significance) in the previous Regression (2). The results confirm that there is no strong linear model which can be used to predict whether a school has a loan. The R Square was reduced nearly to zero at 0.0095, though the Significance F was reduced to 0.1386.

Table 7 Regression 3 - Single Variable

	Regression 1		Regression 2		Regression 3	
	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]	Coefficient [Standard Error]	t-Stat [P value]
<b>Constant</b>	0.6689019 [0.1542346]	4.34 [0.000]	0.6492519 [0.1064545]	6.10 [0.000]	0.6758217 [0.0968343]	6.98 [0.000]
<b>Extracurricular</b>	0.0431892 [0.0275073]	1.57 [0.118]	0.0422027 [0.0270791]	1.56 [0.121]	0.0383445 [0.0258007]	1.49 [0.139]
<b>Enrolment</b>	0.0002352 [0.0002349]	1.00 [0.318]	0.0002133 [0.0002133]	1.27 [0.205]		
<b># Washrooms</b>	-0.0083652 [0.0161465]	-0.52 [0.605]	-0.0069286 [0.0061323]	-1.13 [0.260]		
<b># Classrooms</b>	0.0008219 [0.0081518]	0.10 [0.92]				
<b># Female Washrooms</b>	0.0290251 [0.07]	0.07 [0.941]				
<b>PTR</b>	-0.001704 [0.0044602]	-0.38 [0.703]				
<b>F</b>	0.78		1.51		2.21	
<b>F Probability</b>	0.5889		0.2137		0.1386	
<b>R-squared</b>	0.0203		0.0194		0.0095	
<b>Observations</b>	232		232		232	

Source: Author, 2020

The categorical nature of the dependent variable was expected to result in a poorly fit model, but the most valuable insights gained from this analysis is the significance of the individual variables, which leads to the individual variable testing. From the regression analysis, it is clear that the variables which hold the most promise are Extracurricular Programmes Offered, Number of Students and Number of Washrooms, which will be discussed in the findings.

### 4.3. Findings from the Analysis

The key finding from the output analysis is that there is statistical evidence which demonstrates School Development Loans are enhancing the ability of LCPSs to deliver greater Capacity and Quality. Regarding Capacity Indicators, schools that had completed at least one full loan cycle had 1.66 more classrooms and 89 more students on average than schools that did not have a loan. Borrowing schools can build more infrastructure and generate capacity to enrol more children. The findings were inconclusive regarding change in number of classrooms and change in number of students. The inconclusive nature of the change statistics is possibly driven by the lack of long-term data, where it would take another year or two of data to establish a clear change.

While Quality Indicators were inconclusive overall, schools that have completed one full loan cycle had 1.2 more washrooms than those that did not have a loan. They also offered substantially more extracurricular programmes than schools that had not taken a loan. Despite loan client

schools having lower pupil/teacher ratio and more washrooms, the statistical evidence was inconclusive. The data in Table 8 shows the key results from the statistical analysis. It includes the descriptive statistics and inferences that were gained regarding the variables that have been tested.

**Table 8 Descriptive Statistics and Inference**

Variable	Mean Value with Loan	Mean Value without Loan	T-Stat (Stata Output)	P-Value (Stata Output)	Inference/ Finding
Has the school received a loan? **			NA	NA	
<b>Capacity Indicators</b>					
Number of classrooms	11.35	9.69	3.2570	0.0012	Schools with loans have greater number of classrooms than schools without loans.
Change in number of classrooms	5.92%	4.59%	0.5659	0.5717	Study does not demonstrate that schools with loans have different growth in number of classrooms from schools without loans.
Number of students	355.08	266.65	3.7878	0.0002	Schools with loans have greater number of students than schools without loans.
Change in number of students	7.95%	8.51%	0.4205	0.8410	Study does not demonstrate that schools with loans have different growth in number of students than schools without loans.
<b>Quality Indicators</b>					
Pupil/ Teacher Ratio	19.11	19.29	-0.2527	0.8006	Study does not demonstrate that schools with loans have different PTR than schools without loans.
School washrooms	7.18	5.99	2.2455	0.0250	Schools with loans have greater number of washrooms than schools without loans.
School washrooms - Female Only	3.38	3.23	0.5702	0.5687	Study does not demonstrate that schools with loans have different number of washrooms dedicated to females.
Pupils per washroom	68.68	62.55	1.3140	0.1892	Study does not demonstrate that schools with loans have a different number of Pupils per Washroom.
Extracurricular programmes offered	3.26	3.02	2.0912	0.0370	Schools with loans have greater number of extracurricular programmes offered than schools without loans.

\*\*Independent Variable  
Source: Author, 2020

### Discussion - Capacity Indicators

The following section contains the analysis of the t-test results on the four Capacity Indicators that were tested for the study. In addition to the number of observations for each sample (both with and without a loan) and mean values of each indicator, it also includes the t-Stat, Critical t-Stat and P-Value. The t-Stat relates to the indicator in question, while the Critical t-Stat is the value which needs to be achieved for the difference between the two groups indicator mean to be considered statistically significantly different from zero. The P-Value must be below 0.05 for the indicator to be statistically significant. The discussion that follows presents the inference statistics table which is produced for each of the indicators.

## **Number of Classrooms and Change in Number of Classrooms**

The first indicator which was evaluated was the *Number of Classrooms* and *Change in Number of Classrooms*. The United Kingdom government defines capacity in a school as the number of filled and unfilled school places (Department for Education, 2019). For the purposes of this variable, the number of classrooms is representative of the number of filled and unfilled places. An average classroom has capacity for a fixed number of students, meaning that this variable is representative of the potential number of school places.

The sample included 722 observations of the current number of classrooms in schools with loans and 162 observations of schools without loans. The two samples combined to 882 degrees of freedom. The estimated T-Stat was 3.2570, meaning that the number of classrooms for schools with loans is able to be differentiated in a statistically significant way. The relevant P-Value is 0.0012, which is less than 0.05 required to reject the null hypothesis. Schools with loans have more classrooms and the Null hypothesis that the relationship between taking a School Development Loan and the number of classrooms is not statistically significant and different from 0 is rejected.

The analysis has established that the difference in the number of classrooms is statistically different from 0, however are those schools changing the number of classrooms differently to schools that do not have loans? Testing the change in the number of classrooms would be the ideal measure to demonstrate that there are more spaces becoming available for students to fill, however it is known that this sample only has one year's worth of data, which compares to the average loan duration in excess of two years.

For the variable *Change in the Number of Classrooms*, the sample included 419 schools with loans and 120 schools without loans, which combined for 537 degrees of freedom and an estimated t-Stat of 0.5659. This means that the change in number of classrooms for schools with loans and schools without loans is not able to be differentiated statistically. Therefore, the analysis fails to reject the Null hypothesis that the relationship between taking a School Development Loan and changes in school capacity is not statistically significant and different from 0, with regards to classrooms. The relevant P-Value is 0.5717.

These results therefore provide some evidence that a school receiving a loan is likely to have more classrooms, however it cannot say with certainty that the number of classrooms increases because of the loan. A longer time series or interval between the measurements may be able to draw more conclusions in future.

**Figure 15 Number and Change in Number of Classrooms - Inference**

Growth in Number of Classrooms			Number of Classrooms		
t-Test: Two-Sample Assuming Equal Variances			t-Test: Two-Sample Assuming Equal Variances		
	Class Change (Clients)	Class Change (Non-Client)		# Classes (Client)	# Classes (Non-Client)
Mean	0.05921265	0.04586283	Mean	11.34903	9.691358
95% Conf. Interval Low	0.0362135	0.0131275	95% Conf. Interval Low	10.90712	8.932182
95% Conf. Interval High	0.0822118	0.0785981	95% Conf. Interval High	11.79094	10.45053
Standard Error	0.0117005	0.0165322	Standard Error	0.2250879	0.3844301
Standard Deviation	0.2395031	0.1811006	Standard Deviation	6.048125	4.892997
Observations	419	120	Observations	722	162
Hypothesized Mean Difference	0		Hypothesized Mean Difference	0	
df	537		df	882	
t Stat	0.5659		t Stat	3.2570	
P(T<=t) one-tail	0.2859		P(T<=t) one-tail	0.0006	
P(T<=t) two-tail	0.5717		P(T<=t) two-tail	0.0012	

Source: Author, 2020

**Number of Students Enrolled and change in Number of Students Enrolled**

The next Capacity Indicator which was evaluated was the *Number of Students* and *Change in Number of Students*. According to the United Kingdom government definition, capacity is measured as the number of filled and unfilled school places (Department for Education, 2019). For this study, the *Number of Students* enrolled in a school is most representative of the number of filled school places. The data was collected based on the current academic year and the previous academic year, establishing in many cases one year’s worth of figures.

First, the sample for the *Number of Students* enrolled included 658 schools with loans and 134 schools without loans. The mean *Number of Students* at schools with loans was previously shown to be 355.0821, compared to 266.6493 at schools without loans with 790 degrees of freedom. The estimated t-Stat was 3.7878 and the relevant P-Value was 0.0002. Therefore, the Null hypothesis, that the relationship between taking a School Development Loan and changes in school capacity is not statistically significant and different from 0 is rejected, with regards to the *Number of Students*.

The sample for *Change in Number of Students* included 288 schools with loans and 60 schools without loans, which combined for 348 degrees of freedom. the estimated T-Stat was -0.2008. This means that the change in number of students for schools with loans and schools without loans is not able to be differentiated statistically. Therefore, the analysis fails to reject the Null hypothesis that the relationship between taking a School Development Loan and changes in

school capacity is not statistically significant and different from 0, with regards to enrolment. The relevant P-Value is 0.8410.

These results therefore provide evidence that a school receiving a loan is likely to have more students, however it cannot say with certainty that the number of students enrolled increases because of the loan. A longer time series or interval between the measurements may be able to draw more conclusions in future.

Figure 16 Number and Change in Number of Students - Inference

Growth in Number of Students Enrolled			Number of Students Enrolled		
t-Test: Two-Sample Assuming Equal Variances			t-Test: Two-Sample Assuming Equal Variances		
	Enrollment Change (Clients)	Enrollment Change (Non-Client)		# Students (Client)	# Students (Non-Client)
Mean	0.07949874	0.08511223	Mean	355.0821	266.6493
95% Conf. Interval Low	0.0568247	0.032375	95% Conf. Interval Low	335.5582	232.8645
95% Conf. Interval High	0.1021728	0.1378495	95% Conf. Interval High	374.6059	300.434
Standard Error	0.0115198	0.0263555	Standard Error	65051.70406	39094.0941
Standard Deviation	0.1954979	0.2041489	Standard Deviation	255.0524	197.7223
Observations	288	60	Observations	658	134
Hypothesized Mean Difference	0		Hypothesized Mean Difference	0	
df	348		df	790	
t Stat	-0.2008		t Stat	3.7878	
P(T<=t) one-tail	0.4205		P(T<=t) one-tail	0.0001	
P(T<=t) two-tail	0.8410		P(T<=t) two-tail	0.0002	

Source: Author, 2020

Discussion - Quality Indicators

The following section contains the analysis of the t-Test results on the four Quality Indicators that were tested for the study.

**Pupil/ Teacher Ratio (PTR)**

The first Quality Indicator which was evaluated was the *Pupil/ Teacher Ratio (PTR)*. There are numerous studies which have demonstrated a connection between PTRs and quality of schools. Notably, Koc and Celik (2015) found a negative correlation between the number of pupils per teacher and student achievement, which suggests that reducing the *PTR* is critical to improving student achievement. Two other previous studies, Finn (2003) and Bayo (2005) found that students perform better socially and have greater academic achievement. The reasons behind this include that there is more attention being paid to students, they are able to focus better and they are less likely to sleep during class.

The sample for this study included 651 schools with loans and 147 schools without loans, which combined for 796 degrees of freedom. The mean *PTR* for schools with loans was lower at 19.10715, compared to schools without loans at 19.28555, suggesting that there is the potential to demonstrate that schools with loans can provide lower *PTRs* and better quality for pupils.

However, inferential statistics were unable to demonstrate a significant difference between the two means. The estimated t-Stat was -0.2527. This means that the *PTR* for schools with loans and schools without loans is not able to be differentiated statistically. Therefore, the analysis fails to reject the Null hypothesis that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0, with regards to *PTR*. The relevant P-Value is 0.8006. While the direction of change is accurate, suggesting that a school receiving a loan is likely to have a lower *PTR*, there is no conclusive evidence that the *PTR* changes as a result of the loan. A longer time series or interval between the measurements may be able to draw more conclusions in future.

Figure 17 Pupil/ Teacher Ratio - Inference

Pupil/ Teacher Ratio		
t-Test: Two-Sample Assuming Equal Variances		
	<i>PTR (Clients)</i>	<i>PTR (Non-Client)</i>
Mean	19.10715	19.28555
95% Conf. Interval Low	18.52134	17.94194
95% Conf. Interval High	19.69296	20.62917
Standard Error	0.2983314	0.6798482
Standard Deviation	7.611836	8.242721
Observations	651	147
Hypothesized Mean Difference	0	
df	796	
t Stat	-0.2527	
P(T<=t) one-tail	0.4003	
P(T<=t) two-tail	0.8006	

Source: Author, 2020

### School Washrooms

Next, the *Number of School Washrooms* was evaluated as an indicator of school quality. The academic literature regarding the presence of school washrooms is well established, first by Suryadarma (2006) in Indonesia, where students at schools were found to perform significantly better if the school had at least one functioning toilet. Later, Reeves (2008) was able to determine that students perform better when they have access to toilets.

In total, the sample *Number of School Washrooms* included 639 schools with loans and 152 schools without loans, combining for 789 degrees of freedom. The mean value for the *Number of School Washrooms* was 7.183099 for schools with loans and 5.986842 for schools without loans, indicating that schools with loans may have significantly more washrooms available for students than schools without loans.

The estimated t-Stat was 2.2455, meaning that the *Number of School Washrooms* for schools with loans and schools without loans can be differentiated statistically. Therefore, the Null Hypothesis that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0 is rejected, with regards to *Number of School Washrooms*. Schools with School Development Loans have more Washrooms than schools without School Development Loans. The relevant P-Value is 0.0250.

**Figure 18 School Washrooms - Inference**

<b>School washrooms</b>		
t-Test: Two-Sample Assuming Equal Variances		
	<i>Washrooms (Clients)</i>	<i>Washrooms (Non-Clients)</i>
Mean	7.183099	5.986842
95% Conf. Interval Low	6.702187	5.267305
95% Conf. Interval High	7.66401	6.706379
Standard Error	0.2449022	0.364175
Standard Deviation	6.190748	5.267305
Observations	639	152
Hypothesized Mean Difference	0	
df	789	
t Stat	2.2455	
P(T<=t) one-tail	0.0125	
P(T<=t) two-tail	0.0250	

Source: Author, 2020

### **School Washrooms (Female Only)**

The next Quality Indicator which was evaluated was the *Number of School Washrooms Dedicated to Females Only*. Suryadarma (2006) not only demonstrated that schools with washrooms resulted in greater achievement of students, but that the relationship was most significant with girls. Afridi (2011) also found that gender specific toilets were particularly important for educational achievement of girls in rural India.

The sample included 656 schools with loans and 143 schools without loans, which combined for 797 degrees of freedom. The mean value for schools with loans was 3.376524, compared to

3.230769 for schools without loans. If the Null Hypothesis is rejected, it would suggest that schools with loans do have a significantly greater number of toilets.

The estimated t-Stat of 0.5702 and the relevant P-Value is 0.5687. This means that the number of washrooms for schools with loans and schools without loans is not able to be differentiated statistically. Therefore, the analysis fails to reject the Null Hypothesis that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0, with regards to *Washrooms Dedicated to Females Only*.

**Figure 19 School Washrooms (Female Only) - Inference**

School washrooms - Female Only		
t-Test: Two-Sample Assuming Equal Variances		
	Washrooms - Female only (Clients)	Washrooms - Female only (Non-Clients)
Mean	3.376524	3.230769
95% Conf. Interval Low	3.161469	2.801085
95% Conf. Interval High	3.591580	3.660453
Standard Error	0.1095215	0.2173623
Standard Deviation	2.805120	2.599275
Observations	656	143
Hypothesized Mean Difference	0	
df	797	
t Stat	0.5702	
P(T<=t) one-tail	0.2843	
P(T<=t) two-tail	0.5687	

Source: Author, 2020

**Pupils per School Washroom**

The next Quality Indicator which was evaluated was the *Pupils per School Washroom*. As described, Suryadarma (2006), Reeves (2008) and Afridi (2011) all found there to be a direct connection between schools having a washroom and both social and academic achievement of students. Evaluating the number of students per washroom would therefore indicate whether a school is providing adequate facilities for children to learn.

The sample included 605 schools with loans and 137 schools without loans, which combined for 740 degrees of freedom. The mean value for schools with loans was 68.67789, compared to 62.55134 for schools without loans. If the Null Hypothesis is to be rejected, it would suggest that schools with loans do have a significantly higher number of pupils per washroom, suggesting that they may be lagging in their investment in washrooms.

The estimated T-Stat was 1.3140, resulting in a relevant P-Value of 0.1892. This means that the number of *Pupils per Washroom* for schools with loans and schools without loans is not able to be differentiated statistically. Therefore, the analysis fails to reject the Null hypothesis that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0, with regards to *Pupils per Washroom*.

Figure 20 Pupils per Washroom - Inference

Pupils per washroom		
t-Test: Two-Sample Assuming Equal Variances		
	<i>Pupils per Washroom (Clients)</i>	<i>Pupils per Washroom (Non-Clients)</i>
Mean	68.67789	62.55134
95% Conf. Interval Low	64.87128	53.11751
95% Conf. Interval High	72.48450	71.98517
Standard Error	1.938291	4.770438
Standard Deviation	47.67566	55.83654
Observations	605	137
Hypothesized Mean Difference	0	
df	740	
t Stat	1.3140	
P(T<=t) one-tail	0.0946	
P(T<=t) two-tail	0.1892	

Source: Author, 2020

**Extracurricular Programmes Offered**

The next Quality Indicator which was evaluated was the *Number of Extracurricular Programmes Offered* to students by schools. Infrastructure investment into libraries, computer labs, sports facilities and others are common uses of funds obtained by schools through School Development Loans (TSI, 2018). Previous studies indicated that investment in these areas have been linked to positive quality improvements (Andrabi et al, 2018), producing desired benefits such as increased attendance, better behaviour and greater learning outcomes (Reeves, 2008).

The sample for the *Number of Extracurricular Programmes Offered* included 423 schools with loans and 118 schools without loans, which combined for 539 degrees of freedom. The mean value for schools with loans was 3.276596, compared to 3.016949 for schools without loans. The estimated T-Stat of 2.0912 results in a relevant P-value of 0.0370. This means that the number of extracurricular programmes offered to students by schools with loans and schools without loans is able to be differentiated statistically. Therefore, the Null hypothesis that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0 is rejected, with regards to the number of extracurricular

programmes offered. These results provide evidence that a school receiving a loan is likely to have more extracurricular programmes offered than schools without loans. A longer time series or interval between the measurements may be able to draw more concrete conclusions in future.

Figure 21 Extracurricular Programmes Offered - Inference

Extracurricular programmes offered		
t-Test: Two-Sample Assuming Equal Variances		
	Extracurricular (Loan Client)	Extracurricular (Non-Client)
Mean	3.276596	3.016949
95% Conf. Interval Low	3.162198	2.802442
95% Conf. Interval High	3.390993	3.231456
Standard Error	0.0581998	0.1083124
Standard Deviation	1.196993	1.176574
Observations	423	118
Hypothesized Mean Difference	0	
df	539	
t Stat	2.0912	
P(T<=t) one-tail	0.0185	
P(T<=t) two-tail	0.0370	

Source: Author, 2020

#### 4.4. Validity and Reliability/ Conclusion

The quantitative analysis produced significant evidence that School Development Loans allow LCPS to increase both Capacity and Quality, through multiple indicators. However, results for some of the metrics were also inconclusive.

**Objective 2** was designed to determine whether there is a relationship between a school taking a School Development Loan and change/ difference in the school’s *Capacity* to educate pupils. The Null hypothesis was that the relationship between taking a School Development Loan and changes in school capacity is not statistically significant and different from 0. The schools with loans were determined to have significantly larger *Number of Classrooms* and *Number of Students Enrolled*. All loans in the sample have completed at least one loan cycle, which could explain the difference, given that the schools would have had sufficient time to expand their infrastructure.

However, the *Change in the Number of Classrooms* and *Change in Number of Students* was not able to be differentiated as statistically significant. There are likely to be many reasons why this objective was not able to be observed in this analysis. The most important one would likely be the considerably longer average duration of School Development Loans than the study period.

The survey covered just one single year and the effects may lag, given that the duration of a loan is 2.75 on average (OI, 2018).

**Objective 3** was to determine whether there is a relationship between a school taking a School Development Loan and difference in the school's quality of education provision. The Null hypothesis resulting from the above Objective 3 was that the relationship between taking a School Development Loan and changes in school quality is not statistically significant and different from 0. The analysis determined that the *Number of School Washrooms* and *Number of Extracurricular Activities Offered* by the school were significantly different, allowing a rejection of the null hypothesis. This suggests that School Development Loans do have the effect of improving school quality through provision of some facilities.

The other two indicators that were analysed were *PTR* and *Number of School Washrooms Dedicated to Girls* only. These two indicators were unable to reject the null hypothesis, however the direction of the averages (not statistically significant) is indicative that further data could show School Development Loans do result in better quality through lower PTRs.

Overall, the sample sizes demonstrate that there is sufficient data to determine whether or not the differences in schools that have received a School Development Loan and those that have not is statistically significant. The analytical framework is robust, and care has been taken to ensure that data quality is of a high standard, with outliers having been removed. Greater control on the timing of data collection, capturing data at the beginning of a new loan for a school and capturing the data again at the end of the period of the loan would provide both a better baseline and end-line for a similar study.

## Chapter 5: Conclusions and Recommendations

### 5.1. Introduction

This chapter concludes the study on the *Effect of School Development Loans on School Capacity and School Quality*, highlighting the relevance and findings of the study. These are followed by policy and industry recommendations as well as avenues for future research.

### 5.2. Summary

It has been widely accepted by academics and practitioners that increased investment in education to build up capacity and quality is a key priority if the world is to meet its ambitious targets on the SDGs (SDG 4: Quality Education). Low-income countries are experiencing dramatic growth in their populations and the financing gap is estimated to be US\$ 1.8 trillion to achieve SDG goals (Education Commission, 2016).

To date, there have been very few research studies to quantify the impact that non-state actors and public-private partnerships have on educational access and outcomes (Rose, P., Downing, P., Asare, S., & Mitchell, R., 2019). Existing practitioner literature agrees that public investment, at least in the medium term, will not be enough to meet these objectives (Education Commission, 2016). As a result, there are several proposals on the table which are looking to address the investment gap. This study has focused on the potential to increase the use of non-traditional and innovative financing to achieve these stated aims, with a focus on the outcomes of School Development Loans for private schools.

Most innovative financing schemes utilise some form of School Development Loan in order to achieve greater investment in Capacity and Quality of education across the African continent, making the findings in this study relevant to practitioners looking to implement these schemes. This involves local financial institutions using their own capital to make loans to low cost private schools, so that they can use the funds to build extra classrooms, make other infrastructure improvements and purchase assets. Low cost private schools are booming across SSA, where private school enrolment levels have risen from 12.4% of total enrolment in 2005 to 16.1% in 2017 (UIS, OI, 2018).

Several indicators have been identified by academics that are directly associated with Capacity and Quality. For Capacity, this includes the *Number of Students* enrolled in the school and the *Number of Classrooms* available for use. The indicators of school quality that were identified

were *PTRs*, the *Number of Washrooms*, the *Number of Washrooms Dedicated to Girls* and the *Number of Extracurricular Programmes Offered* by the school. To date, one study in Pakistan has found loans or grants to schools for investment in school facilities, including basic school infrastructure, such as classrooms, seats, installation of toilets, have been found to result in positive educational outcomes (Andrabi et al, 2018).

The intent of this study was to establish whether some of these indicators which have been identified to be significant in other markets also hold for Uganda and Ghana. It is intended to motivate further research in this area, which has not received as much attention as the general challenges facing the education sector in low- and middle-income countries. Ghana and Uganda's challenges are representative of many of the challenges facing other countries and many others are striving to improve educational achievement amongst their population, however they lack the domestic resources to do so alone.

### **5.3. Conclusions**

The study has pulled together research that helps develop better understanding of the current state of Education in SSA and the Innovative Finance approaches that are being utilised to address the problem. School Development Loans, Debt Funds, Results-Based Finance and Impact Investments are having an impact on the market and the result has been that many schools have taken up School Development Loans. Some 80% of the schools that participated in this study have received financing from a local financial institution and completed one full School Development Loan cycle, meaning that they have been utilising funding for several years. However, previous studies have shown that most private schools are still not able to access as much financing as they would like to (CapPlus, 2017).

With regards to the effect of the School Development Loans on indicators of Capacity, the results of the analysis were mixed. In this study, a direct relationship between recipients of School Development Loans and increased capacity through classrooms and enrolment was unable to be established. However, schools that did receive the School Development Loan have more classrooms on average and enrol more students. This signifies that education may be more readily accessed because of School Development Loans, but further study is needed. The results are encouraging given that they are in line with the only other known study of similar nature which found School Development Loans and grants to result in positive educational learning outcomes (Andrabi et al, 2018). A future study with a similar cohort of Opportunity EduFinance schools,

taking a baseline reading at the outset of the loan and an end line reading when the loan is fully repaid would provide more robust results.

School Development Loans were demonstrated to have a positive relationship with a number of Quality indicators, while others were also inconclusive. The number of washrooms at the school and the number of extracurricular programmes on offer at the school were demonstrated to be statistically significant. Meanwhile, PTR and number of washrooms dedicated to girls were not statistically significant, although schools with loans still had a lower PTR on average and greater number of washrooms dedicated to use of girls. The significance of the result is that there is evidence that schools are utilising School Development Loans to build more washrooms and ensure that they are able to offer more extracurricular activities to students.

#### **5.4. Recommendations**

Practitioners are on the right track by attempting to increase the levels of investment in the education sector across Ghana, Uganda and SSA. Acting alongside the public sector to increase investment is the only way that the 262 million children that are out of school will be able to have a place to attend school in the near to medium term. Regardless of the stance on education being a public good, infrastructure must be built in order for those children to attend schools. Governments are overstretched in their capacity to build enough schools. A market solution using innovative approaches to development financing provides the opportunity to increase the capacity and quality of the schools that are already existing and operating in the private sector.

Continued efforts to ensure that the School Development Loan products are appropriately designed for the local markets is of great importance. Ensuring that schools are not overburdened with debt and that they are investing the funds in school improvements will improve the value for money equation seen by DFIs and Governments. It would in turn make the loans affordable for the schools. Building the capacity of financial institutions to effectively disburse School Development Loans, monitor their performance and manage their own portfolios is another piece of the puzzle and the non-traditional finance approaches being taken should ensure that a component of technical assistance is included in funding decisions to facilitate this.

#### **5.5. Avenues for Future Research**

The study was able to identify that schools who are taking out School Development Loans on average have more classrooms, higher enrolment, greater numbers of washrooms and extracurricular activities on offer. However, it is still early to assess whether there was a

statistically significant increase **over time** through a cohort study. This is because the study was conducted at a single point in time. A future, controlled study should include a Randomised Control Trial (RCT).

The future RCT would be better conducted by identifying schools to participate in the sample before they take out their first School Development Loan and recording their baseline statistics at that time. Comparing the baseline result to the resulting value of the dependant test variables at the end of the term of the loan (2-3 years later, on average) would result in a more conclusive assessment. Such a study would also benefit from a more granular child level approach; however, funding constraints are typically a major barrier to this, especially in the case of NGOs conducting the study. Measuring children's reading and writing skills, using an ELOM indicator such as the well-established Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) or Pratham's Annual Status of Education Report (ASER) would offer clear indications of children's learning outcomes and evidence of whether schools are improving in terms of quality.

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## Appendix

Table 9 Education and Population Statistics

	Total Enrol Public	Total Enrol Private	Pop Growth (%)	Fertility Rate	Gov Spend on Edu (% GDP)	Gov Spend on Edu (% budget)
Ghana	6,673,325	2,045,397	2.2%	4.0	6.2%	21.0%
Uganda	7,345,716	2,177,658	3.3%	5.7	2.2%	10.9%
Sub-Saharan Africa	212,834,095	40,835,940	2.8%	4.6	5.0%	16.1%
Total	1,155,443,999	351,009,494	1.1%	3.1	4.3%	15.7%

Source: UIS