Demand for Guarantees and Investments in Africa Infrastructure.

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Declaration

I confirm that this is my own work, and the use of all material from other sources has been properly and fully acknowledged.

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Dedication

This work is dedicated to my parents, Obrempong Kwaku Asumadu and Madam Grace Bempomaa Darko, and my spiritual father, Rev D.A. Ayeh, all of blessed memory.

Dad, Mum, and Papa Osofo, what you dreamt, prayed, and wished for me has come to pass. Unfortunately, you are not here to witness the fruits of your prayers and the reality of your dreams, but I know your spirits are rejoicing—it has finally happened! Your love and guidance have shaped my journey, and your legacy lives on in every achievement.

Abstract

Guarantee solutions are widely recognized as effective instruments for increasing private investment in infrastructure projects. However, the existing literature provides limited insight into the decision-making processes that influence investors' decisions to purchase guarantee solutions for their infrastructure investments in Africa.

This thesis aims to fill that research gap by identifying the key factors that affect investors' decisions to acquire guarantee solutions for infrastructure projects on the continent. To explore this issue, a comprehensive review of relevant literature was undertaken, which subsequently led to the formulation of hypotheses. The primary objective was to identify the key factors that drive investors' decisions to obtain guarantee solutions for infrastructure projects in Africa, as well as to improve the understanding of investor behavior in relation to decision-making concerning these solutions.

To gather essential data for this study, a survey was conducted among professionals in the infrastructure sector, including executives and senior officials from banks, Export Credit Agencies (ECAs), Development Finance Institutions (DFIs), insurance companies, institutional investors, advisors, and brokers. The respondents represented entities actively engaged in infrastructure investment operations in Africa. The collected data were analyzed using Exploratory Factor Analysis (EFA) and a Logistic Regression Model.

The findings revealed statistically significant positive coefficients for three specific variables: uncertain revenue and cash flows, which arise from both country-specific and project-specific concerns; the upstream risks inherent in infrastructure projects; and the regulatory capital requirements imposed on regulated institutions. The findings

suggest that these factors significantly influence investors' decisions to purchase guarantee solutions. Additional insights gleaned from the open-ended responses in the survey further corroborated these findings.

In contrast, the coefficients for other factors—including advisors' knowledge, understanding, relationships, and expertise; the project's perceived left-tail risk; and perceptions of country risk—were not statistically significant and did not emerge as relevant determinants in the decision-making variables related to the purchase of guarantee solutions for infrastructure investments.

The implications of this study hold considerable significance for stakeholders involved in infrastructure development and financing. This includes guarantee-providing institutions such as Multilateral Development Banks (MDBs), Development Finance Institutions (DFIs), and Export Credit Agencies (ECAs). The research outlines several recommended actions that these organizations can take. Key insights into user decision-making processes are presented, which can help inform both the review and creation of innovative financial products, as well as guide necessary policy interventions. Additionally, it fosters engagement among stakeholders such as regulators, lenders, and risk solution providers, emphasizing the need to review the regulatory implications of using guarantees for infrastructure investments and their effects on economic growth, capital consumption, and risk-adjusted returns.

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List of Abbreviations (or Symbols)

AfDB	African Development Bank
Afreximbank	African Export-Import Bank
ATIDI	African Trade and Investment Development Insurance
AUDA -NEPAD	African Union Development Agency- New Partnership for Africa's Development
CEO	Chief Executive Officer
CEO	Chief Finance Officer
COO	Chief Operating Officer
DFI	Development Finance Institution
DfT	Department of Transport
ECA	Export Credit Agency
EFA	Exploratory Factor Analysis
EIB	European Investment Bank
EPEC	European PPP Expertise Centre
EPC	Engineering, Procurement and Construction
ESG	Environmental, Social and Governance
GDP	Gross Domestic Product
GIIN	Global Impact Investing Network
GNPC	Ghana National Petroleum Corporation
GSP	Government Support Package

HL	Hosmer-Lemeshow
H-Z	Henze-Zirler
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
ICC	International Chamber of Commerce
ICIEC	Islamic Corporation for the Insurance of Investment and Export Credit
IDA	International Development Association
IFC	International Finance Corporation
ISP	International Standby Practice
KNN	K-Nearest Neighbor
KMO	Kaiser-Meyer Olkin
K-S	Kolmogorov-Smirnov
KPLC	Kenya Power & Lighting Company
MAP	Minimum Average Partial
MCAR	Missing Completely at Random
MDB	Multilateral Development Bank
MICE	Multiple Imputation using Chained Equation
MIGA	Multilateral Investment Guarantee Agency
MINRES	Minimum Residuals Extraction
MLE	Maximum Likelihood Estimation

OECD	Organization for Economic Cooperation and Development
O&M	Operations & Maintenance
PCOA	Put Call Option Agreement
PIDA	Programme for Infrastructure Development in Africa
PPP	Public-Private Partnership
PRI	Political Risk Insurance
PDI	Private Debt Investors
SBLC	Standby Letters of Credit
SHD	Sequential Hot Deck
SPV	Special Purpose Vehicle
SCTF	Structured Commodity Trade Finance
TTT	Thames Tideway Tunnel
UCP	Uniform Customs & Practice for Documentary Credits
URDG	Uniform Rules for Demand Guarantees
WEF	World Economic Forum

1 Introduction

1.0 Background

Companies take a holistic view when it comes to managing their business risks (Yoon et al., 2018). Such risks are managed through a wide range of enterprise risk solutions, including transferring risks to parties able and willing to accept them (Frisari et al., 2013; Altuntas et al., 2020). One such enterprise risk solution is the use of risk-bearing instruments such as a guarantee solution to de-risk and protect firms' operations, unlock capital, and create capacity to enhance corporate value (Hoyt and Liebenberg,2011; Eckles et al., 2014; Berry-Stölzle and Xu, 2018; Perera et al., 2018).

Other examples of risk mitigation solutions include self-insurance by keeping reserves or buffers as a contingency measure (Yescombe, 2014; Clews, 2016), externalizing risk through structured finance techniques (Braun, Fischer, and Schreiber-Orosz, 2023), and avoiding the risk altogether, amongst other strategies (Snedaker et al., 2014; Conrad et al., 2014).

Indeed, a company's decision to transfer risk to able and willing parties using risk-bearing instruments such as a guarantee solution is not a new phenomenon. As a concept, the guarantee has received significant attention in the literature, ranging from issues of risk aversion (Sydnor, 2010; Klasen, 2014), public choice (Vernikov, 2022; Cao et al., 2024), social welfare maximization (Garbacz et al., 2021; Luo et al.,2024), response to market and institutional failure, among others (Cowling, 2010; Honohan, 2010; Winpenny, 2005; Stiglitz and Weiss,1981; Besanko and Thakor, 1987).

For the purposes of this study, the term guarantee is used broadly to cover all risk-bearing commitments that are used to protect entities and investors, including lenders and financiers, against specific risks. This includes a legal form of indemnity, surety,

insurance, financial options, Letters of Guarantee, Letters of Credit, reimbursement undertakings, and other irrevocable undertakings.

In seeking to remove uncertainties, risk-averse entities use risk mitigation solutions such as guarantees to manage their business risks and cashflows (Doherty, 2000; Hau, 2006).

Investors in infrastructure projects actively use guarantee instruments to manage the risks of their investments. This is because risks in infrastructure projects tend to be relatively high during the construction and operational phases of the project. Each phase of the project is characterized by different risks. For instance, the construction phase has its own unique risks, such as possible delays in construction, cancellation of permits, difficulties in land acquisition, cost overruns, etc. During the operational phase, Off-take risk, throughput risk, contract termination, political pressures, change of laws, and expropriation, amongst other risks, tend to affect the project company's business and its survival. In the case of infrastructure investments in Africa, other issues like microeconomic uncertainties, less developed financial markets, political concerns, and heightened risk perception in general, make investors seek more risk mitigation solutions to manage their investments /assets in Africa.

As indicated earlier, financing infrastructure projects requires lenders not only to commit to long maturities, but projects usually undergo different phases characterized by different risks, including climate and project cash flow volatilities. Investors are particularly exposed to the risk of political changes and their impact on the projects, especially in developing economies like Africa. Guarantees as a risk mitigation solution have proved to be a critical enabler to attract investments and financing into infrastructure projects, as guarantees can be tailored to specific project risks, such as construction period risks, or operational phase risks, such as throughput, offtake, and

non-payment risks (Pereira dos Santos, 2018). For example, the government of the UK provided five(5) different risk mitigation solutions, collectively referred to as the "Government Support Package (GSP)", for the Thames Tideway Tunnel (TTT) project, which provided contingent public financial support under very specific circumstances. (See Appendix A for more details) to attract investors to participate in the Thames Tideway Tunnel project. (Defra, 2015). Again in Nigeria, various guarantees such as Put Call Option Agreement (PCOA) and MDB partial guarantees to backstop Letters of Credit issued by commercial banks were offered by the government and MDBs respectively, to make the Azura Edo Power Project attractive to investors and financiers (See Appendix B for a detailed list) (IFC, 2016; Nichol, 2018). Also, in 2015, the World Bank Group approved guarantees totaling US$700 million for the Sankofa Gas Project in Ghana. This included a payment guarantee of US$500 million from the International Development Association (IDA) to support gas purchases by the Ghana National Petroleum Corporation (GNPC). Additionally, an International Bank for Reconstruction and Development (IBRD) enclave loan guarantee of US$200 million helped the project secure financing from private sponsors. This excludes the US$217 million PRI offered by MIGA for the same project. The government of Ghana issued an Indemnity Agreement for the World Bank Group as a counter-support for their guarantee (World Bank Group, 2015). Without the de-risking support that these guarantee instruments provided to the investors, the above-mentioned projects would not have seen the light of day, and thus demonstrate how risk mitigation solutions can help alleviate investor concerns.

On the face of it, it appears these guarantees are demanded for the projects because of the investors' risk aversion. However, it appears that beyond risk aversion, other reasons also influence the decisions of companies and investors in their usage of

guarantee solutions. In other words, in addition to risk aversion, other factors also motivate corporate demand for guarantees. It is for this purpose that the research is being conducted to understand the rationale behind the corporate decision to buy guarantee solutions to support their businesses, with an emphasis on infrastructure investments in Africa.

1.1 Motivation of the study

While the demand for credit enhancement tools like guarantees is crucial for attracting investments in infrastructure projects, research on this topic has been limited. Previous research has primarily concentrated on various aspects of guarantee usage, with a focus mainly on corporate finance, looking at issues such as relationships between hedging and firm value (Michel-Kerjan et al., 2015; Perez-Gonzalez and Yun, 2013; Campello et al., 2011; MacMinn and Garven, 2000; Grace and Rebello, 1993), agency conflicts and managerial risk aversion, and how they influence the demand for guarantees in a changing risk environment (Park, 2018; Krummaker, 2019), the impact of credit insurance on investment using continuous-time contingent claim analysis (Lai and Soumare, 2010). Other studies have also emphasized the importance of guarantees as a vital tool for exporters in the context of export credit guarantees (Krummaker, 2019; Klasen, 2014), socioeconomic growth (Hussels et al., 2005; La Porta et al., 2000), Political Risk Insurance(PRI)(Braun and Fischer, 2018), and recently on Structured Commodity Trade Finance(SCTF) (Braun, Fitcher and Schreiber-Orosz, 2023).

On export credit, Klasen (2014) argues that the demand for insurance is impacted by specific factors related to the firm, such as the availability of insurance services, liquidity, and the need for balance sheet protection. Hussels et al. (2005) provided a compelling analysis of how the demand for guarantees and insurance is influenced by

economic growth, highlighting the critical roles of economic, legal/political, and social factors in shaping this relationship. Furthermore, research on Political Risk Insurance (PRI) by Braun and Fischer (2018) highlights that a company's demand for political risk insurance increases with its perceived exposure to risk, prior experience and expertise in dealing with political risk, and the perceived adequacy of the insurance cost. Again, Braun, Fitcher, and Schreiber-Orosz (2023) concluded in their recent study on SCTF that banks' propensity to buy risk mitigation solutions such as guarantees and insurance is influenced by their experience and expertise with the product, balance sheet management implications, underlying transaction risk, and the strength of the broker relationship. Others, like size, price volatility, and insurance premium, were less relevant decision factors.

It is important to mention that none of these studies focused on infrastructure financing; geographically, they were also not focused on Africa. Studies reviewed and others seen so far were focused on the USA, Europe, Korea, Japan, China, Malaysia, the UK, etc. Empirical research has not been undertaken into the demand for guarantees associated with infrastructure investments in Africa. I have not come across any empirical study to date that has connected existing literature to the demand for guarantees for infrastructure investment projects in Africa. This gap in knowledge is significant, as infrastructure is vital for Africa's economic growth and development (Challoumis, 2024; Tayo, 2024; Timilsina et al., 2024). Despite the wide recognition of the importance of infrastructure for economic growth, Africa continues to face considerable challenges in developing its infrastructure network, which has resulted in a substantial investment gap (AUDA-NEPAD, 2025; PIDA, 2023; Ehlers, 2014). This gap hinders the continent's ability to keep up with rapid technological advancements, increasing urbanization, climate change, social progress, and shifting population

demographics. The insufficient investments in infrastructure are a major reason for this deficit (PIDA, 2023; Tayo, 2024; AfDB, 2022). According to the World Bank, Sub-Saharan Africa (SSA) must spend 7.1 percent of its GDP annually until 2030 to close its infrastructure gap. However, the region has been spending only about half of that amount (World Bank, 2019). The World Economic Forum estimates that the infrastructure financing gap in Africa is approximately US$1 trillion for the period from 2016 to 2030 (WEF, 2016). In 2018, the African Development Bank made a significant commitment of around US$100 billion towards infrastructure development in Africa. This was in contrast to the total funding required, which was about US$170 billion, resulting in a financing gap of US$70 billion. The cumulative funding gap is projected to reach approximately US$1.59 trillion by 2040 (Heathcote and Mulheirn, 2018).

Addressing this shortfall is not just important, but essential for enhancing the continent's economic resilience and sustainable growth (Timilsina et al., 2024). Many African governments are working hard to invest in infrastructure, committing over 40% of the total infrastructure investments in Africa (AUDA-NEPAD, 2025), but it's clear that they cannot fill this vast investment gap on their own due to budgetary constraints and competing priorities (Andrés et al., 2008; Schwartz et al., 2014; Tayo, 2024). Therefore, the active participation of the private sector is vital to complementing the efforts of governments to bridge this growing infrastructure investment gap (AfDB,2022).

Institutional investors are noted to have around US$100 trillion in resources under management (Humphrey, 2018). A portion of these funds could be directed towards filling this gap, as infrastructure assets provide the types of opportunities these investors seek. This would help governments to free up capital for other urgent

commitments and reduce their fiscal burden (Vecchi, Airoldi, and Caselli, 2015; Tayo, 2024).

However, it's important to recognize that risk perceptions and various challenges associated with financing infrastructure have hindered large-scale private sector investments in Africa. There is a significant disconnect between the attractive opportunities for infrastructure investment—which promise positive externalities including substantial social benefits—and the considerable pools of capital that are eager for deployment. This situation underscores the potential importance of risk mitigation solutions, such as guarantees, in bridging this gap and encouraging private funds to support infrastructure projects across the continent. (Garbacz, 2021; Humphrey, 2018)

According to the World Bank's 2024 Infrastructure Monitor report, guarantees play a vital role in attracting investment. The report reveals that projects backed by guarantees enjoy a private participation rate of 80 percent, in contrast to 42 percent for projects without such support. This statistic emphasizes the critical importance of guarantees in unlocking capital for investments, particularly in lower-income countries (World Bank,2024).

It is evident that investors seek risk mitigation solutions for their infrastructure investments in Africa. The goal of this research, therefore, is to deepen our understanding of the factors that drive investors and financiers when considering the purchase of guarantees for their infrastructure investment projects in Africa, thereby enriching the literature on this important subject. Again, studies of this nature are important as they could help providers of guarantee products to develop appropriate measures to enhance and deploy their product offerings to achieve maximum results. It also helps to unearth the rationale behind the inertia of investors toward infrastructure

investments in Africa and guide policy actions aimed at attracting investors to the continent's infrastructure space.

1.2 Aims and Objectives of the Study

The study seeks to fill an identified gap in the existing literature by addressing a series of focused research questions that revolve around investor decision-making behaviour in the context of purchasing guarantee solutions for infrastructure investments in Africa.

The specific research questions guiding this investigation are as follows:

i. What factors influence investors' corporate decisions when buying guarantee solutions for infrastructure investments in Africa?
ii. What is the relationship between these factors and the types of guarantee solutions purchased for their infrastructure investments?
iii. Are these factors specific to infrastructure investments in general or peculiar to African infrastructure investment risks?

To obtain answers to the research questions and achieve the overall aims and objectives of the study, the researcher has outlined several targeted goals within the thesis:

1. **Understanding Decision-Making Drivers:** This goal focuses on exploring the various factors that drive investors and financiers to acquire guarantees to support their investment projects in Africa. The findings are expected to provide valuable insights that can benefit both academic scholarship and the practical application of guarantees as risk mitigation tools for infrastructure investments.
2. **Evaluating Relationships Between Decision Drivers and Guarantee Types**: The study aims to systematically assess the connections between the identified

decision-making drivers and the specific types of guarantee solutions chosen by investors for their infrastructure endeavors. This analysis intends to uncover patterns and preferences within investor behavior.

3. **Assessing Specificity of Decision Factors:** A critical assessment will be conducted to determine whether the identified decision-making factors are applicable to infrastructure investments broadly or if they contain unique characteristics specific to the risks associated with investing in Africa. Clarifying this distinction is crucial for the development of tailored decision-making frameworks suited to different contexts.
4. **Identifying Gaps and Enhancing Offerings:** The research will also focus on identifying potential gaps in the products offered by guarantee suppliers in relation to the recognized decision drivers. This effort aims to provide practical recommendations for improving guarantee product offerings, thereby enhancing the alignment between investor needs and available market solutions.

In pursuit of the aims and objectives enumerated above, the actions below were performed:

i. Existing literature on risk-bearing instruments like guarantees, their usage, providers of guarantee products, the type of instruments available, and when and how they are structured to meet users' requirements was reviewed to better understand the overall topology of the guarantee-offering ecosystem.
ii. Policy and academic papers on infrastructure investments were reviewed. The review covered the risk characteristics of infrastructure investments and how such risks are managed, the various phases involved in infrastructure investments, the types of investors involved, and how such projects are structured, including common

practices used in developing long-term infrastructure projects in Africa in particular and elsewhere in general.

iii. A specific review was conducted on Africa's infrastructure challenges, including the financing gap, fiscal constraints, socioeconomic and political concerns of investors, and attempts by governments to attract private sector partners to participate in infrastructure investments in Africa.

iv. The various investment modes, structures, and financing instruments commonly used, such as public-private partnership models, project finance techniques, concessional arrangements, etc., were reviewed.

v. Reviewed theories on risk and decision-making under uncertainties, including empirical studies on demand for risk solutions like guarantees, to help establish the theoretical foundations of the study.

vi. From the literature, hypotheses were formulated and empirically tested, following survey data collected to ascertain responses from practitioners in the infrastructure industry, including developers, EPC contractors, and financiers.

1.3 Contribution to Theory and Practice

This study contributes to the relatively underdeveloped literature on the demand for guarantees on investments in infrastructure projects in Africa, addressing the gap between theory and practice in finance literature (Aven, 2023; Jansen, 2018; Roth et al., 2014). It also bridges the divide between empirical and theoretical research concerning corporate risk mitigation decisions, thus enhancing our understanding of the factors influencing infrastructure investors' use of guarantees.

The findings offer valuable insights into the guarantee solutions needed for infrastructure development in Africa. They serve as a guide for entities providing guarantees in the development finance space and other risk mitigation solution

providers. The study highlights important considerations for structuring guarantee instruments, particularly those tailored to the needs of infrastructure financiers and project sponsors. Additionally, government officials, regulators, and other policymakers will benefit from the insights and recommendations presented in this study. For example, the African Union, through AUDA-NEPAD, is currently looking to set up a continental guarantee mechanism to help de-risk and attract investors to support infrastructure projects in Africa. The outcome of this study brings out areas of importance that could help guide the structuring of the proposed continental guarantee mechanism and ultimately respond appropriately to the concerns of investors and financiers involved in infrastructure investments in Africa. The study provides significant insights for stakeholders involved in the infrastructure investment value chain, offering specific recommendations for action directed towards various parties, including guarantee providers, sponsors, and the government, among others. It is recommended that guarantee providers develop tailored solutions to meet the specific needs of users, particularly focusing on mitigating upstream construction risks. For instance, offering a construction guarantee can incentivize commercial banks to finance project construction, especially in turnkey contracts. This approach reduces the risks that typically deter financiers, as the contractor assumes the project delivery risk once financing is secured. After the project is completed and starts generating revenue, the short-term construction financing can be refinanced into a long-term facility. This approach appeals to institutional investors who prefer stable, long-term operational investments over construction-related risks, while allowing construction financiers to exit short-term risks.

Project developers and sponsors are encouraged to adopt a strategic phased approach to project development, structuring, and risk allocation, assigning risks to

those best suited to manage them. This improves project feasibility; for example, a turnkey approach can be used to transfer upstream construction risks to Engineering, Procurement, and Construction (EPC) contractors and operational risks to project management and Operations and Maintenance(O&M) contractors. Clearly defining responsibilities between the construction and operational phases increases accountability and minimizes delays.

Development and policy-making bodies can utilize the study's insights to guide policy actions. As mentioned earlier, AUDA/NEPAD is encouraged to leverage the study's findings in designing the proposed regional infrastructure guarantee mechanism, aimed at facilitating infrastructure financing in Africa. By ensuring that these mechanisms align with investors' needs and expectations, these entities can enhance their effectiveness in supporting the realization of the AU Agenda 2063 actions relating to infrastructure development. The findings are also essential for the Group of G Twenty(G20), especially for the Infrastructure Working Group (IWG). It identifies critical issues related to infrastructure investment in Africa. The IWG's goal is to develop innovative financial instruments, including derisking products, to enhance financing for sustainable infrastructure in emerging markets and developing economies(EMDEs). By leveraging the insights from this study, the IWG can propose creative financial solutions for the G20 to consider and adopt for implementation.

Governments should implement strategic actions to address investor concerns and create a conducive investment environment. This includes streamlining procurement and legal processes for greater transparency and efficiency through standardized practices and technology adoption. Additionally, governments can support private investments in infrastructure for economic growth by using policy tools to assist reputable entities in managing guarantee programs on their behalf or establishing

national policy institutions, such as export credit agencies or development banks, backed by the government's full faith and credit to instill confidence in investors.

Finally, collaboration with regulators is also recommended. Guarantee providers, including multilateral development banks (MDBs) and regional development banks (RDBs), should engage proactively with regulators to foster open dialogues about product offerings and the specific needs of users. MDBs and RDBs should take a leading role in this discussion. This collaborative approach will not only promote transparency but also ensure that the interests of all stakeholders—including investors, regulators, risk solution providers, and end-users—are aligned for mutual benefit. Current regulatory measures can hinder investor participation in infrastructure investments, as the capital requirements associated with this asset class may render projects financially imprudent to finance. By working together, guarantee providers and regulators can identify and address these challenges, crafting frameworks that facilitate investment while safeguarding public interests and ensuring the viability and benefits of infrastructure projects. This synergy will enhance the financial health of investment opportunities and promote a robust financial system, leading to socio-economic growth and development essential for societal well-being.

1.4 Structure of the Thesis

The main components of each chapter of the thesis are summarized in this section. The literature review (Chapter Two) seeks to review the literature on infrastructure investments in Africa, including risk mitigation solutions used to support infrastructure financing with an emphasis on guarantee instruments used to de-risk and unlock capital for infrastructure investments in Africa. It starts with a brief overview of infrastructure investments in Africa, highlighting risk perception and its effect on investor decisions. It emphasizes the importance of collaboration between the public

and private sectors in promoting investments in infrastructure. Following this, it discusses the risk dimensions and classifications associated with investing in infrastructure assets, concluding with an overview of project finance within the context of infrastructure finance.

The rest of the chapter explores the concept of guarantees as credit enhancements and growth enablers. It examines the providers of guarantee solutions and explains how these instruments can be utilized to mitigate risks and attract investors to finance infrastructure projects.

The subsequent chapter (Chapter Three) focuses on the theories and hypotheses central to the study. This chapter is dedicated to risk theories, which establish the foundational concepts for the subject being examined. It begins with a discussion of risk theories related to the demand for guarantees and risk mitigation tools. This is followed by an overview of empirical studies on guarantees and the demand for them, including specific research concerning Africa and infrastructure projects. The chapter concludes with the research questions and hypotheses for the study.

The research methodology (Chapter Four) covers the entire research process. It starts with an exploration of the research philosophy, approach, strategy, and choice of research methods. Additionally, it includes the study's time horizon, data collection methods, and approach to data analysis, which are all integral components of the overall techniques and procedures employed in the research. The study followed a positivist philosophical stance and used quantitative methods for the data analysis; specifically, Exploratory Factor Analysis and Logistic Regression were used for the data analysis.

To gather the necessary data for this study, a questionnaire-based survey was developed and administered to relevant participants from both the public and private sectors involved in infrastructure investments in Africa. This included project developers, financiers, and providers of risk mitigation solutions. The survey was conducted from October to December 2024, targeting participants such as infrastructure project developers, construction companies (EPC contractors), institutional investors, Export Credit Agencies (ECAs), Development Finance Institutions (DFIs), banks, professional and advisory firms, insurance companies, as well as government agencies and departments involved in infrastructure projects.

The questionnaire addresses various topics, including perceptions of risk, the availability and complexity of existing guarantee products, and the decision drivers for using guarantees. A pilot study was initially conducted with industry experts to identify key areas that may need further attention in the research process, including potential improvements to the survey questionnaire. Before starting data collection, all necessary ethical approvals and consents for the study were obtained in accordance with the university's requirements.

Chapter Five presents the data analysis and empirical results of the study, while Chapter Six focuses on discussing the outcomes, conclusions, and broader implications for both literature and practice, including recommended actions for stakeholders. This chapter also addresses the limitations of the study and makes recommendations for future research.

2 Literature Review

2.0 Introduction

This Chapter seeks to review the literature on infrastructure investments in Africa, focusing specifically on risk mitigation solutions that support infrastructure financing, with an emphasis on guarantee solutions as credit enhancement tools to de-risk and unlock capital for infrastructure investments in Africa. It starts with a brief overview of infrastructure investments in Africa and the impact of risk perception on investor decisions. The chapter highlights the importance of collaboration between the public and private sectors in promoting infrastructure investments. Next, it discusses the dimensions and classifications of risks when investing in infrastructure assets, with project finance ending the infrastructure finance overview. The rest of the chapter reviews the concept of guarantee as a credit enhancement and growth enabler, identifies providers of guarantee solutions, and how such instruments are used to de-risk and attract investors to finance infrastructure projects.

2.1 Overview of Infrastructure Investments in Africa

The importance of quality infrastructure to economic growth and development is well documented in the literature (Challoumis, 2024; Tayo, 2024;Timilsina et al., 2023; Dissou et al., 2013; Foster and Briceño-Garmendia, 2010; Moreno-Dodson, 2006; Calderón et al., 2004). Its non-existence threatens the economic development objectives of many countries, especially in Africa (AUDA, 2025; Ehlers,2014; PIDA, 2023). Despite its positive impact on economic growth and development, Africa continues to struggle with its infrastructure development, which is impeding its ability to catch up with the ever-evolving technological advancements, urbanization, climate change, social development, and the shifting demographics of its population. This gap

in infrastructure investments in Africa is well-documented, as the continent is not investing enough in its infrastructure (AUDA, 2025; PIDA, 2023; Tayo, 2024). According to the World Bank, the Sub-Saharan Africa (SSA) region is required to spend 7.1 percent of GDP annually until 2030 to close its infrastructure gap. However, it has only been spending approximately half of that amount (World Bank, 2019). The World Economic Forum estimates the infrastructure financing gap of the continent to be approximately US$ 1 trillion for the period 2016-2030 (WEF, 2016). In fact, in 2018, the African Development Bank made a significant commitment of approximately US$100 billion towards infrastructure development in Africa. This was in contrast to the total funding needed, which was about US$170 billion, resulting in a financing gap of US$70 billion. Furthermore, the cumulative funding gap is projected to reach around US$1.59 trillion by 2040 (Heathcote and Mulheirn, 2018).

The financing gap cannot be solely addressed by governments due to their budgetary constraints and other competing resource needs (Andrés et al., 2008; Schwartz et al., 2014; Tayo, 2024). Therefore, private sector participation, including foreign direct investments, is essential to tackle the increasing infrastructure investment gap AfDB,2022). Governments are actively working to attract private investors into the African infrastructure sector for several reasons: the private sector has better access to capital, and it is often more capable of developing bankable investment projects while bringing innovation, efficiency, and expertise. By engaging the private sector in infrastructure investments, governments can free up capital for other urgent commitments and reduce their fiscal burden. (Vecchi, Airoldi, and Caselli, 2015; Tayo, 2024). In fact, involving the private sector in closing the infrastructure funding gap in Africa was declared at the Addis Ababa Action Agenda of the Third International Conference on Financing for Development as a critical paradigm shift in development

finance (United Nations Department of Economic and Social Affairs, 2015). As a result, most of the MDBs and DFI have introduced programs and facilities to attract private investors to fund critical projects in Africa. For instance, the African Export-Import Bank (Afreximbank) in 2022 introduced its loan repackage program to originate and distribute assets to institutional investors using innovative repackaged notes (Afreximbank, 2022).

2.2 Risk Perception and its Impact on Investor Appetite for African Infrastructure Investment.

Investors generally tend to be risk-averse, particularly when it comes to the perception of risk. As a result, their willingness to invest in infrastructure projects is significantly influenced by how they perceive the investment climate. This perception is shaped by the various policy settings and institutions that support a country's economy and political processes, as well as the government's ability to uphold its commitments (Inderst and Stewart, 2014; McKinsey, 2020).

In the case of Africa, the continent suffers from risk perception, which is one of the main factors contributing to its inability to attract enough resources to finance its development needs, including infrastructure (Arditti and Hruby, 2022). Where financing is obtained, the price of such financing is extremely high due to the risk premium charged as a result of risk perception. For instance, Gbohoui et al., 2023 in their studies on Sub-Saharan Africa's (“SSA”) risk perception premium, found that SSA countries pay significantly higher coupons at issuance compared to their peers from other regions.

Investors' perceptions of the risks associated with a particular country or market, along with their ability to effectively mitigate these risks, play significant roles in influencing

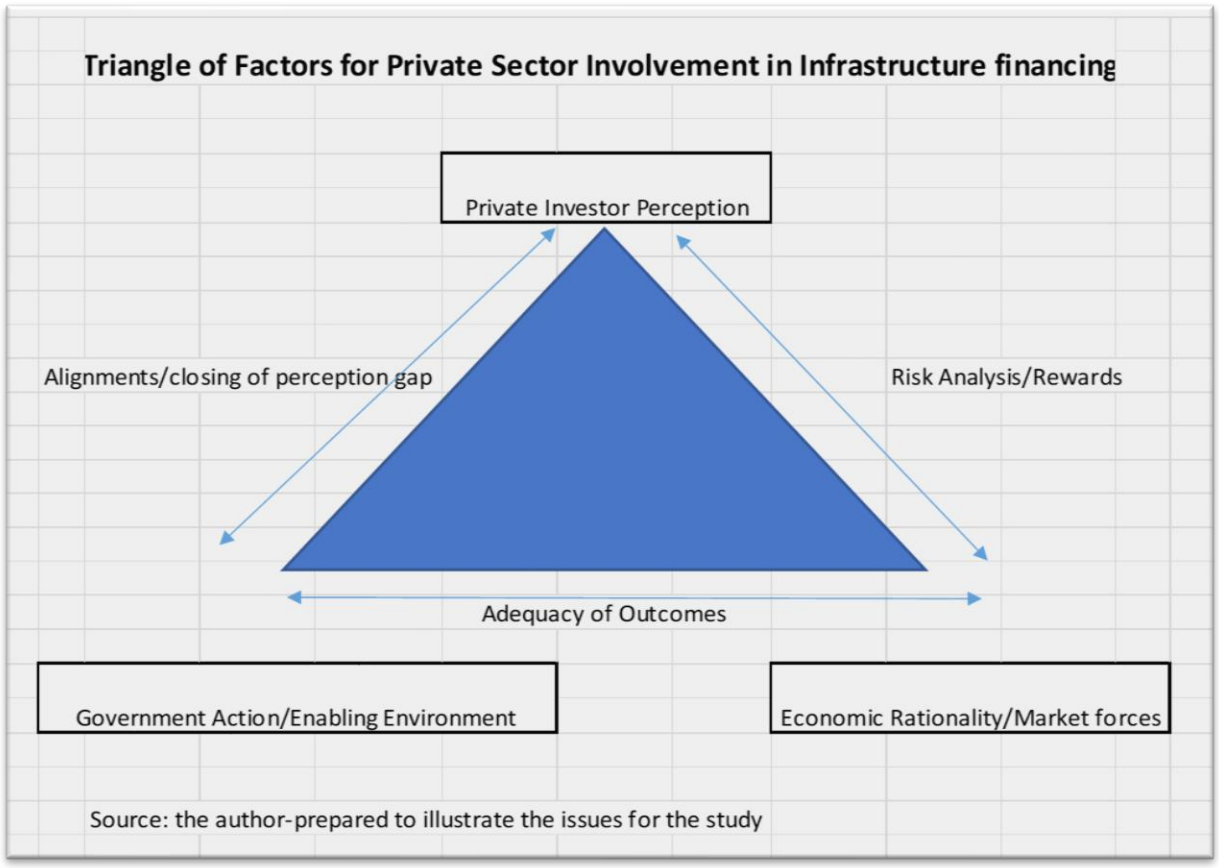
their appetite for and decisions regarding investments in infrastructure projects (WEF, 2016). This perspective aligns with the views of Nobel Prize winner Douglas North, who argued that "efficient economic organization is the key to growth." He maintained that a well-functioning economic system should possess checks and balances within both political and economic frameworks. According to North (1986), "efficient economic organization requires a well-defined legal system, an impartial government to enforce market rules, and a set of attitudes towards contracting and trading that encourage participation in the market at low cost."

It is important to have purposeful and systematic collaboration between the private and public sectors to overcome investor concerns about risk perception and attract them to participate in financing infrastructure in Africa. This need is particularly urgent in light of increasing geopolitical uncertainties and macroeconomic challenges, such as debt overhang, climate issues, and general uncertainties.

From an investor's perspective, it is imperative to conduct a comprehensive analysis of all risks associated with an infrastructure project throughout its economic lifespan. This process involves identifying risks that should be avoided, transferred, or accepted, as well as establishing an acceptable level of compensation for the assumption of any risks deemed acceptable. This analysis is particularly critical due to the distinctive characteristics of infrastructure, including its high specificity and illiquid nature when compared to other asset classes. Infrastructure investment necessitates a nuanced approach to risk analysis, identification, and allocation, directing risks to those parties best positioned to manage them. In Figure 2.1, private sector actors engage in actions to assess the risks and rewards inherent to the project, culminating in an investment decision where economic rationality dictates that such a commitment is warranted.

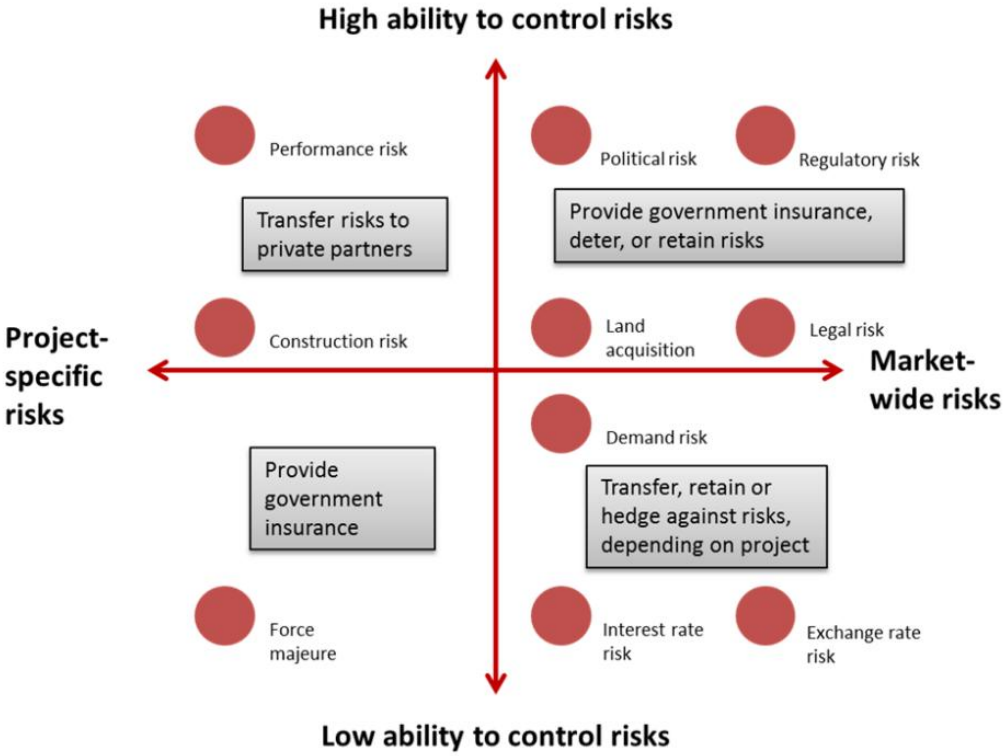
From the perspective of government entities, the decision to proceed with infrastructure initiatives either independently or in collaboration with the private sector is shaped by a multitude of factors. These factors encompass the nature of the infrastructure project itself, the types and extent of associated risks, and relevant policy considerations, including potential regulatory reforms and additional modifications. As depicted in Figure 2.1, governmental actions aim to enhance the enabling environment, thereby addressing risk perceptions while ensuring a harmonious alignment of interests between the public and private sectors. Figure 2.1 further illustrates the interplay between investor perceptions, the economic rationales underpinning infrastructure investment, governmental measures that facilitate private sector participation, and the collective impact of these elements on the attainment of effective outcomes.

Figure 2.1 - Triangle of Factors for Private Sector Involvement in Infrastructure Investments



Notes to Figure 2.1: (i) Public Sector Action: This involves government actions aimed at aligning and closing the perception gap, thereby creating a favorable environment for investments. (ii) Private Sector Action: This is driven by market dynamics and relies on economic rationality, following a thorough risk-reward analysis. (iii) The combined results of government actions and private sector responses lead to satisfactory outcomes.

Figure 2.2 - Risk Dimension & Classification



Source: adapted from Miller et al (2001).

Note: Figure 2.2 elucidates the dimensions of infrastructure risks that pertain to both specific projects and broader market conditions. Additionally, it delineates the risks that are controllable and those that are inherently less controllable.

The triangle (Figure 2.1) and the risk dimension quadrant (Figure 2.2) recognize that there are both public and private sector risk factors that affect infrastructure investments. Alignment of interest (public and private stakeholder interest) is required for such risks to be shared and mitigated (closing of gaps) to help increase the viability of such investments.

Policy actions and appropriate risk mitigants, such as guarantees, give comfort to investors as they enhance the bankability of infrastructure projects. Therefore, the global risk mitigation market, both public and private, has a critical role in enhancing investor confidence and attraction to infrastructure investments in Africa. They have

various risk mitigation instruments focused on addressing key risks, such as credit and political risk (WEF, 2016).

Equally, a supportive and enabling environment plays a crucial role in lowering the risks and costs associated with infrastructure investment. Various factors significantly impact the investment climate, including the rule of law, political stability, property rights, governmental regulations, regime uncertainty, transparency, the enforceability of contracts, and accountability. Establishing a stable and predictable environment is imperative for both domestic and foreign investors, as it fosters confidence and encourages investment initiatives (OECD, 2023; McKinsey, 2020).

2.3 Classification of Risk in Infrastructure

The multiple risks and costs that investors encounter in infrastructure development and financing are particularly high in Africa, primarily due to perceived weaker and less stable economic and financial conditions (Gbohoui et al., 2023; Hassan, 2023). In addition to risks that are specific to the infrastructure sector, there are other risks that are unique to Africa or perceived to be so. For instance, obtaining appropriate credit risk ratings necessary for institutional investors to engage in certain African projects is typically more challenging compared to other global economies (Inderst and Stewart, 2014). Furthermore, options for mitigating regulatory, currency and political risks can be expensive and often unavailable (WEF, 2016; OECD, 2015). The lack of standardization in investment contracts across countries makes due diligence more time-consuming and costly. Additionally, international arbitration is frequently not a viable option, leaving investors with little choice but to rely on local jurisdictions to resolve disputes (Montiel, 2006; Hassan, 2023) Details of specific risks are summarized below

1. Political and Regulatory Risks: Government actions regarding infrastructure investments pose multifaceted risks stemming from changes in laws and regulations that can adversely affect these investments. These risks range from non-renewal of licenses and currency convertibility to specific challenges related to public-private partnership (PPP) contracts (Makovšek, 2018; WEF, 2015). Additionally, risks may emerge from the activities of governmental contracting entities. The inherently subjective nature of these political risks, coupled with the complexities involved in their quantification, presents significant challenges for pricing within the domain of infrastructure finance. For instance, the risk associated with a new government coming into power and changing PPP legislation is uncertain and difficult to quantify into asset pricing models (OECD, 2015; Lysandrou et al., 2016; Makovšek, 2018; McKinsey, 2020; Sercan et al., 2024).

When evaluating risks, it's important to distinguish between sovereign risk, which pertains to overall market conditions and creditworthiness, and specific political risks linked to individual projects. Instruments like government bond yields and credit default swaps are useful for incorporating sovereign risks into infrastructure finance assessments (Kesse et al., 2023; WEF, 2015; OECD, 2015).

However, limited availability of market data poses a challenge in African contexts, as many African countries have yet to access the international capital markets. Nevertheless, governments possess the capacity to adopt strategies, such as upholding the rule of law, etc., to mitigate these risks (Makovšek, 2018; OECD, 2015; Beckers and Stegemann, 2013). In other words, to mitigate against these regulatory and political risks, governments are encouraged to develop a conducive institutional environment by upholding the rule of law and ensuring judicial independence. Establishing a robust regulatory framework that supports infrastructure investments,

such as regulations pertaining to public procurement, permits, expropriation, taxation, litigation, tariff definitions, and credible commitments to uphold mutually agreed contract terms, is crucial for fostering trust and confidence (Engel et al., 2009; OECD, 2015; Makovšek, 2018). Many African governments are actively working to improve the business environment, thereby positioning the continent as a credible investment destination (Jensen, 2008; OECD, 2015).

2. Macroeconomic and business risks: The risks associated with the industry and the broader economic environment are subject to variability. These include macroeconomic factors such as inflation, real interest rates, and fluctuations in exchange rates (Mbui, 2017; Nyanyuki, 2018; Rogoff & Reinhart, 2003). A key business risk pertinent to any asset is its sensitivity to the business cycle, particularly in relation to shifts in demand. Moreover, financial risks, including those related to debt maturity, represent critical dimensions of business risk.

Inflation has always been a key concern in most African countries – encompassing not only the elevated inflation rates but overall macroeconomic volatility, such as fluctuations in exchange rates and the ability of central banks to manage these volatilities (Rogoff & Reinhart, 2003; Musyoka, 2018). Foreign currency availability and transfer sometimes become a challenge due to its scarcity. Furthermore, the chosen exchange rate policy—whether free float, managed float, or fixed—can substantially influence macroeconomic risks, including those concerning currency convertibility. Additionally, changes in exchange rates can markedly affect overall risk exposure.

The commodity supercycle from 2014 to 2016 was a clear test for forex risks in most African countries. Those heavily affected by the commodity price shock were commodity-dependent countries like Nigeria, Angola, Ghana, South Africa, Zambia,

etc (World Bank, 2015). Equally, the terror-induced crisis in tourism-dependent countries such as Kenya and Egypt was also affected (Njoya et al., 2022).

Market-based instruments, including sovereign bond yields and credit default swaps, serve as valuable indicators for evaluating the market's perception of country-specific and macroeconomic risks (Gbohoui et al., 2023).

Business risks should ideally be managed by private entities through public-private partnerships (PPPs) and privatization, as they can arise from both internal and external factors (Beliz and Sevilay, 2015; Macwan and Jayeshkumar, 2018). However, governments may implement specific measures to enhance the attractiveness and financial viability of infrastructure investments, which may be temporary or limited to certain asset categories (UK Government, 2014). In response to the infrastructure investment gap and the scarcity of traditional financial resources, particularly on the debt side, various governments have implemented a range of strategies, including guarantees and subsidies, as well as tax incentives, to stimulate investment in the infrastructure sector (UK Government, 2014; World Bank, 2017; OECD 2015)

3. Technical risks: The risks associated with a project are influenced by the skills of the operators and managers, as well as the project's complexity, construction elements, and technology. According to El Kholy (2015) and Yescombe (2014), project finance is generally more suitable for projects that utilize established technologies, as lenders and other financiers tend to be hesitant to fund new or untested technologies. Technical risks can be mitigated through the expertise of specialized operators. It is therefore advisable to transfer these risks to the private sector to incentivize effective project delivery. However, the public sector can retain certain technical risks, such as archaeological and environmental risk, without adversely impacting performance, as these risks are beyond the private sector's control (Flyvbjerg, 2014; OECD, 2015).

Sometimes, the risks associated with a specific infrastructure project generally arise from the nature of the underlying asset itself, contracts with the public sector, and the operating environment risks. The level of these risks can vary based on factors such as the country and its investment climate, the sector involved, the complexity of the project, and the maturity of the country's institutions.

Risks associated with projects can vary throughout their life cycle, which is typically divided into three main phases: the project development phase (before bid submission and financial close), the construction phase, and the operation and termination phases. Some risks in projects may be specific to particular stages of project finance, whereas others can be present across all phases. Investors frequently perceive an elevated level of risk during the initial stages of a project, which subsequently influences the allocation of these risks.(OECD,2015; Beckers and Stegemann, 2013).

Table 2.1: Classification of Risk Linked to Infrastructure Assets

<table>
<tr><th>Risk Categories</th><th>Development Phase</th><th>Construction Phase</th><th>Operation Phase</th><th>Termination Phase</th></tr>
<tr><td rowspan="8">Political and regulatory risk</td><td>Environmental review</td><td>Cancellation of permits</td><td rowspan="3">Change in tariff regulation</td><td>Contract duration</td></tr>
<tr><td rowspan="2">Rise in pre-construction costs (longer permitting process</td><td rowspan="2">Contract renegotiation</td><td>Decommission</td></tr>
<tr><td>Asset transfer</td></tr>
<tr><td colspan="3">Currency convertibility</td></tr>
<tr><td colspan="4">Change in taxation</td></tr>
<tr><td colspan="4">Social acceptance</td></tr>
<tr><td colspan="4">Change in regulatory or legal environment</td></tr>
<tr><td colspan="4">Enforceability of contracts, collateral and security</td></tr>
<tr><td rowspan="5">Macroeconomic and Business</td><td>Prefunding</td><td colspan="3">Default of Counterparty</td></tr>
<tr><td colspan="2" rowspan="3">Financing availability</td><td colspan="2">Refinancing Risk</td></tr>
<tr><td colspan="2">Liquidity risk</td></tr>
<tr><td colspan="2">Volatility of Demand/Market risk</td></tr>
<tr><td colspan="4">Inflation</td></tr>
<tr><td colspan="4">Real Interest rate</td></tr>
<tr><td colspan="4">Exchange rate fluctuation</td></tr>
<tr><td rowspan="6">Technical</td><td colspan="3">governance and management of the project</td><td rowspan="5">Termination value different from expected</td></tr>
<tr><td colspan="3">Environment</td></tr>
<tr><td>Project feasibility</td><td rowspan="2">Construction delays and cost overruns</td><td rowspan="2">Qualitative deficit of the physical structure/ service</td></tr>
<tr><td>Archeological</td></tr>
<tr><td colspan="3">Technology and obsolescence</td></tr>
<tr><td colspan="4">Force majeure</td></tr>
</table>

Source: OECD, 2015

Notes: Table 2 depicts 3 key risks common in infrastructure finance and how these risks manifest in each phase of the project implementation. The key risks are Political and regulatory risks, macroeconomic and business risks, and Technical risks. The project phases are the development phase and the construction phase. Others include the operations phase and termination phase.

2.4 Project Finance as a Vehicle for Financing Infrastructure

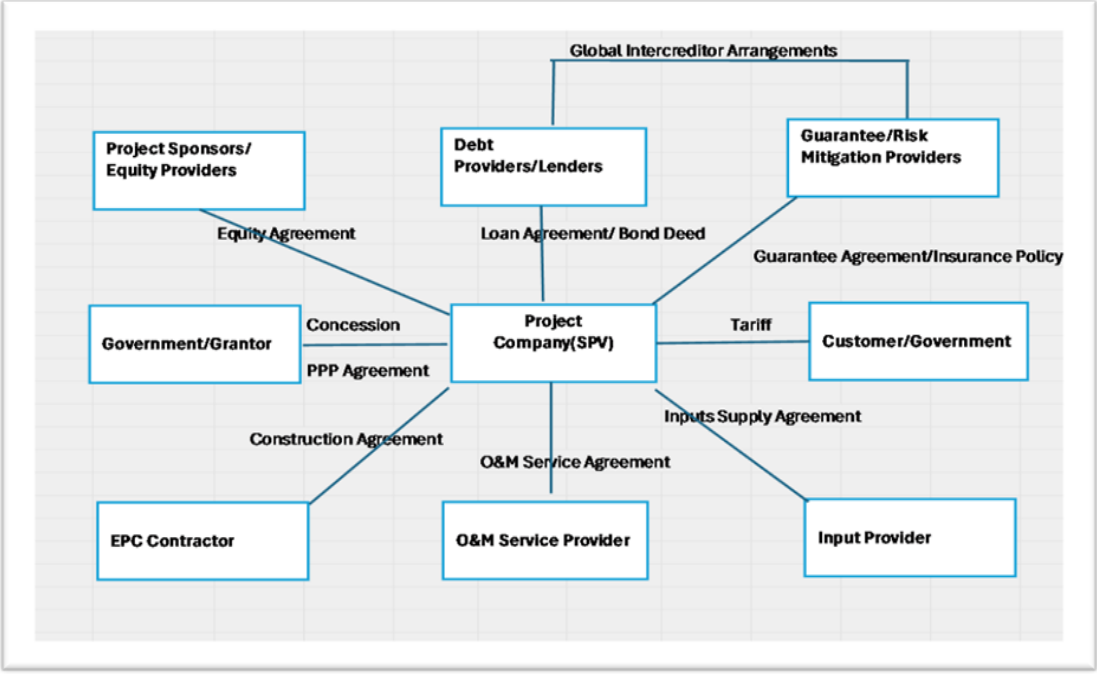
Private participation in infrastructure investment projects is usually done through a project finance technique (Delmon, 2017; Rao, 2018; Gatti, 2012).

Project finance is a form of structured finance that relies on financial engineering techniques. Unlike traditional financing, it does not depend on the creditworthiness of the sponsors. Instead, it focuses on lending against the cash flows generated by the

project itself. This financing approach requires a thorough evaluation of the project's construction, operating, and revenue risks. It also involves the careful allocation of these risks between investors, lenders, and other parties through various contractual arrangements (Yescombe, 2007; Gatti, 2012). It is usually done on a limited or non-course basis, involving complex structures and arrangements, including multiple parties, to deliver the intended results (Esty, 2014).

The above indicates that project finance has several important features. First, the project finance structure is designed for capital investment projects, which usually involve constructing a specific asset, such as a power plant, road, airport, etc, within a set timeframe and budget. Second, cash flows or revenues generated from the operations of the project company post-construction are used to service the payment obligations of the project company. Third, funds raised through the project finance go to the project company, established as a bankruptcy remote special purpose vehicle (SPV). It uses the resources raised to finance the project and repay its investors (Debt and Equity investors) solely from cashflows originating from the operations of the project. Fourth, project finance has multiple parties, fund providers (Debt investors, equity investors, and risk mitigation providers), concession/license providers(government), Construction companies, Suppliers, and O&M contractors, among others (Gatti, 2012; Yescombe, 2007). Figure 2.3 below provides a visual representation of a typical Project Finance structure, showing the parties involved and their role in the project finance structure. (Yescombe, 2007).

Figure 2.3 - Typical Project Finance Structure



Source: Developed by the author (see also Yescombe, 2007)

Notes: Elements of Figure 2.3 are described below:

- **A Special Purpose Vehicle (SPV),** often referred to as a Project Company, is a legal entity created primarily to isolate financial risk and manage specific infrastructure projects. Its main role is to execute the project and establish contractual agreements with various stakeholders involved in the process. SPVs are particularly commonly used in projects that depend on limited or non-recourse project financing, where the primary collateral is derived from the cash flow and assets generated by the project itself. Upon the project's completion, the SPV may either be dissolved or transitioned back to the government after the end of the concession period. This structure allows for more efficient management of resources and risk associated with large-scale projects

- .**Project Sponsors/Equity Investors,** including project developers/ sponsors and shareholders, provide equity and subordinated loans to the Special Purpose

Vehicle (SPV). Project sponsors typically consist of an experienced construction company and a service operator. The government may also provide financing through a joint venture or Viability Gap Funding (OECD 2015, Gatti,2012; Yescombe, 2007)

- **Lenders and debt providers** offer debt financing through corporate debt, non-recourse or limited-recourse project finance, and corporate or project bonds. Typical lenders include commercial banks, long-term institutional investors such as pension and sovereign wealth funds, insurance companies, family offices, and foundations.
- **Customer/government:** The project company has an off-take agreement with a state-owned enterprise or public authority for bulk delivery. It sells the service directly to end users and receives subsidies or a combination of these options.
- **Government/grantor** issues concession agreements to the project company. The grantor may provide financial support, either in the form of direct subsidies and capital or indirectly through guarantees (OECD 2015, Gatti,2012; Yescombe, 2007).
- **Guarantee and Risk Mitigation Providers** or Insurers typically include entities such as Multilateral Development Banks (MDBs), Development Finance Institutions (DFIs), Export Credit Agencies (ECAs), banks, and specialized guarantee entities. Additionally, the insurance market offers specialty insurance solutions, including credit insurance, Political Risk Insurance (PRI), and other tailored insurance options to support infrastructure projects.

2.5 Overview of Guarantee as a Risk Mitigation Instrument and Economic Growth Enabler.

The concept of guarantee as a risk mitigation instrument has received considerable attention in the literature, ranging from risk aversion (Irwin, 2007; Gropp et al., 2014; Schich et al., 2017), public choice (Cooper et al,, 2015; Eisenbach, 2016), welfare maximization (Goldstein and Pauzner, 2005; Beck et al., 2008; Ahnert and Elamin, 2015) and market and institutional failure response (Craig et al., 2007; De la Torre and Ize,2010, 2011; Honohan,2008), and Beck et al., 2008 and Vives, 2014). Arrow and Lind have provided valuable insights into public sector guarantees. Their work is fundamental because it focuses on risk aversion and the government's superior ability to distribute risk over time and across different areas. They analyzed the foundations of public risk-bearing by studying the interactions between risk aversion and two types of market frictions: agency (bilateral) frictions and collective (multilateral) frictions. In their view, guarantee instruments are used to address these frictions (Arrow and Lind, 1970). These arrangements help correct financial market inefficiencies, including market and institutional failures that hinder a more efficient allocation of resources. Guarantee as a risk-bearing instrument is therefore used for different purposes by different parties (Chen-Yu, 2015; Matsukawa and Habeck, 2007). The usage is sometimes aimed at reducing, reassigning, or reapportioning different perceived risks in business transactions (Hughes et al., 1998; Chen-Yu, 2015; Matsukawa and Habeck, 2007). In the context of infrastructure investment, investors, including financial institutions, often use guarantees to protect against risks and make investment projects viable and more attractive for investor consideration (Chang, 2013; Olivier, 2003; Mistry & Olesen, 2003).

The theory suggests that an effective financial system enhances the efficiency of resource and risk allocation within an economy, both spatially and over time (Schich and Kim, 2011). By enabling the distribution of risks and resources among willing and capable participants, economic actors can promote real economic growth, facilitate capital formation, and support wealth accumulation. Consequently, the role of guarantees and other risk mitigation tools is essential for achieving efficient resource and risk allocation in an economy.

2.6 Concept of Guarantee

A guarantee is a financial commitment. It is generally seen as a unique form of insurance relating to commercial transactions, in which the risk of non-compliance by one of the parties to a transaction (e.g., lender and a borrower) is taken on by a third party external to the original transaction (Humphrey, 2015; Halvorson-Quevedo and Mirabile, 2014; Gendron et al., 2006; Merton and Bodie,1992; Lai,1992. From Humphrey's perspective, guarantees are a specialized type of derivative because guarantees are instruments ‘derived’ from an underlying transaction (Humphrey and Prizzon, 2014).

Although a guarantee, in its purest form, has a number of important characteristics that distinguish it from pure insurance and derivatives, for the purposes of this study, the term guarantee is used broadly to cover all risk-bearing commitments used to protect entities and investors, including lenders and financiers, against specific business risks. This includes legal forms of indemnity, surety, insurance, financial options, Letters of Guarantee, Letters of Credit, Reimbursement Undertakings, and other irrevocable undertakings.

As a risk mitigation instrument, guarantee solutions can be offered as a risk cover to mitigate against all possible risks in a transaction. However, in practice, risks covered by guarantees are segmented to ensure that the instrument covers specific or certain risks in a transaction to which the guarantee is sought to address or mitigate (Humphrey and Prizzon, 2015; Halvorson-Quevedo and Mirabile, 2014).

2.7 Why is a Guarantee important?

Guarantee instruments play a crucial role in business transactions because they unlock capital, increase capacity, and serve as risk mitigators by offering safeguards against various business risks (Aretz, 2020; Beck et al., 2008; Ahnert and Elamin, 2015). Business transactions often involve time and uncertainty, particularly concerning the lack of knowledge about the other party's future actions (Wu et al., 2020; Chang, 2015; Mollering, 2001; Giddens, 1990; Luhmann,1979). Throughout the duration of a transaction, the two parties typically have conflicting interests. Additionally, one party may possess information that the other does not; this results in asymmetric and incomplete information. While the information may be complete at the outset of a transaction, one party may later take actions that go unobserved by the other, or they might receive information relevant to the transaction that the other party lacks. This phenomenon is called moral hazard, characterized by hidden actions or information (Linder and Foss, 2015; Schich and Kim, 2011; Schmitz, 2007; Skogh,1989).

Furthermore, information can be incomplete from the beginning of the contract; in such cases, one party may have access to significant information related to the transaction that the other party does not, leading to adverse selection or hidden information (Wolfstetter, 2010; Linder & Foss, 2015). This scenario often results in credit rationing, which adversely affects the overall economy. The implications of this issue are

succinctly expressed by De Meza and Webb, who argue that such circumstances lead to socially suboptimal levels of investment. They explain that in a first-best equilibrium characterized by risk-neutral investors, all projects presenting expected returns equal to the world rate of return would ideally be pursued. However, in a scenario where information is asymmetrically distributed, certain projects may fail to receive funding (De Meza and Webb, 1987).

A mechanism for risk mitigation, such as guarantee solutions or other forms of incentives, is necessary to restore first-best equilibrium. In this context, guarantee solutions serve as instruments to address concerns related to information asymmetry, aligning the interests of both contracting parties and aiding in the restoration of first-best equilibrium.

2.8 Suppliers and Types of Guarantees commonly used for Infrastructure

The guarantees provided to investors for infrastructure projects are typically issued by government or non-government entities. Government guarantees, also known as sovereign guarantees, are issued by the Ministries of Finance on behalf of the State. In contrast, non-government guarantees are issued by various entities, such as banks, specialized guarantee organizations, insurance companies, export credit agencies (ECAs), multilateral development banks (MDBs), and development finance institutions.

2.9 Government (Sovereign) Guarantees for Infrastructure Financing

This guarantee represents a commitment by a sovereign government to assume the downside risk associated with a specific project, program, or obligation. It serves as government support to encourage private sector participation in state projects and programs. As such, it is a crucial public policy tool used by the government to address market failure in optimally distributing risks (Irwin, 2007; Gong, 2011; Lu et al., 2019).

Government guarantees can take various forms, depending on the specific obligation, project, program, or activity involved, as well as the types of risks being addressed and the government's objectives. One common form is the sovereign loan guarantee, wherein the government agrees to cover scheduled debt payments to lenders if a sub-sovereign entity, such as a municipal or a project company, defaults on its obligations. This type of guarantee is a payment guarantee, as it effectively serves as a substitute for debt. For example, the government might take on the responsibility of repaying the debt of a sub-sovereign entity, company or project company if they fail to meet their repayment obligations.

Other government guarantees can be project-specific commitments where the state agrees to assume certain risks, such as traffic, demand/revenue, macroeconomic disruptions, residual risks, etc. For example, the government may take on specific project risks, including traffic/revenue risks, offtake risks, cost overruns, input assurance, market disruptions, and termination compensation, including insurance availability support. This support is crucial to encourage private sector participation in infrastructure projects, as investors are often unwilling to take on such risks without government backing.

For instance, the UK government provided various guarantees to support the Thames Tunnel Tideway project (UK Government, 2015). Similarly, the Nigerian government extended a Put-Call Option (PCOA) to support the AZURE-Edo power project (IFC, 2016). Additionally, the Korean government offered a revenue guarantee for the Seoul-Incheon Road project (Brandão and Saraiva, 2008; Irwin, 2007).

In practice, governments utilize various guarantee instruments, indemnities, comfort letters, and other forms of undertakings, which vary widely in their characteristics. These include the extent of coverage offered, the types of events that are guaranteed,

the nature of the underlying risks, and whether the guarantees are explicitly included in contractual agreements or are implicit, with no contractual basis defining the government's liability (Dailami and Klein, 1997). Figure 2.4 illustrates a typical sovereign guarantee offered by the government to support obligations of the government contracting entity /authority. Elements of Figure 2.4 are described below:

The Guaranteed Entity (government contracting entity /authority): This could be a State-Owned Enterprise (e.g., a utility company) or a ministry or sub-sovereign, such as a municipality, district, or agency of government.

The Guarantor is usually the Ministry of Finance, representing the State/Government, to issue the guarantee on behalf of the State.

Beneficiaries of the Sovereign guarantee are usually the project company(eg IPP entity), Lenders, and equity providers.

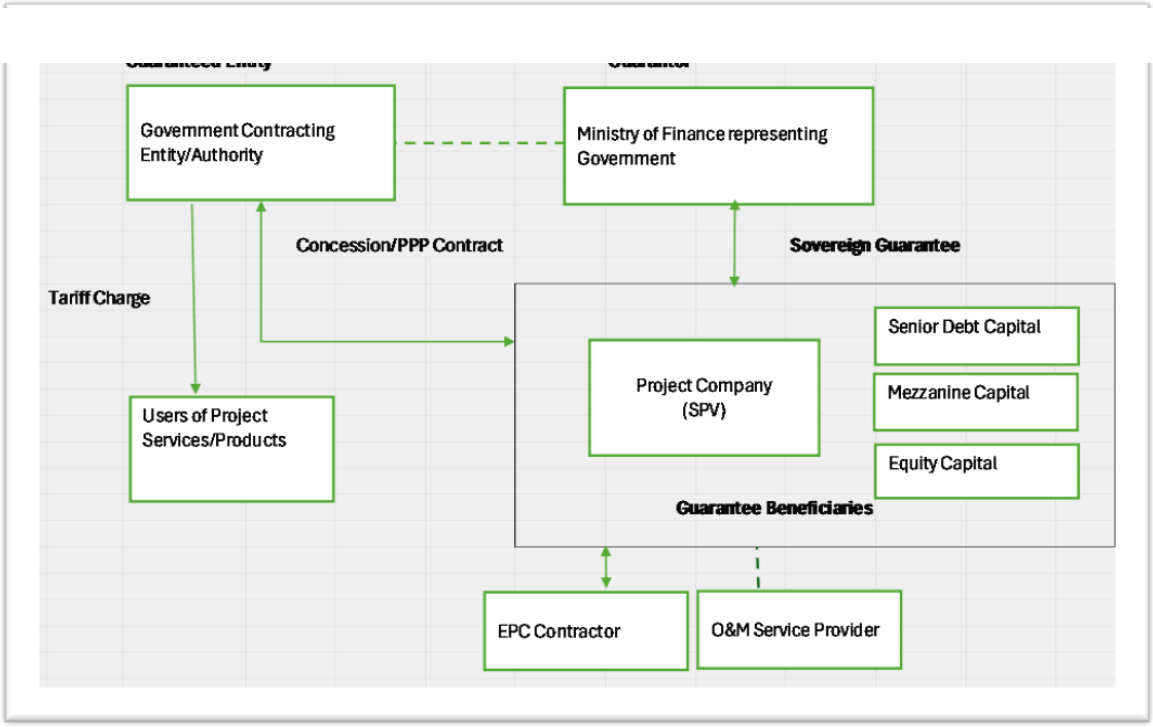
Users of the Services/Products: These are the consumers of the infrastructure project output—for example, electricity consumers for power projects, road users for toll road projects, etc.

EPC Contractor (Engineering, Procurement, and Construction): An EPC contractor is a specialized company engaged by project sponsors to execute infrastructure projects. Their function involves all stages, from the initial design and engineering phases to the procurement of materials and the construction process. The goal is to deliver a fully completed and operational facility, ensuring that the project meets the specifications and requirements set by the sponsors.

Operations and Maintenance (O&M) service providers are specialized companies that maintain and operate various infrastructure facilities, equipments, and systems. They ensure that the facility runs smoothly and reliably. These providers are essential

for reducing downtime and improving performance. Additionally, they play a significant role in extending the lifespan of physical assets through systematic maintenance protocols and upgrades.

Figure 2.4 - Typical Structure to Illustrate Government Guarantee for Projects



Source: Developed by the author.

Notes: See elements of Figure 2.4 described above for details.

2.10 Historical of Government Guarantee for Infrastructure Projects

The use of government guarantees to facilitate infrastructure investment has a rich historical background, originating in the 18th and 19th centuries. Nations and empires, including France, the United States, the United Kingdom, Rome (now Italy), and the Ottoman Empire (now Turkey), utilized guarantees to finance crucial projects such as bridges, canals, roads, and railways. Modern governments continue to leverage this mechanism extensively to foster investment in infrastructure initiatives, which frequently would not materialize without such governmental support (Brandão and Saraiva, 2008; Irwin, 2007).

In the 1990s, the government of South Korea utilized this instrument to attract private investors for the toll road connecting Seoul and Incheon (Brandão and Saraiva, 2008; Irwin, 2007). In Latin America, countries including Chile, Colombia, Peru, Brazil, and Mexico have systematically employed guarantee solutions to finance their infrastructure projects. For instance, during the 1990s, the Colombian government issued a guarantee to facilitate the $755 million expansion of the Barranquilla gas-fired power plant on behalf of the state-owned Public Utility Company, thereby ensuring the utility's commitment to a take-or-pay contract (Beato, 1997; Lewis and Mody, 1998; Irwin, 2007; Brandão and Saraiva, 2008). In Chile, the 1998 concession for the Santiago–Valparaíso–Viña del Mar toll road, spanning 130 kilometers and costing $400 million, included a minimum traffic guarantee, which imposed an additional financial obligation on the investor (Engel et al., 2000; Brandão and Saraiva, 2008). Furthermore, the Linha Amarela Expressway in Rio de Janeiro, inaugurated in 1994, received a grant of $112 million, contributing to an overall project value of $174 million (Dailami and Klein, 1997; Brandão and Saraiva, 2008).

In Europe, this strategy has been adopted to enhance private sector involvement in financing the Trans-European Transport Network (TEN-T) projects, which function based on user fees for the revenue generated by private operators (EPEC, 2011). In the United Kingdom, the government employs a combination of guarantee instruments to underpin infrastructure financing. For instance, guarantees were utilized in the expansion and modernization of the Thames Water tunnel project, as well as in the Mersey Gateway bridge project. The latter employed several financial instruments, including a government guarantee for 50% of senior debt (up to £270 million), availability payments, and a Department for Transport (DfT) grant allocated for land

assembly and associated costs. The anticipated revenue was projected to derive 70% from tolls and 30% from government grants (HM Treasury, 2011).

In Africa, various governments have implemented diverse types of guarantees to support investments in infrastructure, particularly in sectors such as power and water services. For example, Kenya employed a guarantee to uphold the Kenya Power and Lighting Company (KPLC) obligations in a power project (AfDB, 2014). Additionally, both the Nigerian and Ghanaian governments have utilized guarantees to support infrastructure financing within their respective nations (World Bank, 2015; Nichol, 2018).

These forms of government guarantees appear popular to investors as they create a direct obligation of the government toward the investors. They also allow the government to attract investments to support its development objectives.

2.11 Challenges of using Government Guarantee to support infrastructure investments

Government guarantee mechanisms can have a significant impact on infrastructure financing, but they also bring forth concerns and potential drawbacks that may undermine their advantages. These guarantees are treated as contingent obligations for the government, which can result in their classification as on-balance sheet debt instead of remaining off-balance sheet items. This reclassification can adversely affect the government's ability to manage its debt, particularly during economic downturns. Many guarantees are likely to crystallize during such periods, which could lead to new debt sustainability crisis that negatively impacts the overall economy. Consequently, many governments are cautious about extending this form of support (Feder and Uy, 1994; Lee, 1993; Lu, Chao, and Sheppard, 2019).

A major concern raised about sovereign guarantees was that present governments use them to transfer their current financial burdens to future generations, which inevitably results in considerable future contingent liabilities and fiscal constraints. This phenomenon was notably illustrated during the Mexican, Indonesian, and Argentina debt crises when governmental contractual liabilities and losses significantly inflated overall debt obligations (Nasution, 2000; Sharma, 2001; Irwin, 2007; Brandão and Saraiva, 2008)

It is imperative to recognize the substantial concerns associated with government guarantees, particularly the moral hazards they introduce for private sector beneficiaries. Such guarantees diminish the impetus for public-private partnership (PPP) project companies to operate with efficiency, as they are aware that any adverse outcomes will ultimately be assumed by the government. Furthermore, this scenario considerably weakens the motivation for government officials to perform rigorous due diligence on projects, thereby increasing the likelihood of funding projects or initiatives that are of less economic importance to the country, commonly referred to as "white elephants" (Irwin, 2007; Cangiano et al., 2006; Lu, Chao, and Sheppard, 2019).

When the government extends guarantees for infrastructure projects, it assumes responsibility for potential future liabilities. Inadequate assessment of these risks can result in substantial costs. Accurate valuation of such guarantees is vital for comprehending their budgetary consequences and determining appropriate guarantee levels. This ensures that projects remain economically sustainable while alleviating potential burdens on governmental resources (Lu, Chao, and Sheppard, 2019).

Concerns regarding government guarantees frequently arise from uncertainties associated with rapidly advancing technology and the broader economic context.

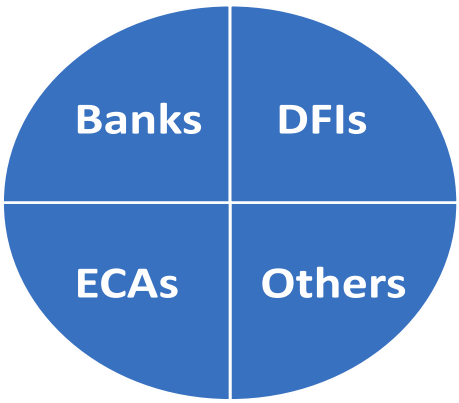
Technology obsolescence may compromise long-term commitments, potentially leading to defaults (Brandao and Saraiva, 2008; Irwin, 2007; Cangiano et al.,2006).

Additionally, country credit risk can impact the reliability of government guarantees. Investors often hesitate to accept sovereign guarantees or similar support mechanisms due to concerns about credit ratings and high country risk profiles. This issue is especially prevalent in some African countries. Rating agencies apply a "weak-link effect" in their methodologies, meaning that the sovereign rating acts as a ceiling beyond which a project cannot receive a higher rating unless special justification is provided. For instance, S&P explicitly outlines this in its methodology for project finance transactions (S&P, 2018).

2.12 Non-Sovereign Guarantees for Infrastructure Financing

These guarantee solutions for infrastructure investments come in various forms and are offered by a diverse range of entities, including banks, insurance companies, specialized guarantee funds, export credit agencies (ECAs), and multilateral and development finance institutions. Furthermore, these guarantees are tailored to address specific needs and the requirements of their beneficiaries. For example, ECAs offer export credit guarantees and other untied guarantee solutions to facilitate exports and meet the strategic objectives of their respective governments. ECA guarantees closely resemble the credit insurance products available within private credit insurance markets. Banks provide a variety of instruments, including on-demand guarantees, letters of credit (LCs), standby letters of credit (SBLCs), and bonding facilities. Multilateral and development finance institutions issue partial guarantee solutions, and some also offer credit and political insurance solutions. Detailed guarantee solutions offered by these entities are summarized below:

Figure 2.5 - Categories of Guarantees by Issuer



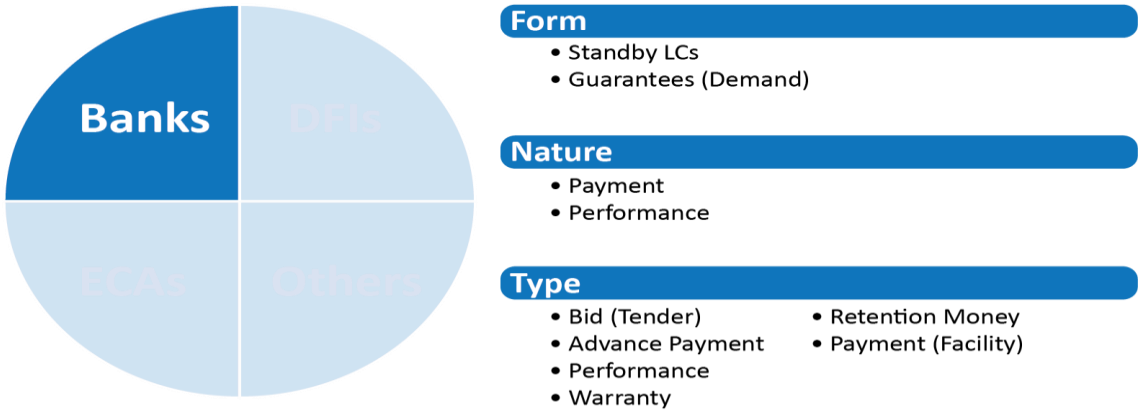
Source: Developed for this study

Notes: Figure 2.5 depicts various suppliers of the guarantee solution.

2.13 Bank Guarantees

Bank guarantees can be classified into two main types: accessory guarantees and abstract guarantees. Accessory guarantees, also known as suretyship guarantees, resemble insurance in that they are only payable when the beneficiary proves an actual default on the underlying obligation. Abstract guarantees, also known as independent or on-demand guarantees, are payable upon the presentation of compliant documents, regardless of whether there has been a concrete default in the underlying agreement. There are two main types of independent bank guarantees: demand guarantees (or letters of guarantee) and Standby Letters of Credit. Demand guarantees are often issued under ICC rules (URDG 758, revised in 2010), while Standbys typically follow ISP 98 or UCP 600.

Figure 2.6 - Bank Guarantees



Source: Developed for this study

Notes: Figure 2.6 outlines the examples of forms, nature, and kind of guarantees offered by banks.

Standby letters of credit and Demand guarantees are payment commitments issued by financial institutions at the request of a customer (applicant). These instruments create a direct obligation for the issuer, independent of the applicant's financial or contractual obligations, making them legally enforceable on their own. This independence is valued by both the financial institution and the beneficiary for ease in managing and enforcing rights. Both instruments provide financial assurance to beneficiaries in case the applicant defaults.

Demand Guarantees are commonly used internationally (except in the US, where banks generally use Standby LCs). Demand Guarantees can be classified as payment or performance guarantees and are independent of the underlying contract. A Payment Guarantee ensures the fulfillment of a payment obligation, such as a bank guarantee securing a buyer's payment for goods. The bank only assesses the customer's ability to pay, not perform. Performance Guarantees cover the risk of non-performance in a contract, assuring compensation for inadequate or delayed performance. For example, an Advance Payment Guarantee is required by Tender Authorities for mobilization advances in construction contracts, ensuring that the contractor will deliver

performance for the funds advanced. If the contractor fails to complete the work on time, the beneficiary can claim compensation under the guarantee from the bank for non-performance.

It is important to mention that that a performance guarantee does not guarantee performance as such. The bank merely guarantees that if its customer fails to perform, it will be liable to pay the guarantee up to the maximum guaranteed amount., and its customer's client (the beneficiary) is the sole arbiter of its customer's performance.

2.14 Export Credit Agencies (ECAs)

ECAs are national policy institutions officially mandated to promote trade and exports. (Dawar, 2020). They play a significant role in financing trade and development, including infrastructure projects. Its significance in global trade and development has attracted several academic research covering policy approaches to stimulate exports (Klasen et al., 2023); export market risk (Heiland and Yalcin, 2020); export credit (Badinger et al., 2013; Janda et al., 2013); prohibited subsidies, competition, and compliance issues (Kim, 2020; Dawar, 2020); export credit in capital scarce economies(Oramah, 2020); application of service model(Klasen et al, 2024) demand for export credit (Krummaker, 2020; Klasen,2014). Other research on ECAs covered issues like geopolitics, trade megatrends, and global energy, among others (Gianturco, 2021; Klasen et al., 2024; Wright, 2011).

ECAs are very active and among the major providers of guarantees for infrastructure and projects. They provide coverage against non-payment risk under export contracts (Kim 2020). It is important to mention that, in practice, the "guarantees" provided by ECAs are not guarantees or unconditional indemnities but conditional insurance facilities.

ECAs often have “guarantee facilities,” which means that they undertake to lenders that, should the borrowers fail to repay loans, then, provided that the repayments are contractually and legally enforceable, they will take responsibility for making the repayments. Any loss arising from the borrower's failure to pay will then be an issue for the guarantor rather than the lender, although the lender may be required to take action(s) to enforce the debt(s) against the borrower. Sub-rogation of debts is an important issue in itself – especially for lenders - which must be clarified before guarantees are issued.

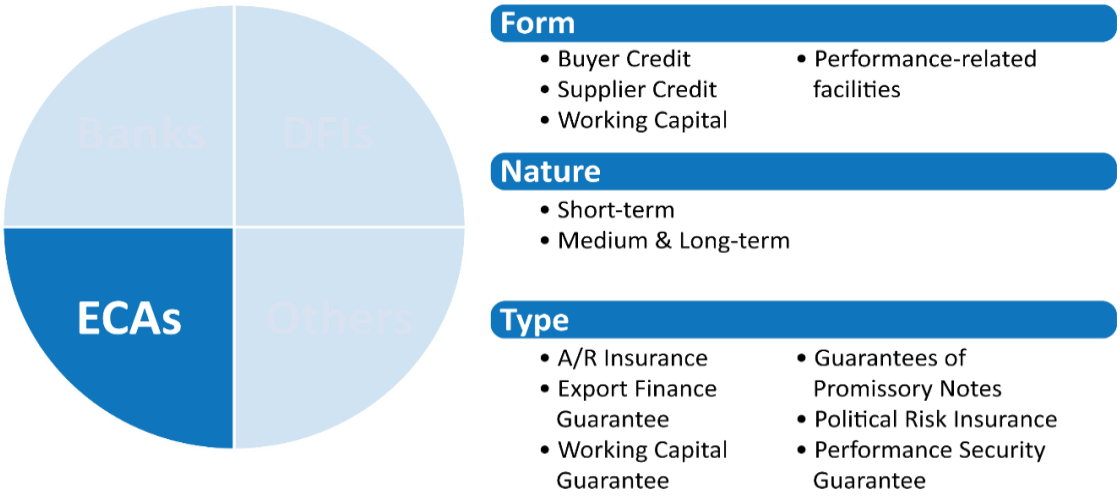
ECA guarantees to lending banks will not normally be totally unconditional. Document failure or defaults due to lenders' actions or inactions will not normally be covered by guarantees. Neither will situations where the borrowers are entitled to withhold repayment(s) due to sellers/exporters' failure to perform or where borrowers cannot pay because, at the time the documents were signed, they were not able to enter into such arrangements by any local laws or regulations in their country.

ECA guarantees will not be in respect of free-standing or general-purpose loans but will almost always be restricted to loans to finance an export contract(s). These contracts will be between an exporter in the country of the ECA and a buyer in another country. The contract(s) will often be in respect of a specific and identified project. So, the loans which are the subject of the guarantee will be used to finance the specific and, usually, identified contract(s).

ECAs will normally wish to examine - in detail - the terms of the documentation of the loan facility and the underlying credit risk (counterparty risk, collateral) which is to be the subject of the guarantee. But they will often also wish to examine the terms of the contract being financed, e.g. to ensure that the provisions relating to any termination of the contract will match the terms of the loan documentation in order to ensure, inter

alia: 1) that the loan cannot be drawn when the contract is in dispute or where work may have stopped or where the contract is in the process of being terminated; and 2) the overall risk profile of the contract.

Figure 2.7 - Typical ECA Guarantees Products



Source: Developed for this study

Notes: Figure 2.6 outlines the examples of forms, nature, and kind of guarantees offered by ECAs.

- Export Finance Guarantee covering a bank's longer-term loans to buyers to finance exports for both commercial and/or political risk (buyer credit).
- Working Capital Guarantees covering a bank's pre-shipment working capital loan to an exporter who has received an export order. This will often be used by the bank as a substitute for the requirement for cash collateral by the exporter.
- Accounts Receivable Insurance (Export credit insurance) of an exporter's receivables (supplier credit) covering the risk of non-payment.
- Supply Credit Guarantees for promissory notes or other medium-term instruments
- Political Risk Insurance for investments
- Performance Security Guarantees to cover a bank that has issued a performance instrument on behalf of an exporter as a substitute for cash collateral.

Against this background, the ECA will normally issue the guarantee facility directly to lending banks and not to the exporter. However, ECAs can also provide "guarantees" to exporters. In these instances, ECAs will provide credit insurance against non-payment by a foreign buyer.

2.15 Multilateral Development Institutions (MDBs)and Development Finance Institutions (DFIs)

MDBs and DFIs play a crucial role in economic growth and development. Their existence is grounded in neo-liberal economic theory, as their core function is to support economic growth and development, especially when there is a market failure (Griffith-Jones & Cozzi, 2017; Peitz, 2022). Their intervention helps to overcome development challenges unaddressed by the market. For example, to overcome market credit squeeze including lack of credit appetite, and compensate for unavailability or under-provision of finance, MDBs and DFIs intervene by using their instruments to address such market failure situations. (Gilbert, Powell, & Vines, 2006; Strand, 2014; Culpeper et al., 2016; Peitz, 2022).

Multilateral Development Banks (MDBs) and Development Finance Institutions (DFIs) play a crucial role in infrastructure investments, particularly in emerging markets like Africa. They utilize various development tools like technical assistance, development debt facilities, risk enhancements such as guarantee solutions. The involvement of MDBs and DFIs in projects not only helps to de-risk transactions but is also viewed by investors as a quality endorsement. Their participation enhances numerous non-financial aspects of infrastructure projects, reflecting the positive spillover effects of MDBs' halo effect, upfront project development activities and their reputation as reliable partners in transactions (Pereira dos Santos, 2018).

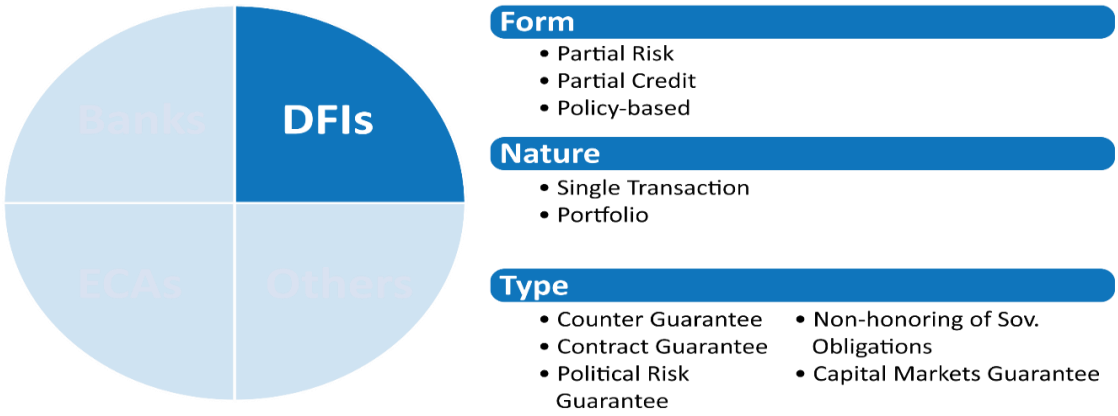
Investors regard these projects as higher quality due to improved project selection, better preparation processes, and adherence to elevated governance and procurement standards, which in turn attracts more investors to participate in such transactions (S&P, 2018). They recognize the advantages of having MDBs and DFIs on their side, particularly because of their Preferred Creditor Status (PCS). MDBs serve as honest brokers, providing negotiation leverage during financial distress. Additionally, the presence of these institutions may discourage governments from altering contracts for political gains.

S&P refers to the favorable perception associated with the involvement of MDBs in infrastructure transactions as the "MDB halo effect." This intangible positive influence distinguishes MDBs and some other DFIs from ECAs and other specialised guarantee and risk mitigation offering entities (S&P, 2018).

MDB guarantees can be classified into three distinct categories, each serving a unique purpose in the development finance landscape. The first two, which are either project-based or policy-based categories, include financial and bank-type guarantees, which assure lenders and investors by mitigating the risk associated with non-payment of financial obligations. The second category encompasses guarantees that resemble insurance, offering protection against potential losses. They also often use partial guarantee structures to align interests and mitigate concerns such as moral hazard and information asymmetry. They believe their triple-A rating reassures investors, making 100% full coverage unnecessary. When counterparties have "skin in the game," they are more motivated to manage risks themselves rather than offloading them onto the guarantor, who may have limited information about the transaction (Pereira dos Santos, 2018). The three specific types of guarantees within these categories are Partial Risk Guarantees, which cover specific risks related to a project;

Partial Credit Guarantees, designed to enhance the creditworthiness of borrowers; and Policy-Based Guarantees, which align financial support with specific policy objectives. Each type plays a vital role in fostering investment and stability in various sectors.

Figure 2.8 - DFI Guarantees



Source: Developed for this study

Notes: Figure 2.6 outlines the example of forms, nature, and kind of guarantees offered by MDBs/DFIs

i. **Partial risk guarantees** are financial products that cover specific types of risks, such as political risk. These guarantees are typically offered by institutions like MIGA, AfDB, and IADB, among others. They are designed for lenders or investors who are providing shareholder loans or making equity investments. One category of PRGs focuses on the non-honoring of sovereign obligations, which guarantees payments in case of default due to a government's failure to fulfill contractual obligations in private sector development projects(Pereira dos Santos, 2018)

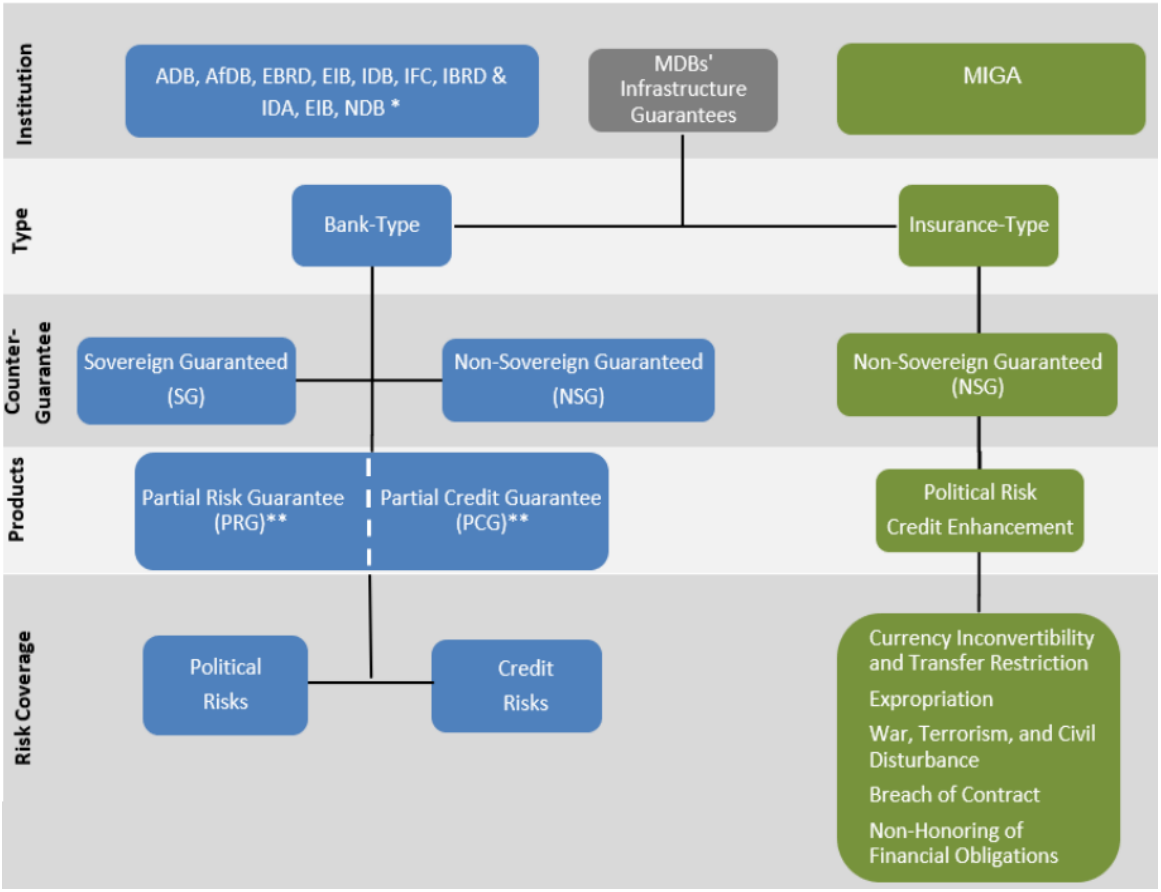
ii. **Partial Credit Guarantees (PCGs)** involve risk-sharing with other entities and are commonly offered by MDBs. A PCG serves as a commitment to ensure full and timely payment of debt service up to a specified limit, regardless of the cause of default. Almost all the MDBs such as AfDB, World Bank, EIB, ADB offer PCG. The PCGs provided by DFIs protect against any nonpayment by the borrower or issuer for the guaranteed portion of the payment obligations on a variety of debt

instruments. These include bonds, financial leases, letters of credit, promissory notes, and bills of exchange (Pereira dos Santos, 2018; Matsukawa and Habeck, 2007). PCGs are primarily utilized by banks and non-bank financial institutions, as well as in capital markets and infrastructure projects. They can be applied to loans or other debt instruments issued by either the private or public sector, including limited recourse financing and public-private partnerships (PPPs) (Gatti 2013).

iii. **Policy-Based Guarantees (PBGs)** protect private lenders from the risk of default on debt service by sovereign governments. Although they are structurally similar to PCGs, PBGs are specifically offered for general balance of payments support. The International Bank for Reconstruction and Development (IBRD) and other multilateral financial institutions provide PBGs to countries that are eligible for IBRD's fiscal support programs, known as Development Policy Lending (Pereira dos Santos, 2018).

Figure 2.9 below provides a summary of guarantee instruments used by MDBs.

Figure 2.9: Summary of Guarantee Instruments used by MDBs



Source: adapted from Pereira dos Santos, 2018

Notes: Figure 2.9 presents types of guarantee instruments issued by MDBs. It covers both commercial and political risks. MDB guarantee coverage is partial, covering less than 100% of the outstanding obligation of the transaction being guaranteed.

2.16 Others, including insurance entities and specialized guarantee Funds

There are numerous potential uses for guarantees that may be conceptually valuable but are not necessarily offered as products by the suppliers mentioned above. For instance, specialized guarantee funds or entities established specifically to provide guarantees include the Korea Infrastructure Credit Guarantee Fund, the Indonesia Guarantee Fund, GuarantCo, Green Guarantee Facility, and the Africa Guarantee Fund. In terms of structure, these entities can also provide various solutions to address specific risks related to the project or transaction concern (Garbacz, Vilalta, and Moller, 2021; Yescombe, 2014).

3 Theories and Hypotheses for the Study.

3.0 Introduction

This chapter is devoted to risk theories, which help to set the tone and theoretical foundations of the subject under study. It starts with risk theories relating to the demand for guarantees and risk mitigation tools and attempts to review relevant literature on various decision-making theories under uncertainty, including how information is disseminated to achieve a maximum outcome, incomplete information and its decision implications, task delegation and conflict of interest issues, amongst others and how these frameworks of theories shape the direction and outcomes of the study. This is followed by a review of empirical studies on guarantee and guarantee demand, including studies specific to Africa and infrastructure projects. The rest of the chapter covers the research questions and the hypotheses for the study.

3.1 Risk Theories Relating to Demand for Guarantees

3.2 Expected-Utility Theory

The Expected Utility Theory is one of the decision-making models or instruments used by economic actors to analyze situations when the outcomes of decisions are uncertain. It assumes that the decision-makers are rational and will choose the outcome with the highest expected utility. The origins of the expected utility model are traced back to Daniel Bernoulli in the 18th century from his work, the St. Petersburg Paradox. However, the theory was formally developed and extended by John von Neumann and Oscar Morgenstern (1944) in their book Theory of Games and Economic Behavior (Briggs, 2023; Broome, 2001).

The theory is based on the assumption that investors are generally risk-averse and expected utility maximizers, with the utility curve being concave. It posits that the decision maker chooses between risky or uncertain prospects by comparing their expected utility values, i.e. the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities (Mongin,1998). This, therefore, means that under conditions of uncertainty, the decision mantra for a rational investor is to opt for actions that maximize the expected return for a given level of risk or where it is not possible to minimize risk for a given level of return (Maiti, 2021; McAskill, 2015; Nyman, 2001).

The statement below by Joseph P. Newhouse(1978), which was quoted by Nyman 2001, fully captures the assumed notion/ interpretation of expected utility theory: "The purpose of any insurance policy is to convert an uncertain, but potentially large, loss into a certain, small loss. Such a conversion benefits the consumer if greater losses cause progressively larger declines in utility (that is if there is diminishing marginal utility of wealth)" (Newhouse, 1978; Nyman,2001).

The Expected Utility Theory is pivotal, as it takes into account individual risk preferences when making decisions under uncertainty. It has become an important rational economic model for decision-making in risky situations and has proven to be an effective normative and prescriptive framework (Just and Peterson, 2010).

Expected-utility theory serves potentially as a relevant theoretical tool in analyzing the guarantee and other risk mitigation solution purchase decision of investors, given its central importance to individual risk preferences in economics and the potential to uncover an individual's tendency to buy a guarantee to solve risk-related traps as a precaution due to risk aversion instinct (Doherty and Smith,1993; Nyman,2001). A

number of authors describe risk aversion and shifting as critical for companies where the owner's risk aversion is a relevant factor. It holds that the demand for risk mitigation, such as a guarantee, is a demand for certainty because, under the theory's conventional specification, it seems that purchasers of risk mitigation solutions, such as guarantees, prefer certain losses to actuarially equivalent uncertain ones (Nyman, 2001). Doherty (2000), also noted that an individual with a concave utility function is likely to seek risk mitigation cover as long as the cover is actuarially priced fairly, all things being equal. The expected-utility theory offers valuable insights into risk decision-making, thereby serving as a sound framework for examining investor demand for guarantees as a tool for risk mitigation.

Despite its importance in decisions under uncertainty, the expected-utility theory has received several criticisms in the economic literature and its application for this study.

One of the fundamental principles of expected utility theory is its assumption that individuals prefer certain losses over uncertain losses of equivalent expected magnitude (Nyman, 2001). However, this assumption stands in stark contrast to a significant body of empirical evidence presented in the literature. Indeed, research indicates that certainty is not necessarily valued when potential losses are involved (Nyman, 2001; Tversky and Kahneman, 1986). Such studies demonstrate that individuals often exhibit a preference for uncertain losses as opposed to certain losses of the same expected value, suggesting a risk-seeking behavior among investors when confronted with the prospect of loss. In essence, when faced with the risk of loss, individuals tend to embrace, capitalize on, or exploit this uncertainty, as empirical findings reveal a clear preference for uncertain losses over certain losses of equivalent expected magnitude (Nyman, 2001). Thus, the conventional explanation for the

demand for insurance and guarantees -- a preference for certainty or a desire to avoid the risk of losses--does not align with the prevailing empirical evidence.

Furthermore, Doherty (2000b) observed a technical challenge regarding the application of the expected-utility theory, i.e., computing the expected utility of an individual decision-maker relies on the specific form of their utility function, but this information is often unavailable to researchers (Hong, 2002).

The expected utility theory's weaknesses are highlighted by its limited predictive power. This theory often makes inaccurate predictions about people's decisions in various real-life situations (Briggs, 2023). However, this does not necessarily imply that individuals should not base their decisions on expected utility considerations.

Another major criticism of expected utility theory is its inability to consider exogenous factors, such as market competition and industry regulations, which can influence corporate guarantee decisions (Garven, 1987). This oversight extends to insurance decisions as well.

Furthermore, the expected utility theory lacks a solid foundation for explaining the insurance purchasing choices of highly diversified companies (Main, 1982). According to Modigliani and Miller (1958), these entities can diversify their portfolios to avoid unsystematic, insurable risks (Fama and Jensen, 1983; Mayers and Smith, 1982). As a result, purchasing guarantees or other risk mitigation solutions may have little impact on value creation. The cost of seeking certainty can reduce shareholders' cash flows from dividends. This is because reducing diversifiable, firm-specific risk through risk mitigation solutions such as guarantees does not necessarily add value for the shareholders of a diversified firm.

Another criticism of expected utility theory relates to its definition of risk aversion. According to expected utility theory, the shape of the utility function determines risk preferences, as formalized by Friedman and Savage in 1948. A concave utility function indicates risk aversion, a commonly used measure of absolute and relative risk aversion coefficients that indicates concavity. However, the concavity of a utility function may not be directly linked to risk aversion (Just and Peterson, 2010). A concave utility function suggests that the marginal utility of wealth decreases as wealth increases. This concept, known as diminishing marginal utility of wealth (DMUW), can arise from factors other than risk aversion, with the saturation effect being particularly significant. The saturation effect occurs when the utility gained from additional units of the same good is less than that derived from the first unit consumed (Just and Peterson, 2010). Rabi (2000) formally illustrated this phenomenon as a theorem within a framework of dichotomous choices and discrete probability distributions (Just and Peterson, 2010).

Given these challenges and criticisms, the expected utility theory is deemed an inadequate framework for the study.

3.3 Market Signaling Theory

Another important risk theory for decision-making is the Market Signaling Theory. This theory is a powerful framework for understanding how information is conveyed in situations where not all parties or participants possess equal access to that information. It is anchored on the premise of information asymmetry between two actors and serves as a useful tool for explaining interactions between parties (individuals or organizations) with different information access (Drover et al., 2017; Connelly et al., 2011; Levy and Lazarovich-Porat, 1995). Generally, one party, the

sender (e.g., company managers), must decide whether and how to communicate (or signal) that information, while the other party, the receiver (e.g., investors), must determine how to interpret the signal. Signals are actions or traits of people in a market that can change what others believe or provide them with information, whether on purpose or by chance (Brian et al., 2010). The sender decides how to communicate the signal (Connelly et al., 2011), while the receiver figures out what the signal means (Drover et al., 2018; Brian et al., 2010). To minimize information asymmetries and distinguish a specific entity from its competitors, managers are motivated to convey insider information to external parties in various ways. This can include voluntarily disclosing "good news" while withholding "bad news" (Brian et al., 2010). It's important to mention that signaling has its own costs and benefits associated with it; entities often disseminate information as a positive signaling tool to help reveal unique capabilities/strengths, including the company's intrinsic value to the market. For example, a company could use press releases or annual reports to signal some achievements and their implications for the market.

Several market signaling hypotheses have also been proposed to describe firm risk mitigation solution buying decisions, including guarantee, hedge, and other risk mitigation decisions (Doherty, 2000). For instance, the company's managers could decide to use risk mitigation solutions such as guarantees as a strategic management tool to insulate the firm from possible risks and signal their prudent management measures and capabilities to outsiders (Tufano, 1996; Han, 1996; DeMarzo and Duffie, 1995).

Furthermore, the utilization of risk-bearing instruments like guarantees and insurance to credit enhance project finance transactions is a positive signal to unlock capital from

investors and debt providers, as it signals the robustness of the project structure and thus encourages the investors to allocate capital to such investments (Drover et al., 2018).

Additionally, the purchase of a risk mitigation solution such as a guarantee by a highly geared company might signal to lenders and other debtholders that managers are serious about creating value for all stakeholders of the firm (e.g., see (Rawls & Smithson, 1990; Han, 1996).

Levy and Lazarovich-Porat (1995) argue that signaling theory has conceptual appeal because it offers a plausible explanation that bridges the gap between theoretical predictions and firms' actual financial management practices. Paul (1992, p. 483) further adds, "... investors are interested in a signal to the extent that it resolves uncertainty about the firm's ultimate payoffs. The more uncertainty it resolves about firm payoffs, the more weight the signal receives in the stock price" (Paul,1992; Hans,1996). This perspective can help explain a firm's risk management decisions by using risk mitigation solutions like guarantees.

However, signaling theory has faced criticism in the academic literature. First, the theory is sometimes criticized for its oversimplifications and assumptions, such as the idea of rational behavior and certain cost structures. Additionally, excessive signaling can create a clutter of signals, making it challenging for recipients to distinguish genuine signals from noise (Grace and Rebello, 1993).

Furthermore, concerns about the empirical validity of the theory have arisen, as some studies have found mixed or inconclusive evidence regarding the relationship between signaling and capital structure (Ichwanudin,2022; Brennan, 1995, p. 13). Similar to the points made above, the predictions of signaling theory are often difficult to test, which

hampers the framework's empirical support. Levy and Lazarovich-Porat (1995) also note that “... virtually all [extant] signaling studies are theoretical... however, it is difficult, if not impossible, to test signaling effects empirically” (Lazarovich-Porat 1995, p. 39). This challenge stems from the unclear nature of the theoretical predictions (Hong, 2002).

Multiple criticisms, especially regarding the limitations of empirical testing in signaling theory, have significantly hampered its application in empirical research (Hong, 2002). Thus, signaling theory is a less appropriate framework for this research.

3.4 Transaction Cost Theory.

Transaction cost theory is a significant concept within "new institutional economics," offering an alternative perspective to the neoclassical view of economics, particularly regarding the coordination of economic activities. This theory traces its origins to Coase (1937) but is most closely associated with Williamson (1979). Unlike neoclassical economists, who view transactions as cost-free, Williamson acknowledges that conducting business involves various costs. These include expenses related to obtaining relevant information, negotiating and making decisions, as well as contract monitoring and enforcement (Macher and Richman, 2008; Hodgson, 1988).

Transaction costs can be relatively minor in some cases; however, they can also be substantial enough to outweigh the benefits of the exchange. In such instances—where costs exceed benefits—rational agents may choose not to continue with the transaction.

Transaction costs can be understood by examining the factors that lead to them. These factors can be categorized into two groups:

i. Human attributes; and

ii. Transaction-specific characteristics.

With regard to human attributes, Williamson (1979; 1985) describes economic actors in terms of two key attributes- (a) Bounded rationality and (b) Opportunism. Bounded rationality refers to a cognitive concept that acknowledges the limitations of individuals as biological beings. Every individual has constraints on their ability to act, meaning that while they strive to be rational, their capacity to receive, process, store, and retrieve information is inherently limited (Williamson, 1979).

One significant implication of bounded rationality is that it can be costly for agents to consider, agree upon, and document all potential future scenarios that might arise during a transaction. In fact, these costs can become so high that agents may avoid the necessary contemplation to foresee some future contingencies altogether. Additionally, there may be unforeseeable events, such as force majeure, which, according to Williamson's analysis, can result in infinitely high transaction costs (Macher and Richman, 2008; Furlong, 1996).

The second attribute to discuss is Opportunism. Market exchanges provide a fertile ground for economic actors to engage in what Williamson (1979) describes as “opportunism.” Opportunism refers to self-seeking behavior that broadens the conventional understanding of how economic agents operate, incorporating strategic behavior into their actions. This behavior is characterized as “self-interest seeking with guile” (Williamson, 1979). When it benefits them, opportunistic agents may selectively

reveal, distort information or even provide false information to their trading partners as long as they can do so without facing consequences later (Furlong, 1996).

However, it is essential to mention that not all agents behave selfishly or are presumed to behave opportunistically. There are indeed agents of good character, but it can be costly and challenging to identify who can be trusted and who cannot. Consequently, economic actors grapple with the challenge of managing opportunistic behavior in an environment where information is often imperfect and costly to obtain (Furlong, 1996).

Trust has been proposed as a potential solution to reduce the risk of opportunism (Hoffmann, Neumann, and Speckbacher, 2010). A higher level of trust between exchange partners can lead to lower costs associated with implementing safeguards against opportunistic behavior (Hoffmann, Neumann, and Speckbacher, 2010). When trust is present between parties, transactions can take place without the strict structures and expenses typically associated with hierarchical organizations, while also minimizing the risk of opportunistic behavior in the marketplace (Furlong, 1996).

Transactions vary in complexity and the potential for opportunism. The interplay between human attributes and transaction-specific characteristics serves to determine transaction costs. Williamson (1985) outlines three principal transaction-specific characteristics that are pertinent to the issue under discussion (Furlong, 1996).

The first is asset specificity, which refers to the extent to which investments in material, financial, and human resources cannot be easily repurposed for other transactions (Grabher, 1993). The second characteristic is the degree of uncertainty involved in a transaction. This uncertainty stems from both imperfect information and the potential opportunistic behavior of others.

Lastly, the frequency of transactions influences the relative costs of different institutional arrangements or governance structures under which a transaction occurs. When a transaction occurs frequently between two parties, they can establish a specialized governance system for it. Although implementing such a governance structure may be costly, those costs can be spread over many transactions. In contrast, for one-off transactions or those that occur infrequently, creating specialized mechanisms tends to be more expensive (Macher and Richman, 2008; Furlong, 1996; Kreps, 1990).

Williamson's framework provides an explanation for the existence of alternative organizational arrangements in the economic system. He argues that agents with bounded rationality and opportunistic behavior are motivated to minimize their transaction costs. This motivation plays a critical role in determining the governance structures under which transactions are conducted. Transactions that necessitate significant investments specific to the transaction, involve uncertain outcomes, or occur on a frequent basis are more likely to be executed within well-structured systems that are organized hierarchically within a firm. Those that require no transaction-specific investment, are of a more certain outcome, or are one-off in nature are more likely to take place between firms in the marketplace. In other words, the governance structure that is the most efficient in the reduction of transaction costs is adopted for the duration of that transaction (Furlong, 1996).

Transaction Cost Economics (TCE) provides a framework for understanding the rationale behind purchasing risk mitigation solutions like insurance. Williamson (1993, 2000) describes a transaction as involving both the exchange processes among

parties and the contractual agreements that govern various domains, including finance and product acquisition.

In this context, the exchange of risks between an organization and a commercial insurer, formalized through an insurance policy, is considered a hedge transaction. The insurer's risk pooling serves as a governance structure for multiple hedge transactions. Thus, the choice to retain corporate risks or transfer them through insurance represents a "make-or-buy" decision, known as the "paradigm problem" in TCE (Hong, 2002).

Corporate insurance can be viewed as a specific type of financial contract, functioning as a contingent post-loss financing mechanism (Mayers and Smith, 1982; Doherty, 2000). Grillet (1992) posits that effective management of property and liability risks should be recognized as an essential component of capital structure optimization. By employing risk mitigation strategies, such as guarantees, an organization can reduce the anticipated costs associated with financial distress, thereby enhancing its debt capacity (Hong, 2002). Thus, a Transaction Cost Economics (TCE) framework provides valuable insight into the economic justification for investor decisions to buy risk mitigation solutions such as guarantee and insurance.

Some studies analyze insurance purchases through the lens of Transaction Cost Economics (TCE). For example, Bjuggren (1995) suggests that a firm's level of asset specificity can influence its choice of capital structure and insurance purchases. Researchers like Grillet (1992) and Main (2000) argue that insurance helps firms lower transaction costs associated with hedging by pooling low-frequency, high-loss risks. Insurers can achieve efficiencies through risk pricing, contract enforcement, and claims handling expertise.

Insurance also allows firms to reinvest cost-effectively after significant losses at a fixed cost rather than resorting to expensive external financing (Doherty, 2000). Skogh(1989) contends that insurance underwriters can monitor managerial behavior, reducing opportunism and fostering stakeholder cooperation (Hong, 2002; Furlong, 1996).

Insurers have incentives to assess policyholders' risk profiles upfront (adverse selection) and monitor behavior afterward (moral hazard) (Grillet, 1993; Han, 1996). Grillet (1992) notes that purchasing insurance can help internalize the social costs of limited shareholder liability, optimize risk allocation, and economize payouts to non-shareholder claimants (Hong, 2002).

Transaction Cost Economics (TCE) presents notable conceptual strengths; however, it has also been the subject of substantial critique in the academic literature (Hong, 2002; Spekle, 2001). Recognizing the limitations can provide valuable insights for refining its application in the current research project.

Firstly, TCE has been critiqued for adopting a somewhat narrow economic perspective on individual and firm behavior (Hong, 2002; Shelanski and Klein, 1995; Spekle, 2001). This focus may overlook important factors in corporate insurance decision-making, such as managers' socially responsible actions, the risk-reducing advantages of business diversification, and the regulatory frameworks surrounding firms. Expanding the scope of these considerations could enhance the applicability of TCE in this context.

Secondly, Shelanski and Klein (1995) point out the empirical challenges associated with testing TCE theory across diverse industries. Key variables—such as asset specificity, uncertainty, and frequency—can be difficult to operationalize and measure

consistently across firms and sectors. To address this, employing a more standardized approach to data collection, including case analyses, surveys, or interviews, may yield more reliable findings. For example, measuring asset specificity through consistent criteria can improve comparability across industries and enhance analytical rigor.

Thirdly, Williamson (1988) acknowledges that the TCE framework remains relatively informal compared to the rigorous modeling characteristic of much of the financial economics literature. Main (2000) further emphasizes that while transaction cost is a comprehensive concept, uncertainties regarding its influence on corporate insurance motivations persist, indicating a need for more precise analysis. Developing more explicit definitions and operational parameters could strengthen future applications of TCE in this area (Hong, 2002; Furlong, 1996)

Considering these insights, while TCE may not serve as the ideal framework for the current study, its limitations offer opportunities for further exploration and refinement in future research endeavors. By addressing these challenges, researchers can enhance our understanding of transaction costs and their impact on corporate guarantee purchase decision-making.

3.5 Agency Theory

The Agency theory is a prevailing theoretical framework within neoclassical economics. It is centered on the problems and solutions linked to task delegation under information asymmetry and conflicting interests between two or more parties. It assumes the rationality and self-interest of the parties involved and deals with both problems of ex-ante (‘hidden characteristics’) and ex-post information asymmetry (‘hidden action’) (Linder and Foss, 2015; Lawrence, 2010).

The foundation of agency theory is simple, as it reduces corporations to two or more groups of participants –Owners of the company and Managers of the company. Other possible participants include debt providers, and other suppliers of resources. The divergent interests of all the participants are clearly defined (Kultys, 2016)

It also makes another common assumption of human beings ("Man") - it assumes that a Man generally is intrinsically self-seeker, and therefore, every rational individual, given the opportunity, will pursue his or her own interests. The owners pursue their interests, and the managers also pursue their interests. Owners are generally interested in the maximization of the firm's value. The Managers on the other hand, may seek to maximize their own utility. They might take certain decisions which are of best interest to themselves (the managers), as opposed to decisions that are of best interest to the owners.

The theory has been extensively researched and applied to economics and corporate management (Linder and Foss, 2015; Lawrence, 2010). Agency theory provides some very important recommendations for designing contracts, such as the incentive intensity and monitoring intensity principles. The theory's broad applicability allows agency theory to enjoy tremendous scientific impact both within economics and management research (Linder and Foss, 2013; Jensen and Meckling, 1976)

Despite its theoretical appeal and applicability in economics and management research, agency theory has been criticized. Most of this criticism centered on the assumptions underlying agency theory, particularly, those underlying simple models. They argue that the theory does not cover all the complexities of human actions. They agree that the simplistic premises of the theory are very convenient for mathematical modeling but unrealistic when it comes to the description of human behaviors. The

assumptions of the theory are often very restrictive in fostering the tractability of the problems in mathematical terms (Kultys, 2016). Others have also raised concerns about adverse selection problems inherent in agency theory due to control and access to asymmetrical information among the principals and the agents (Hori, 2017). Another criticism of the theory relates to concerns of ownership of a firm. The critics argue that, conceptually, shareholders are technically owners not of a firm but only of its shares, and therefore, they should not be considered the only residual claimants. These critics believe that the exclusive rights of shareholders can alter the risks faced by various stakeholders. Specifically, managers who are influenced by shareholders may choose strategies that prioritize safer financial returns, often at the expense of innovation or other essential goals for the firm. This shift in focus can lead to risk being transferred from shareholders to other groups, such as employees. Furthermore, managers are not direct agents of shareholders; their authority comes from the board of directors, which operates as an independent fiduciary (Kultys, 2016).

It is important to note that, although agency theory has faced significant criticism, it remains a unique and valuable framework in economic and management research, particularly for this study. One of its key strengths is its explicit nature, which allows for the systematic adjustment of its assumptions to reflect more 'realistic' scenarios. While the basic assumptions of agency theory may not accurately represent human behavior in general, the theory provides a framework for modeling a wide range of assumptions, including those that diverge significantly from the baseline. This flexibility enables researchers to test the necessity, advantages, and limitations of various governance models, as well as incentive and monitoring schemes based on these assumptions. Moreover, the explicit nature of agency theory's assumptions is an asset, as it fosters

cumulative knowledge and continuous improvement of the recommendations put forth by scholars (Linder and Foss, 2015).

The framework of the theory is very relevant to the subject of this study as motives for securing a guarantee for investment in infrastructure can be explained with agency theory. Two main agency conflicts are discovered in project corporate settings: the conflict of interest between owners of the firm and managers of the firm and the conflict between interests of other resource suppliers like debt-holders(lenders) and equity-holders (project sponsors). Conflicts between project sponsors and lenders in project companies, which are usually leveraged, lead to problems such as the underinvestment problem or asset substitution. Sponsors of the project(owners) might want to increase the risk of the project with the view of benefiting from the positive gains from the project and enhancing their equity value at the expense of the lenders. On the other hand, if the benefits of the value-increasing investments accrue to the lenders, the sponsors (owners) might not be interested in undertaking these investments as they have to bear the risks (MacMinn, 1987, Mayers and Smith, 1987; Froot, Scharfstein and Stein, 1993; Myers, 1977). To avoid such conflicts, credit enhancement in the form of guarantees is usually demanded by the lenders to ensure alignment of interest (Mayers and Smith, 1982; Mayers and Smith, 1987).

The conflict between owners and managers arises from the different interests of shareholders and managers (Han and MacMinn; 2006), which are addressed by shifting the reward system to ownership by way of stock options to ensure alignment of interest. Greenwald and Stiglitz (1990, 1993) provide seminal theories that show how the risk of bankruptcy and the existence of incentive systems within the firm could lead managers to act in a risk-averse manner on behalf of the company, and thus

buying risk mitigation solutions such as guarantee /insurance when a risk-neutral firm would not do so (Michel-Kerjan, Raschky, and Kunreuther, 2014). In this spirit, Mayers and Smith (1982) and Han (1996) argue that risk-averse managers have an incentive to purchase risk mitigation solutions such as guarantees and insurance to protect their interests and reputation.

Other literature supports this perspective and suggests that some of the variance in corporate performance can be attributed to the discretionary behavior of individual managers (e.g., Adams, Almeida, and Ferreira, 2005; Bloom and Van Reenen,2010). Bertrand and Schoar (2003) provide strong evidence that the investment and financing decisions of firms are influenced by the fixed characteristics of executives, such as their age and level of education, which in turn affect their risk-taking behavior. Furthermore, the impact of these factors is significantly large (Michel-Kerjan, Raschky, and Kunreuther, 2014).

Some studies support this theory (Hoyt and Khang, 2000), showing that managerial risk aversion influences insurance demand (Zou, Adams, and Buckle, 2003; Core, 2007).

Several other studies point out the positive appeal of the agency theory framework for risk mitigation, such as insurance research. For instance, Krummaker, 2019 notes that "Another motive for firm's insurance demand can be explained with agency theory……. the conflict of interest between owners and managers and the conflict between interests of debtholders and equity-holders. Conflicts between equity-holders such as shareholders and debtholders, e.g. banks or bondholders, in leveraged firms lead to problems such as the underinvestment problem or asset substitution …….. purchase

of insurance is more likely for firms with higher leverage in order to alleviate these conflicts" (Krummaker, 2019b)

Smith (1986) highlights that corporate insurance demand exemplifies agency analysis, as it stems from corporations rather than individuals. He argues that this framework effectively addresses the distinct needs of corporate purchasers, a topic often overlooked in prior insurance literature (Hong, 2002; Smith 1986).

Garven and MacMinn (1993) and Doherty (2000b) argue that commercial insurance can help mitigate asset substitution and underinvestment issues within firms. This, in turn, reduces the risk associated with debt and ultimately lowers their market cost of capital. Scholars like Campbell and Kracaw (1987) and Grillet (1992) suggest that insurance plays a vital role in managing conflicts between managers and owners. It provides job security after disasters and offers effective monitoring of external shareholders (e.g., Main, 1982; Mayers and Smith, 1982). Additionally, insurance serves as a bonding mechanism that allows managers to showcase their integrity and helps create incentive compensation systems that align managerial and shareholder interests (e.g., Doherty, 2000). This analysis has led to several testable hypotheses about corporate motivations for acquiring insurance. Empirical studies (e.g., Mayers and Smith, 1990; Hoyt and Khang, 2000) have examined some of these agency-based hypotheses within developed markets, such as the United States. These findings may provide an important benchmark for comparing and evaluating similar research in emerging and other developing markets (Hong, 2002).

As indicated earlier, the agency theory is considered the most appropriate framework for the subject of this study, as it effectively guides the empirical research. Our

objective is to understand the motives behind the corporate demand for guarantee solutions to support their investments in infrastructure projects in Africa.

3.6 Empirical Studies of Guarantees as a Risk Mitigation Solution.

After reviewing the various risk theories, we also examined empirical studies on the usage of guarantees and other risk mitigation solutions to understand and contextualize the motives behind corporate demand for guarantees. We also examined whether issues identified in previous studies are applicable to the current studies, including gaps and other areas of further research relevant to this study.

3.7 Enterprise Risk Mitigation and Demand for Guarantee.

3.7.1 Risk Aversion and Guarantee

In an effort to eliminate uncertainties, risk-averse entities utilize guarantees to manage business risks and cash flows. However, it seems that additional factors also influence companies' and investors' decisions to use guarantees. In other words, besides risk aversion, several other reasons affect the demand for guarantees, as established by Mayers and Smith (1982) in their seminal articles on the demand for insurance and other risk mitigation instruments.

Building on the work of Mayers and Smith (1982, 1987) and Main (1982), several scholars have extended and tested this original framework through empirical studies focused on companies' demand for insurance and guarantees. Notable contributions include research by Hoyt and Khang (2000), Schulenburg (2008), Regan and Hur (2007), Tufano (1996), and Adams and Buckle (2012), among others.

In the case of project and infrastructure investment, it has been argued that credit enhancement is crucial for attracting and mobilizing resources from investors, given the unique characteristics of such investments (Shrimali, Konda, & Srinivasan, 2014).

Indeed, research on the rationale for buying guarantees has not only highlighted the need for risk mitigation solutions but has also provided an academic response to address challenges posed by the fundamental theories of firm and corporate finance, which appears to overlook the importance of risk mitigation tools. For instance, in perfect market conditions, according to Modigliani and Miller (1958), entities are able to diversify their portfolio and thereby eliminate any unsystematic, insurable risk (Dufey and Srinivasulu, 1983; Bartram, 2002; Fama and Jensen, 1983; Mayers and Smith, 1982). This implies that buying risk mitigation solutions such as a guarantee is of no consequence to value creation. Indeed, it is even seen that paying fees for certainty, i.e., paying premium or guarantee fees to buy risk mitigation solutions such as guarantee/ insurance, reduces shareholder's cash flows from dividends (e.g., Jensen and Meckling, 1976; Fama and Jensen, 1983; Mayers and Smith, 1982).

The reality, however, is that markets are not perfect; the existence of risk exposes entities to potential risk (left-tail exposure), which has cost, liquidity, and survival implications.

In the case of infrastructure investments, project-specific complexities and the economic and legal environment of the project country also add an additional dimension to the firm and project-level challenges.

Therefore, companies and project investors take appropriate mitigation measures, such as buying guarantees and other risk mitigation tools, to avoid the negative implications of left-tail risk exposures.

As indicated above, Mayers' and Smith's seminal paper in 1982 and that of Main(1982) on demand for risk solutions such as guarantees and insurance ignited research interest in the topic, analyzing why and when firms purchase guarantees and insurance, which has led to several theories being developed to explain corporate buying decisions relating to risk mitigation solutions such as guarantees and insurance. The paragraphs below outline the theories that are used to explain the factors influencing corporate demand for risk mitigation solutions, such as guarantees and insurance, and empirical findings.

3.7.2 Transaction Costs and Provider Service Efficiencies

Focusing on transaction costs, Eeckhoudt, Gollier, and Schlesinger (2005) illustrate that risk solution providers, such as insurers, possess a comparative advantage in risk-taking attributable to economies of scale and gains from specialization. They contend that the transfer of risk to a risk mitigation provider, such as an insurance company, facilitates an efficient allocation of risk.

Mayers and Smith (1982) assert that the proportion of risk-averse stakeholders is a critical factor influencing the demand for insurance. Organizations that encounter excessive insurance claims may find claims administration to be a significant burden. Consequently, it is often in the best interest of such entities to delegate claims management to a specialized agent with the necessary experience and resources, thereby capitalizing on the insurance firm's comparative advantage.

Furthermore, Mayers and Smith indicate that "for a given premium, efficiencies in claims administration motivate corporate purchases of insurance, particularly as the frequency of insurance claims escalates" (Mayers and Smith, 1982). The benefits derived from an insurance firm's specialization in areas such as claims administration,

loss prevention, and risk assessment provide a compelling rationale for organizations to acquire retroactive liability coverage.

Mayers and Smith argue that when total claims surpass previous coverage limits, insurance adjusters may have insufficient incentives to negotiate efficient settlements. Thus, the efficiencies offered by insurance firms in managing claims serve to further incentivize the acquisition of insurance by organizations (Mayers and Smith, 1982; Doherty and Smith, 1993).

3.7.3 Bankruptcy costs

Mayers and Smith (1982), Smith and Stulz (1985), and Froot, Scharfstein, and Stein (1993) discuss how risk mitigation is beneficial for protecting businesses against the potential costs of bankruptcy. They show that risk mitigation solutions such as hedging and insurance, can reduce the negative impact of revenue volatility, thereby lowering the probability of bankruptcy. Doherty (2000) and Hau (2006) also emphasize that a major risk for firms related to business interruptions, including property damage, is a lack of liquidity. Catastrophic events, such as country risk events, can cause significant business interruptions, hindering firms from fulfilling their contractual obligations. This is particularly crucial for infrastructure projects, where non-access by users due to a catastrophe can affect the revenue of the infrastructure company. If the company cannot mobilize enough resources in time to respond to the crisis and resume operations swiftly, it may face bankruptcy. Risk mitigation strategies, such as guarantees, are designed to address the impact of these unexpected events (Stulz, 1996) and the resulting cash flow variability (Froot, Scharfstein, and Stein, 1993).

The existing literature typically focuses on using guarantees and other derivatives as hedges against negative outcomes. Leland (1998) theoretically demonstrates that the

use of derivatives can directly influence cash flow and indirectly affect adverse (left tail) results. Smith and Stulz (1985) examine how firms implement hedging strategies with off-balance-sheet instruments, such as options and futures. Empirical research (e.g., Nance, Smith, and Smithson, 1993; Colquitt and Hoyt, 1997; Gezcy, Minton, and Schrand, 1997; Graham and Rogers, 2002) further supports the idea that such instruments are widely adopted by firms.

3.7.4 Tax Shield Considerations

Another motive influencing the demand for risk mitigation solutions such as guarantees and insurance is the impact of corporate taxation. In specific tax regimes, insurance contracts may serve to mitigate the tax obligations of corporations. Mayers and Smith conducted an extensive analysis of the relationship between taxation and the propensity to purchase insurance. They contend that insurance acts as a deductible tax expense, providing tax relief to companies and consequently reducing their expected tax liabilities. This dynamic establishes a measurable incentive for corporate demand for insurance coverage (Mayers and Smith, 1982; MacMinn, 1987). Furthermore, empirical studies by Hoyt and Khang (2000) and Regan and Hur (2007) have identified strong evidence supporting the influence of tax shields on the demand for insurance.

3.7.5 Regulation

The regulation also creates demand for credit enhancement, which has become critical for regulated entities like banks, insurance, and fund managers. National and industry regulations, such as Basel Committee rules, require entities like banks, insurance entities, pension funds, fund managers, and other deposit-taking entities to assign economic capital to risk exposure on their balance sheets. To optimize the use of

capital, they tend to buy guarantees and other risk mitigation tools for capital relief. In assessing the impact of regulations on insurance demand in Japan, Yamori (1999) analyzed 504 companies, focusing on 1986 data due to the availability of published insurance premiums. His research found that company size and regulatory status significantly influence corporate insurance demand. This was consistent with Mayers and Smith's (1982) conclusion that regulations impact insurance demand; regulated companies can shift premium costs to customers, leading them to purchase more insurance than unregulated firms (Krummaker, 2019b).

3.7.6 Information Asymmetry

Information asymmetry is another factor considered in the literature as a reason for corporate demand for guarantees. Entities demand guarantees because of risk in business transactions. Business transactions often involve both time and uncertainty, including the absence of pertinent knowledge concerning the other's future actions (Gümüş, Ray, and Gurnani, 2012; Mollering, 2001). Throughout the duration of a transaction, the two parties involved tend to have conflicting interests. Additionally, one party often possesses information that the other party lacks, resulting in an asymmetry of information and, consequently, an incomplete understanding of the situation. Information may initially seem complete when both parties agree to a transaction. However, after the agreement, one party might take actions that remain unnoticed by the other party or receive relevant information that the other party does not possess, leading to moral hazards related to hidden actions or hidden information. Additionally, information can be incomplete from the outset of the contract, as one party may be aware of significant details related to the transaction that the other party is not, which is a case of adverse selection or hidden information (Schich and Kim, 2011). Such

incidents usually result in credit ration and its effect on the overall economy. De Menza and Webb (1987) clearly articulated the effects of such incidents, asserting that they lead to socially suboptimal levels of investment. They explained using the general equilibrium principle that, in a first-best equilibrium with risk-neutral investors, all projects with expected returns equal to the world rate of return will be pursued. However, when information is asymmetrically distributed, some projects may not receive financing. The first-best equilibrium can only be restored through credit enhancement mechanisms, such as guarantees or other risk mitigation solutions.

The issues of information asymmetry and moral hazard and their influence on risk mitigation solutions have been well documented. For example, Grace and Rebello (1993) explored the insurance decisions of a firm that has private information regarding its cash flows and insurable losses. They concluded that even without bankruptcy costs or information gathering by insurers, the firm's efforts to manage its information risk could lead it to demand insurance.

3.7.7 Agency Conflict

Factors influencing the demand for guarantees are closely related to the agency conflict between owners and managers. This conflict primarily stems from differing diversification opportunities available to each party and the separation of ownership from control, as noted by Jensen and Meckling (1976). This phenomenon is often referred to as the "risk differential" between agents and principals, as Beatty and Zajac (1994) discussed. Furthermore, the agency conflict between equity holders and debtholders can result in issues such as underinvestment and asset substitution. Research suggests that the demand for insurance can alleviate these conflicts (Krummaker, 2019; MacMinn, 1987; Mayers and Smith, 1987)

In terms of empirical studies, several scholars have tested factors influencing demand for insurance and guarantees. Most of the empirical studies centered on issues like commercial property insurance, business interruption, export credit insurance, derivatives, reinsurance and terrorism, among others.

Mayers and Smith (1990) were pioneers in this research front. Their analysis focused on the acquisition of reinsurance within a sample of property and casualty insurance companies in the United States, utilizing data that is systematically reported in insurers' statutory returns. The empirical model employed in their study designated the ratio of reinsurance ceded to total business premiums received as the dependent variable. They considered various firm characteristics as independent variables, including ownership structure, geographic concentration, company size, concentration of business lines, and the firm's best rating. The findings indicated that ownership structure, size, line of business concentration, geographic location, and default risk exert significant influences on reinsurance purchases. However, the study faced limitations due to data constraints, which resulted in the exclusion of several factors, such as growth opportunities and tax considerations, as well as certain industry-specific variables. Given that the research was confined to the insurance sector, it proves somewhat challenging to extrapolate meaningful insights regarding the demand for insurance among non-insurance firms. Furthermore, as noted by Mayers and Smith (1990), reinsurance procurements from other members within the same group were not differentiated from external acquisitions, leading to the inclusion of actual retention in the reinsurance purchases. Mitigating these limitations may be possible with data from industrial firms (Hamid, Osman, and Noordin, 2009).

3.7.8 Financing and foreign buyer risks

In seeking to discover significant factors influencing demand for export credit guarantee using evidence from Germany, Klasen (2014) analyzed factors such as risk aversion, the existence of bankruptcy costs, financing needs and risks related to foreign buyers and countries to test microeconomic factors based on existing theory. The findings of the study indicate that five firm-related factors significantly influence state export credit guarantee demand. The officially support export credit offered by government of Germany is valued by German exporters. They regard the ECA guarantee as an important component of risk-averse behavior and of transferring potential bankruptcy costs; they also see demand for export credit insurance as critical for financing transactions and for risks related to foreign buyers in risky countries. The study focused on a single year of data (2010 only) in a single industry – manufacturing and thus has the potential to limit the outcome of the work.

In their study, Yamori (1999), along with Meyers and Smith (1990) and Hoyt and Khang (2000), studied the determinants of corporate demand for property insurance using insurance premium data from a 1989 survey of 251 NYSE-listed companies. They found that leverage, firm size, growth opportunities, and tax considerations significantly influence this demand. However, the focus on a single year (1989) may limit the generalizability of their findings (Hamid, Osman, and Noordin, 2009).

3.7.9 Company Size

In testing for the influence of company size on demand for risk mitigation solutions such as insurance, Zou, Adams, and Buckle (2003) analyzed a dataset of 235 Chinese companies, using insurance premium information from a telephone survey and financial data from the Shanghai and Shenzhen Stock Exchanges between 1997 and

1999. They categorized companies into systematic and unsystematic risks and found that the decision to buy property insurance is positively related to company size, insolvency risks, and geographical concentration. In contrast, the amount of property insurance purchased is positively associated with systematic risks but negatively related to insolvency risk, unsystematic risks, company size, and leverage. A limitation of their study is the brief data period, which may lead to endogeneity issues.

Daniel and Paul (2003) also performed a study on property insurance in the United States from 1991 to 2002, using data from SwissRe and Compustat. They evaluated 180 firm-year observations and used excess value as a proxy for corporate insurance demand. Their findings indicate that expected default costs and company size significantly influence insurance decisions, differing from previous studies that relied on insurance premiums. The excess loss principle states that insurers cover losses only after they exceed a specified amount (Rejda, 2005), suggesting that premiums are a more accurate measure of insurance demand. While using excess value is intriguing, its relevance to corporate insurance behavior is not clear (Hamid, Osman, and Noordin, 2009).

3.7.10 Cost of Insurance (Pricing)

In their attempt to investigate the varying demand for property and terrorism insurance among companies, Michel-Kerjan, Raschky, and Kunreuther (2015) employed a distinctive dataset comprising insurance policies acquired by large U.S. firms, coupled with relevant financial information from both the corporate clients and the insurance providers. They implemented a two-stage least squares approach to yield consistent estimates of the premium elasticity concerning the corporate demand for property and terrorism coverage. Their analysis revealed that both types of insurance exhibit a

relatively price-inelastic demand, with corporate demand for terrorism insurance demonstrating a significantly higher degree of price inelasticity compared to property insurance. Furthermore, they identified a negative correlation between the solvency ratios of property and terrorism risk coverage, with a more pronounced impact observed in the latter. This finding suggests that companies may utilize their self-insurance capacity as an alternative to acquiring market insurance.

Zou and Adams (2005) followed up by examining insurance data sets for 698 Chinese publicly listed companies from 1997 to 2003, using the Simultaneous Equation Method of analysis to test the simultaneous linkage among debt capacity, cost of debt, and corporate property insurance. The study's outcome indicates that debt capacity, cost of debt, and corporate insurance seem to be simultaneously related(Hamid, Osman and Noordin, 2009).

3.7.11 Leverage

Utilizing panel data from 1997 to 1999, Zou and Adams (2006) conducted a comprehensive analysis of 235 publicly listed companies in China, neglecting the distinction between systematic and unsystematic risk, which represented a deviation from their earlier study in 2003. They replicated the factors identified by Hoyt and Khang (2000) while also incorporating additional variables such as geographical location and various ownership structures, including foreign and state ownership. The results of their analysis indicated that the decision to procure property insurance is positively associated with leverage, while it is negatively associated with state ownership and tax considerations. In contrast, the volume of property insurance acquired is positively correlated with managerial ownership and growth options yet

negatively related to the size of the company (Klasen, 2014; Hamid, Osman, and Noordin, 2009).

3.7.12 Others

Other researchers have conducted empirical studies in specific areas, such as export credit guarantees, structured commodity trade finance, and political risk insurance. Regarding export credit guarantees, Klasen (2014) stated that firm-specific factors, including the need for insurance services, liquidity, and balance sheet protection, drive the demand for such guarantees.

In their study on insurance purchase decisions for structured commodity trade finance, Braun, Fischer, and Schreiber-Orosz (2023) concluded that a bank's likelihood of purchasing insurance increases with its experience and expertise with the product. Additionally, factors such as the impact of insurance coverage on the bank’s balance sheet, the risk associated with the underlying transaction, and the strength of broker relationships play significant roles. Meanwhile, other factors—such as the size of the commodity trade finance portfolio, the competitiveness of insurance pricing, and risks from commodity price volatility—are considered less critical in the bank's decision to purchase insurance for structured commodity trade finance.

Lastly, Braun and Fischer's (2018) research on political risk insurance found that a company's demand for this insurance grows in proportion to its perceived exposure, experience, and expertise with political risks, as well as its evaluation of pricing adequacy.

Despite several empirical studies on the demand for risk mitigation solutions such as insurance, I have not come across empirical studies that connect existing literature to

the demand for guarantees for investment in infrastructure projects in Africa. It is, therefore, important to address this gap in the literature by looking into the motivation behind investor decisions for risk mitigation solutions such as guarantees for their investments in Africa, especially where infrastructure assets are involved.

3.8 Research Questions

In line with the aims and objectives outlined in Section 1.2 of Chapter One, this study seeks to address significant gaps identified in the existing literature regarding investor decision-making behavior in relation to guarantees for infrastructure investments in Africa. To attain a comprehensive understanding of this subject matter, the following targeted research questions are proposed:

1. What factors influence investors' *corporate* decisions when buying guarantees for infrastructure investments in Africa?
2. What is the relationship between these factors and the types of guarantees purchased for their infrastructure investments?
3. Are these factors specific to infrastructure investments in general or peculiar to African infrastructure investment risks?

3.9 Development of Hypotheses

Following the literature review and the research questions, the hypothesis is developed to guide the next steps of the research process, including survey and other data collection processes and the subsequent empirical analysis. Industry experts and opinions were used, especially where appropriate and reliable literature was unavailable, to complement the literature and ensure appropriateness and consistency in the approach to the hypothesis development.

Going by the basic theory of finance, there seems to be no justification for entities to buy risk mitigation solutions such as guarantees as it has no value creation consequence (Modigliani and Miller 1958; Markowitz 1952), but a number of authors describe risk aversion and shifting as critical for companies where the owner's risk aversion is a relevant factor (Doherty and Smith, 1993; Meyer and Power, 1983). This is because markets are not perfect; the existence of risk exposes entities to potential left-tail risk, which must be mitigated. Exposure to risks(commercial and/or political) influences firms' decisions to buy risk mitigation solutions to derisk their investments (Braun and Fischer, 2018; Klasen,2014). In the case of infrastructure investments, the financiers bear the potential left-tail risk irrespective of the cause of the risks because of the limited recourse or no recourse nature of such projects. As a result, the financiers' willingness to invest in infrastructure projects is driven by the robustness of the project structure underpinned by appropriate risk mitigation tools such as guarantees to give them comfort.

Hypothesis 1(H1): The larger the perceived left-tail risk of an infrastructure project with a limited recourse structure, the more risk mitigation tools, such as guarantees, are demanded.

The risk of survival because of bankruptcy and its cost implications motivates companies, including investors in infrastructure projects, to seek risk protection. Such protection in the form of a guarantee improves negative volatility impact on revenues and cashflows and, therefore reduces the probability of bankruptcy (Froot, Scharfstein, and Stein, 1993). Doherty (2000) and Hau (2006) posit that firms' principal risk associated with business interruption, including property damage, is a lack of liquidity and its potential impact on business survival. Another concern is non-payment risk,

which affects revenues and cash flows. In the case of infrastructure investments, risks get heightened during the operational phase, as that is the time the users of the infrastructure facility see the benefits and have to pay user fees to access usage of the facility. If revenues expected from the user tariffs/ fees become politically contentious due to public outcry over the user fee, and the project company is unable to charge enough to cover its operations and finance costs, or if the contract is terminated, it will lead to losses and potential bankruptcy. Other operational issues, including unavailability or inadequate supply of inputs, maintenance and local expertise, technology and change of standards, logistics, and procurement issues, can also trigger significant business interruptions and prevent firms from fulfilling their contractual commitments. If the firm is unable to raise enough resources to respond to the crisis and resume operations on time, it faces the risk of bankruptcy.

Hypothesis 2(H2): Projects with uncertain revenue and cashflows due to operations and project-specific concerns are expected to have a higher demand for risk mitigation cover such as guarantees.

Guarantees and other credit enhancements are usually aimed at de-risking infrastructure transactions and making them more attractive to investors and financers (Bielenberg et al., 2016). Private debt finance sources usually come from commercial banks and institutional investors (e.g., pension funds, insurance, family office investors, private debt funds, etc.). Such investors prioritize revenue visibility and certainty, making it a key consideration in their decision-making. Infrastructure projects during the construction phase pose a greater risk in terms of cash flow uncertainty and can be difficult to manage(Saha et al., 2018). As a result, they typically prefer brownfield projects rather than greenfield projects, as such assets usually have a

proven performance track record without risks of construction or operational delays. They also have an appetite for investment-grade rated projects, which means that high-risk investments, such as greenfield infrastructure projects in developing markets like Africa, are difficult for them to support. Saha and others (2018) note that institutional investors have largely avoided infrastructure assets in emerging markets and developing economies due to structural constraints in the operating environment. Operating environment concerns include macroeconomic instability, early termination of contracts, and frequent renegotiation of contracts following changes in government. The financial market is less developed, making refinancing very difficult in such markets. All these affect the ability of investors to plan and manage their investments in such markets. Certainty and predictability are key ingredients to ensuring that sufficient and appropriate financing and investment are available for infrastructure development (Blundell-Wignall & Roulet, 2015). When it comes to such investments in developing economies like Africa, macroeconomic risks become a challenge, especially where the required financing is long-term and in foreign currency (Visconti,2012; Crăciun,2011). Musarat et al. (2020) stated that the inflation rate significantly contributes to construction cost overruns, impacting all components involved. Monetary policies in these countries are not sufficiently mature and fail to maintain long-term stability. (Ebekozien et al., 2024). Financing Infrastructure projects focusing on the construction phase poses a greater risk regarding cash flow uncertainty. They can be difficult to manage, as funds deployed during construction must be refinanced during the project's operational phase. Without the assistance provided by credit-enhancement mechanisms, many greenfield projects remain unfeasible and unable to attract private financing. Zou, Adams, and Buckle (2003) argue that insurance enables companies to realize financial advantages such as more

consistent cash flows. According to Pereira dos Santos (2018), providing a guarantee for infrastructure investments offers financial benefits to those parties directly involved in the project. For sponsors, benefits come in the form of lower borrowing costs, larger volumes, longer tenors, and higher credit ratings; for investors, they come in a better risk-return equation. For the government, sponsors, and investors, the guarantee, including those offered by MDBs, represents the realization of an investment that would not have been viable otherwise. The benefits for users may include lower prices and expedited provision of services. Scholars have discussed that increased use of guarantees could result in unlocking additional financing for sustainable infrastructure from the private sector (Bielenberg et al., 2016; Grace & Rebello, 1993)

Hyp*othesis 3a(H3a): The higher the infrastructure project's upstream risks (construction and completion risks), the greater the guarantee demanded by investors.*

Hypothesis 3b(H3b): Uncertain Operating Environment prompts infrastructure companies/developers to purchase guarantees to unlock capital and manage investment risks.

The weakening global economy, increased austerity measures and decreased investment capacity, banking regulations under the Basel Accord and Solvency II rules for insurance and other allied institutions, and the perception of high-risk infrastructure projects have kept banks and other regulated investors away from investing in such projects because of the regulatory and economic capital requirements for such projects.

The economic and regulatory capital required to be allocated for such projects in the financiers' books makes them economically unviable unless credit substitution

solutions like guarantees are available to help improve the project's creditworthiness, risk rating, and overall optimization of capital usage. The appetite of banks as traditional lenders has fallen in recent years as they become warier in committing to long-term loans (which have become more expensive in capital terms) unless such risks can be transferred efficiently through the use of guarantees to optimize the usage of economic and regulatory capital. Project finance is regarded as a pivotal means of financing infrastructure, but it is yet to be reflected comprehensively and consistently in most solvency regimes. For instance, solvency regulatory requirements for insurance and pension funds do not provide room for infrastructure investments. Jobst (2018) pointed out that infrastructure debts are typically treated like other forms of long-term exposure, resulting in a relatively high capital charge. However, anecdotal evidence indicates that infrastructure investments can be less risky than traditional asset classes, particularly over the medium to long term. To finance infrastructure projects and meet regulatory and internal capital requirements, these regulated entities need risk mitigation solutions, such as guarantees or credit insurance. These tools help minimize the impact of the capital charge and enable them to achieve risk-adjusted returns on their investments.

Hypothesis 4(H4) : Regulatory Entities' (Financiers') regulatory and internal economic capital requirements influence guarantee demand. The higher the regulatory/ economic capital required to meet a project's hurdle rate, the more guarantee is demanded.

Guarantees for projects are complex instruments to structure, especially when a Guarantee contract includes multiple risk coverage and parties with various preferences, risk appetites, and objectives. In the case of infrastructure projects, the

availability of the required guarantee instruments to meet all project risks becomes a challenge, and where available, such guarantee instruments become even more complex as the structuring is done to address specific project risks and investment rating requirements. In addition, non-standardization and familiarity can lead to more time being spent on negotiations by the parties involved in a deal and its implications on the project timelines and costs (e.g., legal costs (GIIN, 2017). This requires expertise and a deep understanding of the solutions available, which implies thorough due diligence on all relevant issues of the project risks being covered, including legal and regulatory issues. The intermediary advisors' experience, negotiation abilities, claim processing experience and efficiency, knowledge, and wider relationship strength are critical for the investor's decision(Maas, 2006; Garbacz et al., 2021).

Hypothesis 5(H5): The more knowledge, understanding, and expertise of and relationship with the advisors/brokers, the more likely the guarantee solution will be purchased.

Investors in infrastructure projects, including commercial lenders, pension funds, insurance companies, debt funds, capital market investors, and infrastructure funds, may encounter project-specific risks (Marsh, 2024). For instance, when dealing with projects in Africa, project lenders might be satisfied with the project's commercial viability and credit profile but could have concerns related to jurisdictional risks and country-specific issues. Such concerns include the perception of country-related perils such as the government canceling critical permits and concessions, actions leading to forced abandonment, war, and political violence risks, currency restrictions blocking debt service, expropriation of project assets, and breach of contract by the host government on critical project agreements amongst others. The macroeconomic

situation, culture, and the legal and political environment of the country also influence investor decisions on projects in certain geographical locations. The political climate is filled with uncertainties that could seriously impact business, especially where the investor has existing operations in the country. To mitigate against such country-related perils, managers seek country risk guarantee solutions to manage the potential country risk events.

Hypothesis 6(H6): The higher the perception of country risk in the location of operations, the more likely the company will buy a guarantee to mitigate against country risk.

In pursuit of the study's aims and objectives, the above hypotheses were tested using survey data collected from industry practitioners and experts in infrastructure investments, risk mitigation, and financing, in accordance with the research methodology described in Chapter Four.

3.10 Alignment of the Hypotheses and the Research Questions

To effectively address the research questions, the above hypotheses based on existing literature were developed to guide and structure the research process. The following analysis elaborates on how each hypothesis supports and aligns with the research questions. This detailed analysis contributes to a clearer understanding of the research questions and their related hypotheses, highlighting the complexities associated with investors' buying decisions regarding guarantee solutions for infrastructure investments in Africa.

1. The first research question aims to identify the key factors influencing corporate decisions made by investors in the procurement of guarantees for infrastructure

investments in Africa. To address this question, an analysis of various issues relevant to infrastructure investors will be conducted, including economic conditions, regulatory environments, stakeholder perceptions, the expertise of advisors, and available risk mitigation instruments. Each of these elements plays a critical role in shaping investors' decisions regarding guarantee solutions required to support their infrastructure investments in Africa.

To further guide the analysis, six hypotheses (H1, H2, H3, H4, H5, and H6) have been formulated, reflecting these research interests. H1 examines the perceived left-tail risk associated with infrastructure projects that utilize limited recourse financing structures. It posits that stakeholders frequently perceive these projects as possessing an increased potential for significant adverse outcomes. This perception, in turn, drives the demand for guarantee solutions to mitigate these risks. Hypothesis H2 explores the impact of financial uncertainty on investors' risk management strategies. Conversely, H3 suggests that an increase in construction and completion risks will heighten the demand for more robust protective measures. Additionally, H4 posits a relationship between a higher need for regulatory and economic capital, necessary to meet a project's hurdle rate, and an increased desire for guarantees. H5 indicates that greater familiarity with advisory resources and expertise improves the decision-making process, while H6 contends that a heightened perception of country risk will lead companies to actively seek guarantees as a means of mitigating risk.

This enhanced depth provides a clearer understanding of the research questions and the corresponding hypotheses, outlining the complexities involved in the

investor decisions regarding the purchase of guarantee solutions for their infrastructure investment in Africa.

2. The second research question investigates the correlation between the influencing factors identified in the first question and the selection of various types of guarantees by investors for their infrastructure projects. This analysis aims to understand not only the relationship between these factors and the types of guarantees chosen—such as political risk guarantees and commercial risk guarantees (for non-payment risks)—but also the underlying rationale for these choices in relation to specific infrastructure risks.

   To explore these issues, four hypotheses (H1, H2, H3, H4) have been formulated. Hypothesis H1 examines the concept of perceived left-tail risk, which pertains to the potential for severe negative outcomes associated with infrastructure projects that employ limited recourse structures. This necessitates a greater demand for guarantee solutions focused on addressing demand risk. The hypothesis highlights the connection between risk perception and the need for financial protection mechanisms, suggesting that perceptions inform the decisions investors make regarding the types of guarantees they secure.

   As discussed earlier, Hypothesis H2 delves into the impact of financial uncertainty on investors' risk management strategies. Meanwhile, H3 posits that an increase in risks related to construction and project completion will lead to a heightened demand for more robust protective measures, encompassing both commercial and political risk coverage. Finally, H4 underscores the influence of regulatory requirements on the growing demand for guarantee solutions, illustrating how

external factors like regulation can shape investor behavior in the context of infrastructure projects.

3. The third and final research question aimed to investigate whether the factors influencing infrastructure investments are universally applicable or specifically relevant to the unique risks associated with investing in African infrastructure. This inquiry seeks to determine if the challenges and risks that infrastructure investors face are similar to those found in other regions worldwide or if they are particularly intensified within the African context.

   To analyze these issues comprehensively, several hypotheses—H1, H2, H3, H4, and H6—were developed. Hypothesis H6 is particularly noteworthy, as it addresses the perception of country risk, which includes aspects such as political, economic, and social stability related to the location of the infrastructure asset and its operations. This hypothesis posits that higher perceived country risk correlates with a greater likelihood of investors seeking guarantee solutions to counteract these risks.

   The other hypotheses contribute to this exploration as well: H1 examines perceived left-tail risk in infrastructure projects that utilize limited recourse structures, suggesting that this perception drives demand for guarantee solutions. H2 investigates the impact of financial uncertainty on investors' risk management strategies. H3 proposes that increasing risks associated with construction and project completion lead to a heightened demand for stronger protective measures. Lastly, H4 emphasizes the role of regulatory requirements in shaping the demand for guarantee solutions, illustrating how external factors influence investor behavior in infrastructure projects, regardless of the investment's geographical location.

Table 3.1: Summary of Hypotheses and Research Questions Aligned/ Supported

Hypotheses	Description	Research question supported
Hypothesis 1:	The larger the perceived left-tail risk of an infrastructure project with a limited recourse structure, the more risk mitigation tools, such as guarantees, are demanded.	Research Questions 1, 2, and 3
Hypothesis 2:	Projects with uncertain revenue and cashflows due to operations and project-specific concerns are expected to have a higher demand for risk mitigation cover such as guarantees.	Research Questions 1, 2, and 3
Hypothesis 3:	a: The higher the infrastructure project's upstream risks(construction and completion risks), the greater the guarantee demanded by investors. b: Uncertain Operating Environment prompts infrastructure companies/developers to purchase guarantees to unlock capital and manage investment risks.	Research Questions 1, 2, and 3
Hypothesis 4:	Regulatory Entities' (Financiers') regulatory and internal economic capital requirements influence guarantee demand. The higher the regulatory/ economic capital required to meet a project's hurdle rate, the more guarantee is demanded.	Research Questions 1, 2, and 3

Hypothesis 5:	The more knowledge, understanding, and expertise of and relationship with the advisors/brokers, the more likely the guarantee solution will be purchased.	Research Questions 1
Hypothesis 6:	The higher the perception of country risk in the location of operations, the more likely the company will buy a guarantee to mitigate against country risk.	Research Questions 1 and 3

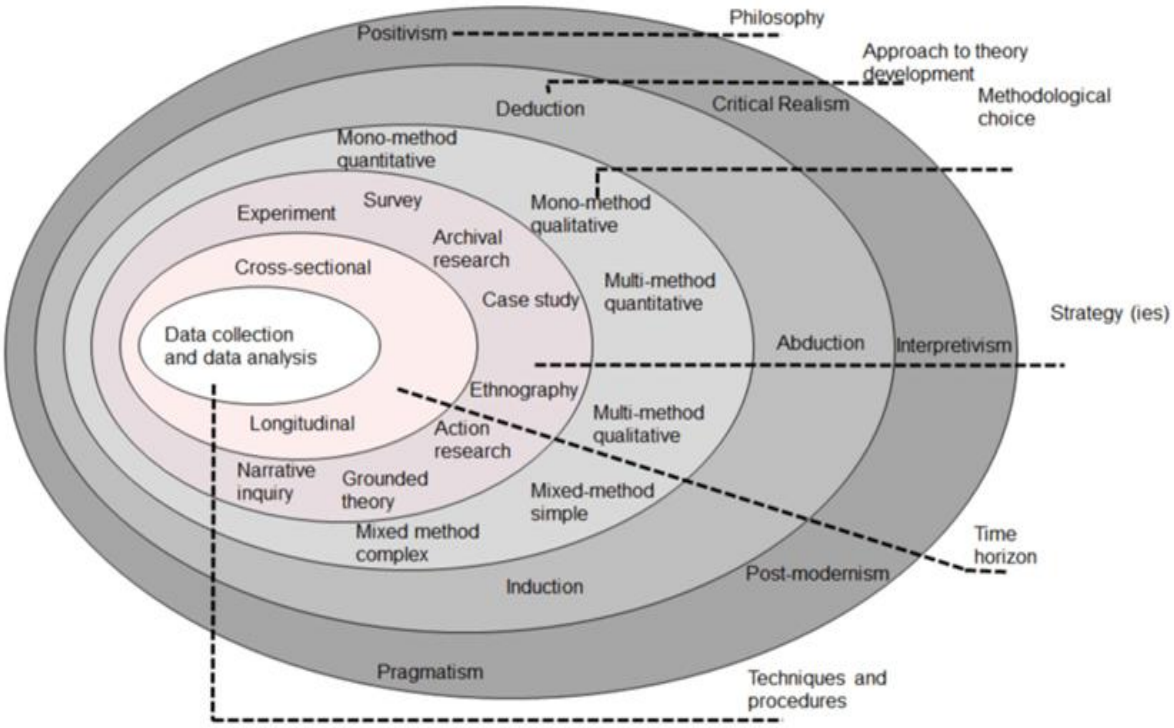
Notes: This table presents the related research questions and the hypotheses.

4 Research Methodology

4.0 Introduction

This section of the study covers the overall research process. It starts with the research philosophy, research approach, strategy, and choice of research method. Others include the time horizon of the study, data collection, and approach to data analysis, as they form part of the overall techniques and procedures outlined in the research process. In designing the research process, the researcher was guided by the work of Saunders et al. (2018) (Research Methods for Business Students, 8th Ed), Easterby-Smith et al. (2018) (Management Research, 6th Ed), and Blaikie and Priest (2019(Designing Social Research, 3rd Edition). The researcher found the overview by Saunders et al. (2018), the “Research Onion,” particularly helpful in guiding the research process, as it systematically outlines the methodological flow of the research process. It provides a snapshot of the whole research process step by step, from the philosophical stance of the research to the last step, which is the techniques and procedures used in the research, and thus provides an effective approach to the process progression of the research methodology. Figure 4.1 depicts the research Onion as shown below.

Figure 4.1 - The Research Onion



Source: Adapted from Saunders et al., 2018)

Note: Figure 4.1 The "Research Onion" depicts the methodological flow of the research process, starting with research philosophy and ending with research techniques and procedures.

4.1 Research Philosophy

Research philosophers view the paradigm of research from different perspectives, but two key concepts, according to Easterby-Smith et al., (2018), are pivotal in discussing the research paradigm among philosophers. The two concepts are: ontology and epistemology.

4.2 Ontology

Ontology explores the philosophical foundations of reality and existence, serving as a key starting point for research debates (Easterby-Smith et al., 2018). It differentiates between objective reality and subjective perception, influencing our understanding of how beliefs shape behavior (Pessu, 2019). Key ontological questions include: What exists? What is true, and how do we categorize existence? (Gill and Johnson, 2010;

Saunders et al., 2019). Perspectives on ontology vary, though the core concepts remain intact. Easterby-Smith et al. (2018) identify four ontological positions: Realism, Internal Realism, Relativism, and Nominalism, as detailed in Tables 4.1 and 4.2. Table 4.1 describes the ontological positions, while Table 4.2 differentiates truth from facts on each ontological position.

Table 4.1: Description of the Ontological Positions

Realism	The world is real and exists independently of perception. Science is based on observations of real phenomena, observable behavior, and facts that are considered to be 'hard facts.'
Internal Realism	The world is real and causally independent of the human mind, but it is impossible to observe it directly as our understanding of its structure (types, kinds, categories, etc.) is a function of the human mind. Scientific laws, once discovered, are absolute.
Relativism	Scientific laws are created by people who are embedded in a context (so it's in the eye of the beholder).
Nominalism	Reality is created by us and as such does not exist independently of our perception

Source: Adopted from Easterby-Smith et al. 2018

Table 4.2: Truth and facts differentiation of the Four ontological positions

	Realism	**Internal realism**	**Relativism**	**Nominalism**
Truth	Single truth	Truth exists, but it is obscure	There are many 'truths'	There is no truth
Facts	Facts exist and can be revealed	Facts are concrete but cannot be accessed directly	Facts depend on viewpoint of observer	Facts are all human creations

Source: Adopted from Easterby-Smith et al.,2018

Another perspective that was more granular regarding ontological positions was outlined by Blaikie and Priest (2019). They offered six different perspectives, which are shown below in Table 4.3

Table 4.3: Ontological positions according to Blaikie and Priest (2019)

Shallow Realist	• Phenomena we study exist independently of us • There are patterns or sequences in observable phenomena, and the challenge for science is to discover and describe them
Conceptual Realist	• Reality has an existence independent of human minds • It is not the property of any individual or the construction of a social community but is a collective consciousness, or structure of ideas, and is not directly observable
Cautious Realist	• Reality has an existence independent of human minds • However, direct access to this reality is not possible
Depth Realist	• Social reality is viewed either as social episodes that are products of the cognitive resources of social actors, or as social arrangements that are products of material but unobservable structures of relations
Idealist	• Social reality is made up of shared interpretations that social actors produce and reproduce as they go about their everyday lives • Idealist ontologies differ in the extent to which the existence of an independent external world is acknowledged and, if so, whether or not it constrains or facilitates individual and social activity
Subtle Realist	• A knowable reality exists independently of social scientists • Cultural assumptions prevent direct access to this world

Source: Adopted from Blaikie and Priest (2019)

This study adopted a cautious realist ontology, as articulated by Blaikie and Priest (2019), and serves as a foundational framework for understanding complex corporate decision-making phenomena regarding demand for guarantee solution. This ontology aligns closely with the internal realist position described by Easterby-Smith et al. (2018), emphasizing the nuanced interplay between observable realities and human perception.

The choice of this ontology is particularly pertinent given the multifaceted nature of the phenomenon under investigation: corporate buying decisions pertaining to guarantee as a risk mitigation solution, specifically demand for guarantee solutions for investments in African infrastructure. The act of purchasing a guarantee is rooted in an observable transaction, yet the intricate details that inform the buying decision of the investors—such as the assessment of risk, market conditions, financial models, and geopolitical factors—remain largely inaccessible. This absence of direct visibility into the decision-making process aligns well with the cautious realist perspective, which posits that while reality exists independently of human thought, our access to that reality is inherently limited and complex (Blaikie and Priest, 2019).

The cautious realist ontology adopted for this study, therefore, provides a basis for analyzing the intricate rationale behind corporate demand for guarantee solutions, highlighting both the tangibility of the transaction and the challenges of fully understanding the underlying motivations and considerations behind their decisions.

4.3 Epistemology

Epistemology is about the nature of knowledge and ways of enquiring into the physical and social world. How do we know what we know? (Easterby-Smith et al.,2018).

Epistemology, therefore, helps to define how the knowledge of social reality is determined and outlines a set of assumptions about the way of inquiring into the nature of the world. Blaikie & Priest (2019) described six sets of assumptions, as shown in Table 4.4 below

Table 4.4: Sets of Epistemological Assumptions

Empiricism	Knowledge is both derived and verified by our human senses of perception and trained researchers are able to create reliable knowledge that can be considered true or certain when it reflects the external world
Rationalism	Knowledge is derived by human thought processes that can describe unobservable phenomena through reasoning and inferences using mathematics and logical reasoning
Falsificationism	Knowledge is created by testing and re-testing theories based on falsifiable propositions that allow us to narrow down the possible explanations behind the phenomena that exist
Neo-realism	Knowledge of the causes behind observations is based on understanding the mechanisms that produce them
Constructionism	Social phenomena are constructs dominated by the language used by participants, and criteria for determining truth are malleable according to mechanisms that create social constructs
Conventionalism	Scientific theories are developed to describe observed data, and do not necessarily define the actual phenomena that exist, and these theories' merit is determined by judgment as opposed to proofs

Source: Adapted from Blaikie and Priest (2019)

This study adopts Falsificationism as its epistemological perspective. This comes from the strong belief that while the truth may be elusive in research, we can identify and reject falsehoods. By eliminating adequate falsehoods, we can enhance our understanding of the relationship that describes how our world exists and its interactions.

4.4 Linking of Ontology and Epistemology and Philosophical Stance of the Study

There is a link between the two concepts, Ontology and Epistemology, as it helps define several research paradigms, such as positivism, social constructionism, critical realism, among others. These research stances are very common in management research, and they effectively stand out as the pillars from which other paradigms are developed or derived. Each research philosophy has its unique strength. It would, therefore, be inappropriate to think that one research philosophy is inherently better than the other (Podsakoffet et al., 2012). They are better at doing different things (Saunders et al., 2019).

It is also important to mention that research philosophy as a concept is a bit fluid as it is not seen as fixed or stable. This is probably because of its intrinsic self-critical nature and how its practitioners are always challenging their own presuppositions and conclusions (Tsui-James, 2003). To quote Easterby-Smith et al. (2018) -" So philosophers within one school not only disagree with each other; they may also disagree with themselves over time". It is, therefore, necessary for researchers to carefully think through the rationale for their philosophical stance, given its overall impact on the outcome of the research. The Cautious Realist-Falsification ontology-epistemology pair is one of the common pairings described by Blaikie and Priest as

shown in Table 4.5. The Cautious Realist-Falsification ontology-epistemology pair is highlighted in green.

Table 4.5: Common ontological and epistemological pairings

Shallow realist	**Conceptual Realist**	**Cautious Realist**	**Depth Realist**	**Idealist**
Empiricism	Rationalism	Falsificationism	Neo-Realist	Constructionism

Source: Blaikie and Priest (2019)

Table 4.5: Common ontological and epistemological pairings

Shallow realist	**Conceptual Realist**	**Cautious Realist**	**Depth Realist**	**Idealist**
Empiricism	Rationalism	Falsificationism	Neo-Realist	Constructionism

Source: Blaikie and Priest (2019)

4.5 Philosophical Stance of the Study

This brings to sharp focus the researcher's philosophical stance for this study, which is a positivist approach.

Figure 4.2 - Research Paradigm for the study

Source: Developed by the author

The researcher maintains that a distinct reality exists independently of human perception, although direct access to that reality is inherently limited. Therefore, the research must rely on indirect methodologies to infer the nature of this reality. This will be accomplished by conducting comprehensive surveys among carefully selected

samples of individuals operating in the infrastructure investment and financing value chain. The survey is designed to uncover patterns and regularities in investor decision-making behavior when buying a guarantee solution for their infrastructure projects in Africa, enabling the researcher to analyze data quantitatively. This quantitative analysis is essential for testing various hypotheses, systematically eliminating alternative explanations, and precisely measuring key factors—thus facilitating the verification or falsification of the stated hypotheses.

This methodological approach aligns well with the positivist perspective articulated by Easterby-Smith et al. (2018), which champions the use of empirical evidence as the cornerstone of knowledge acquisition in management research. Furthermore, it adheres to the principles of Cautious Realism and Falsificationism as discussed in the critical rationalism paradigm by Blaikie and Priest (2019). These frameworks emphasize the importance of skepticism in the scientific process, advocating for the notion that theories should be rigorously tested, rather than accepted as absolute truth.

Additionally, this research aligns with a falsificationism epistemology, wherein theories are constructed not as definitive answers but as provisional frameworks that are validated through a process of eliminating alternative explanations. This approach aims to create optimal frameworks for understanding complex phenomena, which can significantly contribute to the verification or rejection of the stated hypotheses. By emphasizing empirical inquiry and systematic testing, this study aims to enhance practice and the body of knowledge in guarantee solution usage as a risk mitigation tool to create capacity, derisk, and unlock capital for infrastructure investments in Africa.

Research Approach

The research approach emphasizes logic, generalization, data, and theory to determine which 'what' and 'why' questions can be addressed (Blaikie & Priest, 2019). Researchers typically use three approaches: deductive, inductive, and abductive. The deductive approach, linked to positivism, derives conclusions logically from premises (Ketokivi and Mantere, 2010). Inductive reasoning, on the other hand, identifies a conclusion based on observed data without a direct logical connection. The abductive approach combines elements of both deduction and induction, moving back and forth between theory and data

This research adopts a deductive approach, which is well-suited to the phenomenon under investigation: the demand for guarantee solutions in infrastructure investments in Africa, as it allows the researcher to test specific hypotheses derived from existing theories and models related to infrastructure financing, risk assessment, mitigation options, and project performance. By starting with general principles and applying them to specific risk scenarios in infrastructure projects, the deductive approach facilitates a structured and systematic examination of potential risks and their mitigation strategies, including the likelihood of project success. Furthermore, the deductive approach aligns with the assumptions of Cautious Realism and Falsificationism, as well as the research strategy adopted for this study.

We began the study with a cautious and explicit hypothesis regarding the expected empirical relationships, as derived from theoretical arguments concerning the drivers of corporate demand for guarantees that support infrastructure investments in Africa. Data were collected through a survey administered to practitioners in risk mitigation, finance, and project development, including contractors, policymakers, and various stakeholders within the infrastructure industry. The gathered data were subsequently

analyzed to test the hypothesis established from the theoretical framework. This deduction is based on knowledge grounded in widely accepted principles, asserting that any valid conclusion must align with foundational premises.

The study's methodology, the survey method, accurately documents the norm, identifies extreme outcomes, and clarifies associations between variables in the sample. Indeed, Check and Schutt (2012) highlight the relatively superior 'deductibility' of the survey method over other alternative approaches, such as field methods. They argue that "without the survey data, the observer could only make reasonable guesses about his area of ignorance in the effort to reduce bias." Furthermore, Jick (1983) posits that survey research can enhance confidence in the generalizability of results, which is a key feature of the deductive reasoning approach.

Table 4.6 below summarizes the three approaches to research as outlined by Saunders et al. (2018): induction, deduction, and abduction.

Table 4.6: Summary Approaches to Research

Elements	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalizability	Generalizing from the general to the specific	Generalizing from the specific to the general	Generalizing from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or	Data collection is used to explore a phenomenon, identify	Data collection is used to explore a phenomenon, identify

	hypotheses related to an existing theory	themes and patterns create a conceptual framework	themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory.

Source: Saunders et al., (2018):

Research Strategy

As mentioned above, the Survey Method was adopted as a methodology for the data collection. It was adopted because it has a useful and legitimate approach to data collection for the research, as information is collected from a sample of individuals through their responses to questions, in this case, from decision makers who use guarantees and other risk mitigation solutions to support their infrastructure investments in Africa. It, therefore, has a clear benefit in helping to describe and explore variables and constructs of interest for the study (Check & Schutt, 2012).

From an epistemological perspective, the survey method aligns with positivism, emphasizing quantitative analysis. Data is collected through methods such as questionnaires or published statistics and analyzed using statistical techniques. By studying a representative sample of organizations, the survey aims to identify common

relationships across these organizations and provide generalizable statements about the subject of the study.

Moreover, surveys can accurately document norms, identify extreme outcomes, and delineate associations between variables within a sample. Jick (1983) notes that survey research enhances confidence in the generalizability of results.

The researcher recognized the methodological gaps in using the survey as a data collection tool. This is because, for a survey to effectively elucidate causal relationships or provide descriptive statistics, it must contain well-crafted questions that are appropriately framed. Kaplan and Duchon (1988) suggest that "The stripping of context, for example, reduced 'representability' or model complexity through the use of a closed survey instrument, buys 'objectivity' and testability at the cost of a deeper understanding of what actually is occurring."

Furthermore, survey research seems a bit inflexible regarding discoveries (relatively poorer 'discoverability') made during data collection. Once the work is underway, there is little one can do upon realizing that some crucial item was omitted from the questionnaire or upon discovering that a question is ambiguous or is being misunderstood by respondents.

To avoid these gaps in the research strategy and ensure that the survey has the right questions to attract the required information needed for the study, a pilot was conducted with key industry experts to test the potency of the survey questionnaire and its fit for purpose. Relevant suggestions and recommendations received during the pilot process were incorporated into the final survey questionnaire before being administered to potential participants. Sections 4.6.1(Data Collection), 4.6.2

(Questionnaire Design), and 4.6.4(Participant Recruitment) below describe the whole research strategy adopted for the data collection.

Research Choice

The research choice is another layer or step in the research process, as described in the Research Onion. Saunders et al., (2019) outlined three choices in the Research Onion: the Mono, Mixed, and Multi-method research choices.

This study follows the mono-research choice, as it uses the quantitative method, which falls within the positivist stance adopted for the research. The quantitative method has been adopted because it is more scientific, objective, and relatable, as this study aims to use statistically grounded facts to make predictions, establish facts, and test the hypotheses stated in section 3.4. It aims to find evidence that supports or does not support the hypothesis and establish the causal relationship between buyers of risk mitigation solutions, such as guarantees, and the key driving factors of the buyers' decision. The quantitative method is also generally acceptable as a mode of research. The data collected from the survey was analyzed using Exploratory Factor Analysis (EFA) and Logistics Regression. The objective of using the EFA is to assist in obtaining the factor scores for the potential drivers of guarantee buying decisions discussed in the hypothesis. Logistic regression also measures the relationship between the factors and the identified dependent variables. Details of the EFA and the Logistics Regression, including the rationale for their usage for the study, are described below in sections 4.8.1 and 4.8.2, respectively.

Research Time Horizon

The Research Onion outlines two types of time horizons: cross-sectional and longitudinal (Bryman, 2012). The study adopts the cross-sectional approach.

By utilizing a cross-sectional design, the researcher was able to examine multiple characteristics of the phenomenon being investigated simultaneously. Various factors related to the phenomenon were assessed, including corporate information such as location, turnover, asset size, type of business or industry, types of guarantees purchased, investment type, challenges encountered when investing in infrastructure, risks specific to investments in Africa, and the suppliers providing their guarantee solutions, among others. Detailed information on the cross-sectional data obtained from the survey is provided in the data collection section (see section 4.6.1 below).

Research Techniques and Procedures

4.6 Data collection

To fully gather the required information for the study, primary data was collected for the research. For the data gathering, a survey in the form of a questionnaire was developed and administered to relevant stakeholders involved in infrastructure financing and investments in Africa to help get a better understanding of demand factors for risk mitigation solution usage. The stakeholders include Infrastructure project developers, global construction companies (EPC Contractors), institutional investors, infrastructure funds, ECAs and DFIs, Bankers, professional and other advisory firms active in the infrastructure business, insurance companies, and government agencies/ departments involved in infrastructure projects, amongst others.

4.7 Questionnaire design

The variables that influence the demand for risk mitigation solutions, such as guarantees for infrastructure investments, are quite specific to the infrastructure industry in general and those geographically specific, like African risks in particular. In designing the questionnaire, the researcher was guided by the works of Braun and

Fisher (2018), Pereira dos Santos (2018), and WEF(2016). The questionnaire captures broad areas of interest relevant to the research. Table 4.7 provides an outline of the issues covered in the survey questionnaire.

Table 4.7: Structure of the Survey Questionnaire- Sections and themes covered

Sections of the Questionnaire	**Themes covered in the Questionnaire**
I: General Information	Participant Title/Role, Industry of operation, Company-specific factors, Revenue, Business Activities or Operations in Africa, Use of Risk Mitigation
II: Decision Drivers of Buying Guarantee/ Risk Mitigation Instruments	Regulatory/Balance Sheet, Internal Factors, Access to Financing, Scale, and Portfolio of Africa Projects, Nature of Investment, Project/ country-specific elements, and Relationship Factors, among others.
III: Availability and Understanding of Guarantee/ Risk Mitigation Instruments	Assessment, Market needs, Product Availability, Complexity, Expert Relationships, Cost Reduction, Credit Rating, and Pricing, among others
IV: Risk Identification, Exposure & Mitigants	Construction Risks, Completion Risks, Operational Risks, Commercial, Political, and Country Risks, etc.
V: Types of Risk Coverage and Suppliers	Product Providers ECAs, DFIs, Banks, Insurance, specialized guarantee entities, government, Risk Category, Guarantee/Insurance Policy, etc.
VI: Other Comments	Additional information relevant to the study.

To measure the constructs underlying the study's hypotheses, a suitable item battery was developed for the questionnaire. Prior to finalizing the draft of the questionnaire, a series of expert discussions were held in London, Dubai, Cairo, and Nairobi with practitioners and industry experts who are involved in project finance, guarantee and

insurance, infrastructure project advisory, and sponsors of projects to review and comment on the questionnaire before the final draft was submitted to the ethics committee of the University for clearance to pave way for the administration of the survey.

As discussed earlier, the draft questionnaire was tested by piloting it with select industry practitioners and sector experts to ascertain their feedback. This helped improve the overall adequacy of the survey's structure and content and ensure its completeness and fit-for-purpose objectives. Suggestions and feedback received from the pilot were carefully considered. All relevant responses were incorporated in the final version of the survey questionnaire.

As indicated in Table 4.7 above, the questionnaire was divided into five sections (Sections I to IV), with section I covering general background variables such as the business sector (role) of the responding participants, firm-specific information like revenue, location of the firm, Africa business operations, and whether the firm is a buyer of risk mitigation solutions such as guarantees for their investments in Africa, etc.

The second section covers drivers of guarantee buying decision of their firms. Series of 9 closed and 1 open-ended questions were asked under this section to help elicit as much information as possible for the study. The close ended questions were measured on a 5-point Likert scale, with 5 representing extremely important and 1 representing extremely less important.

The third section of the questionnaire is on the availability and understanding of guarantee instruments in the market to support infrastructure projects. It sought to get information on the availability, accessibility, complexity, and understanding of the

instruments. Other areas covered included the cost of the instruments and their impact and rating implications, among others. The questions were measured on a 5-point Likert scale, with 5 representing either extremely important, adequate, complex, or extremely high impact on decision and 1 representing extremely less important, less adequate, less complex, or less impact on decisions.

Section four questions were specific on risks in Infrastructure investments, their identification, exposure, and mitigation. It had both closed and open-ended questions, with the closed-ended questions measured on a 5-point Likert scale, with 5 representing the highest deterring factor and 1 representing the lowest deterring factor. The opened- ended question requested the participant to provide additional comments, if any, and identify four major risks that affect their investment decisions to invest in Africa infrastructure and how guarantee solutions could help mitigate such risks for them.

Section 5 of the questions focused on suppliers of guarantee solutions in the market, the type of products they buy, and which products are important to users.

Section 6 of the questionnaire was a general question asking the participants to provide additional comments they felt might be relevant to the study.

4.8 Ethical Considerations and Approvals.

In accordance with the university's ethics compliance requirements, this study underwent an ethical review as outlined by the Henley Business School/University of Reading Research Ethics Committee. The necessary ethics approval form was signed off by the primary supervisor and subsequently approved by the university's ethics-approving authority. The ethics approval to commence data collection was received on

September 27, 2024, which paved the way for the data collection to commence. The survey was subsequently launched during the first week of October.

Participants of the survey confirmed their ages as 18 years or older and gave their consent for the responses to be used for the purposes of the research. They were informed that their responses are anonymous/confidential and that individual respondents will not be identified by name or organization in the final report. The data will be kept securely and either destroyed after the completion of the study or retained securely for inclusion in publications directly related to this research, subject to participants' consent to do so. They were also advised that they could decide on their own option to withdraw from the study at any time.

The survey questions were structured and properly reviewed to ensure that they were ethically grounded and fit for purpose. None of the questions, to the best of the researcher's knowledge, was inappropriate or had a semblance or reasonable expectation of causing any unpleasant easiness or distress to the participants. I confirm that all costs associated with this study were borne by the researcher. No external party provided financial support for the study.

4.9 Participant recruitment

Post Ethics clearance and pilot testing, the final version of the questionnaire was circulated to participants using both Google Forms and Microsoft Forms. The two were used to circulate the questionnaire because some of the respondents reported that their company system prevented them from opening the survey on Google. The surveys were sent via email or LinkedIn. Participation in the survey was voluntary and on an anonymous basis. However, participants who were interested in receiving copies

of the results voluntarily offered their contact details and requested that copies of the results be made available to them.

The participant composition for this study primarily consisted of senior officials and executives from a diverse array of sectors and regions involved in the infrastructure development and financing value chain. Key participants included infrastructure project developers, global construction companies (EPC contractors), institutional investors, infrastructure funds, export credit agencies (ECAs), development finance institutions (DFIs), bankers, and advisory firms that are actively engaged in the infrastructure sector. Additionally, the sample included insurance companies, brokers, operation and maintenance (O&M) contractors, equipment suppliers, and pertinent government agencies or departments that play a role in infrastructure initiatives (See section 5.1.7 for descriptive statistics of the main areas of respondents' activities).

By focusing on these critical players, the study aimed to capture a comprehensive understanding of the current landscape in infrastructure development and financing in Africa. Furthermore, the decision to engage primarily with executives and senior officials was based on their essential role in corporate decision-making processes. These leaders bring a wealth of experience and expertise, making their insights particularly valuable for the research. Their perspectives not only enhance our understanding of the complexities associated with infrastructure projects and the factors influencing risk mitigation buying decisions but also add significant depth to the overall findings.

Geographically, the sample was diverse, with participants drawn from multiple countries across Africa, Europe, Asia, and the Americas. (See Table 5.1 and section 5.1.1 for location and descriptive statistics of the sample.) Some of the UAE and UK respondents are subsidiaries, affiliates, and/ or regional offices of Chinese, Japanese,

Indian, and other Asian countries that cover their EMEA business from the UAE and the UK.

This wide-ranging perspective was facilitated through a survey questionnaire that was broadly distributed using contact information obtained from industry event platforms such as the Africa Investment Forum, Private Debt Investor (PDI), and TXF. This approach was crucial in identifying and reaching entities involved in infrastructure projects and investments, as these platforms regularly convene global stakeholders to discuss trends and developments in the industry.

It is important to note that project and infrastructure investments represent a niche within the finance industry, involving multiple stakeholders such as developers, contractors, lenders, advisors (such as lawyers, engineers, environmental experts, brokers), insurers, and institutional investors like fund managers. As a result, the range of suitable participants is inherently limited due to the nature of the market.

Despite this limitation, the researcher successfully identified a substantial number of potential participants operating within this niche. By utilizing the aforementioned industry event platforms, the researcher was able to pinpoint professionals whose activities are closely aligned with the unique context of the study. This targeted approach not only enriched the participant pool but also ensured that the research outcomes accurately reflect the realities of corporate decision-making regarding guarantee solutions and the dynamics of infrastructure development and financing in Africa.

The questionnaire was launched in the first week of October 2024 and closed at the end of the second week of December. It was circulated to 250 participants. Reminders were sent out via email, followed by personal calls where possible. To give the

participants enough time to complete the survey, a 10-week completion period was allowed, i.e., the survey was kept open from the launch date until the end of the second week of December, when it was finally closed. Overall, 83 participants completed the survey questionnaire, representing a response rate of 33.2%.

4.10 Survey Characteristics and Compensating for Missing Data

The 33.2% response rate was encouraging, given the respondents' busy schedule and the survey timing, which was the beginning of the fourth quarter of the year, when most entities were busy finalizing their budgets and programs for next year and end-of-year activities. Some were also extremely busy trying to close deals during that period and had little time to attend to the survey. Most of the participants invited were among the key decision-makers of their firms.

In reviewing the responses, we identified one item nonresponse. Some respondents did not respond to that item, which was on the question “completion risk.” To compensate for this categorical missing data, we followed Memon et al. (2023), Brick and Kalton (1996), and Kalton and Kasprzyk (1986).

Several methods exist to compensate for categorical missing data, such as Mode Imputation, Sequential Hot Deck (SHD Imputation, Multiple Imputation using Chained equations (MICE), and K-Nearest Neighbor Imputation (KNN Imputation). However, for Mode imputation and SHD Imputation to respond appropriately, both require data to be Missing Completely at Random (MCAR). Data is said to be MCAR when the probability of missing depends neither on observed nor on missing data, and is the same for all cases. Our data was not MCAR, hence the two methods do not suffice.

Multiple Imputation using Chained equations (MICE) also has the challenge of yielding several plausible values per missing value, which differs from our goal of seeking a

singular value. In addition, MICE loses its efficiency with increased categorical variables.

K-Nearest Neighbor imputation (KNN imputation) was the best option for meeting our requirements. This is because KNN Imputation imputes a singular value and has the highest accuracy in predicting missing values in categorical data (Memon et al., 2023). We, therefore, imputed for the missing data using KNN imputation. The KNN imputation exercise was based on participants with matching characteristics, such as country, main areas of activity, and respondent title. With KNN Imputation, the K neighbors (cases) that are most similar to the case with the missing value are selected, and the corresponding value is imputed in the missing value.

4.11 Methods Used for the Data Analysis

4.11.1 Exploratory Factor Analysis

We conducted an Exploratory Factor Analysis (EFA) to determine the factor scores for each of the potential drivers of guarantee demand discussed in our hypotheses. EFA is a statistical methodology used for dimensionality reduction, which allows us to condense numerous survey variables into a smaller number of factors. This helps clarify and interpret the results. The primary goal is to summarize the data by explaining a large number of observed variables in terms of a smaller set of latent variables (factors). These factors represent the underlying reasons for the observed correlations among the variables.

Below is an analytical representation of the general EFA model, as adopted from Braun, Müller, and Schmeiser (2013). (see also Woods and Edwards, 2007; Jöreskog,1967)

$$X = \Lambda\xi + \delta \quad (1)$$

Where X is the vector of observed variables, Λ the factor loadings matrix, ξ is the vector of latent variables (factors), and δ vector of unique factors. One can then derive the covariance matrix $\sum$ implied by the model

$$\Sigma = \Lambda\phi\Lambda' + \Psi_\delta \quad (2)$$

With ϕ being the covariance matrix of the factors and Ψ_δ denoting the covariance matrix of the residuals.

For an EFA to be conducted, assumptions on sufficient sample size, outliers, linearity, and data normality must be met. To test for the appropriateness of the factor analysis, we tested for sampling adequacy using the Kaiser-Meyer-Olkin measure (KMO), and Bartlett's test of sphericity. We also performed the Kolmogorov-Smirnov (K-S) test, the Shapiro–Wilk test, and the Henze–Wirkler test for the normality of the data (see section 5.2 for the test outcome).

We generated a scree plot to guide the number of factors to be selected (see Figure 5.11). The scree plot is a two-dimensional graph with factors on the x-axis and eigenvalues on the y-axis. Eigenvalues are produced by a process called Principal Components Analysis (PCA) and represent the variance accounted for by each underlying factor.

The next step is to derive the Factor loadings. The type of extraction method used to derive the factor loading is a function of the outcome of the normality test described above. Factor loading is a matrix of how observed variables are related to the factors selected. They provide the basis for interpreting the latent variables. Higher loadings mean that the observed variable is more strongly related to the factor, which is used to estimate a logistic regression model.

Based on the derived factor loadings, we can compute factor score estimates $\hat{\xi}$ which represents the determinants of guarantee/insurance buying decisions in further analysis, in our case, the regression method, which uses the sample covariance matrix $\hat{\Sigma}$ and the estimated factor loadings matrix Λ is as follows:

$$\hat{\xi} = \hat{\Lambda}'\hat{\Sigma}^{-1}\mathrm{X} \quad (3)$$

4.11.2 Logistic Regression Model

Based on the factor scores from the EFA, we estimated a logistic regression model. Logistic regression also called a logit model, is used to model dichotomous outcome variables, that is, one that takes on only two values: one and zero. In our case, the buyers vs. non-buyers of guarantees/insurance. In the logit model, the log odds of the outcome are modeled as a linear combination of the predictor variables, which, in our case, is derived from the EFA.

Generally, logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables.

We used the logistic regression model over the linear regression model since the survey data collected did not meet assumptions for linear regression. Linear regression is based on an assumption that the outcome variable Y is continuous, with errors that are normally distributed. Our outcome variable being dichotomous means that these assumptions are violated. Additionally, for a binary outcome, as in our case, the mean is the probability of a 1, using a linear regression to model this, it is possible to have predicted values for some respondents outside of the (0,1) range.

Logistic regression solves these problems by applying the logit transformation to the dependent variable. The simple logistic model has the form

$$logit\ (Y) = natural\log(odds) = \ln\frac{\pi}{1-\pi} = \alpha + \beta X \qquad (4)$$

Taking antilog of equation 1 on both sides, we can derive an equation to predict the probability of the occurrence as below

$$\pi = \frac{e^{\alpha+\beta x}}{1+ e^{\alpha+ \beta x}} \qquad (5)$$

Where π is the probability of the outcome of interest (in our case, buying guarantee solution), α is the Y-intercept, is the regression coefficient, and e = 2.71828 is the base of the system of natural logarithms. X can be categorical or continuous (in our case, it is categorical). The value of the coefficient β determines the direction of the relationship between X and the logit of Y. When β is greater than zero, larger (or smaller) X values are associated with larger (or smaller) logits of Y. Conversely if β is less than zero, larger (or smaller) X values are associated with smaller (or larger) logits of Y.

This can be extended to multiple predictors as follows:

$$\pi = \frac{e^{\alpha+\beta ixi}}{1+ e^{\alpha+ \beta ixi}} \qquad (6)$$

Where $\beta_i x_i = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots\ldots$

5 Empirical Results

5.0 Introduction

This section presents the study's data analysis and findings. It starts with a brief explanation of the sample's descriptive statistics to help give a complete picture of the sample analyzed. This is followed by results obtained from the Exploratory Factor Analysis (EFA). The factors obtained from the EFA were used to test the hypotheses using a logistic regression model. Details of the logistic regression model results continued after the EFA results.

5.1 Descriptive statistics

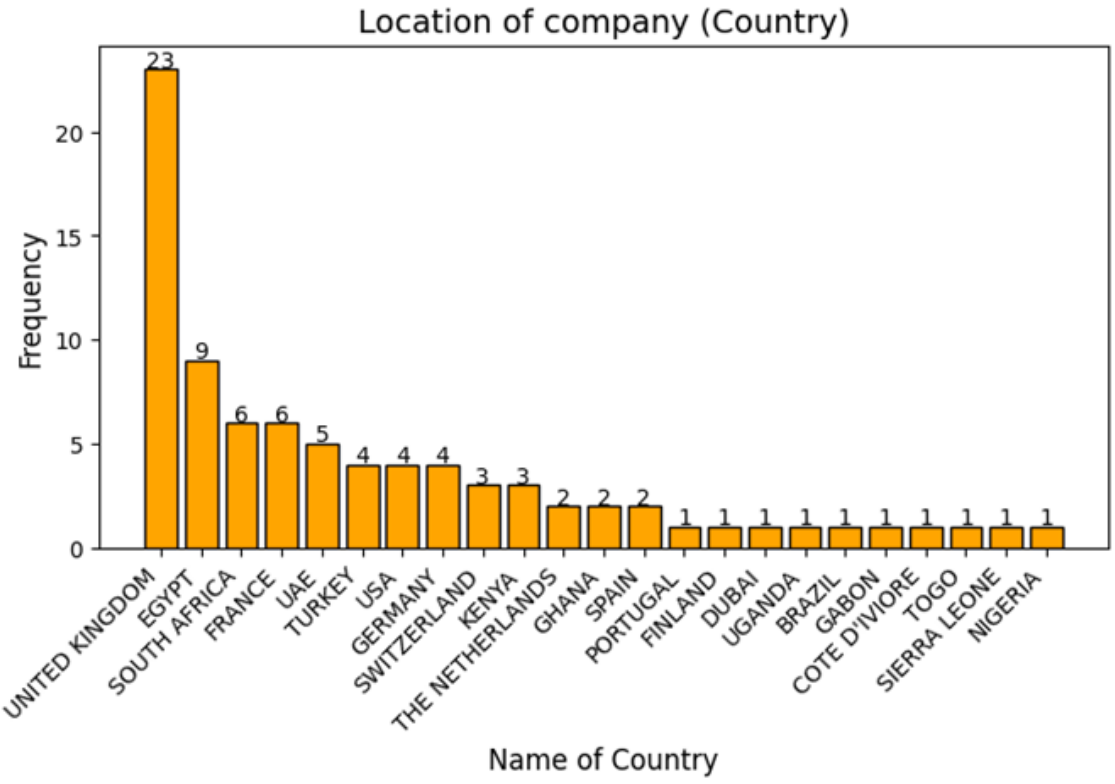
This section presents various descriptive statistics to characterize the sample's composition. Table 5.1 below provides a complete overview of the survey's sample size. It shows the breakdown of respondents by company location (country), respondent's title/role, company turnover, company type (private or public), whether they have been investing in infrastructure business in Africa, and the company's main activity area. Other areas covered in the survey include the type of guarantee solution the respondents buy, the risks they seek to cover, and the type of suppliers they source/buy their guarantee solutions from.

5.1.1 Location of Respondents

Regarding location, respondents' companies were spread across 23 countries. The most significant proportion, 28%, had their companies based in the United Kingdom, followed by Egypt 10.8%, with South Africa and France accounting for 7.2% each, and the UAE

accounting for 6% of the respondents. This split of the sample respondents' location tracks the infrastructure trade flows to Africa well, as most global international banks and insurance entities are based in London. French entities are also very active in the francophone African countries. Dominant countries in Africa active in infrastructure development are Egypt and South Africa. UAE is emerging as an infrastructure investor in Africa. The remaining countries accounted for 5% or less of the respondents. Figure 5.1 below shows the graphical presentation of the respondents' country of location.

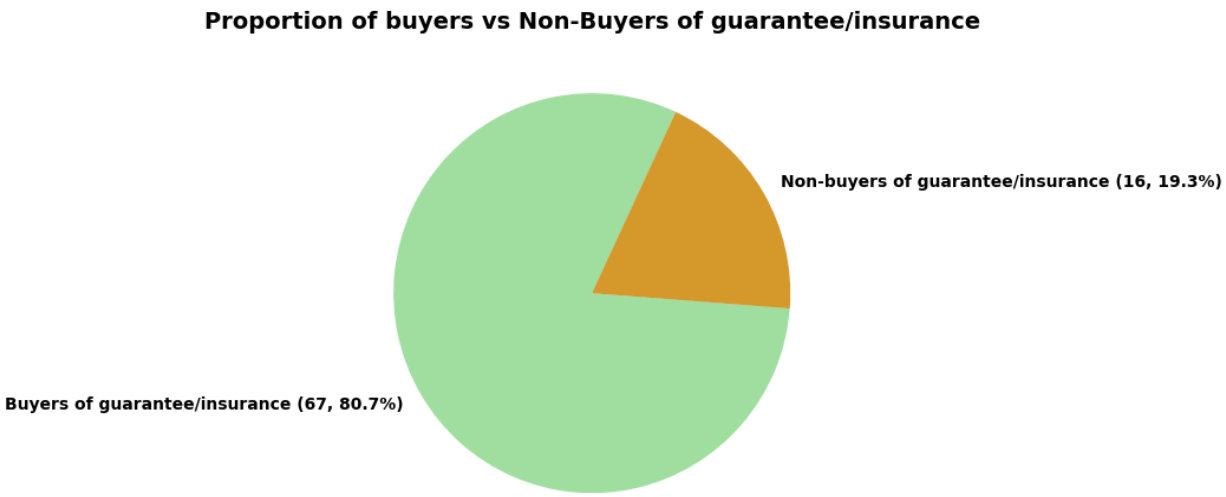
Figure 5.1 - Distribution of the Respondents' Country of Location



5.1.2 Buyers and Non-buyers of Guarantee

The respondents' responses regarding purchasing guarantees as a risk mitigation solution to support their business were split between those who purchase guarantees and those who do not. 80.7% of the respondents reported being guarantee buyers, and 19.3% represented non-guarantee buyers. The buyers see guarantees as a critical enabler for their business in Africa. The respondents indicated that investing in Africa's infrastructure is a challenge without some form of risk mitigation. Figure 5.2 depicts the graphical distribution of buyers vs. non-buyers of guarantees.

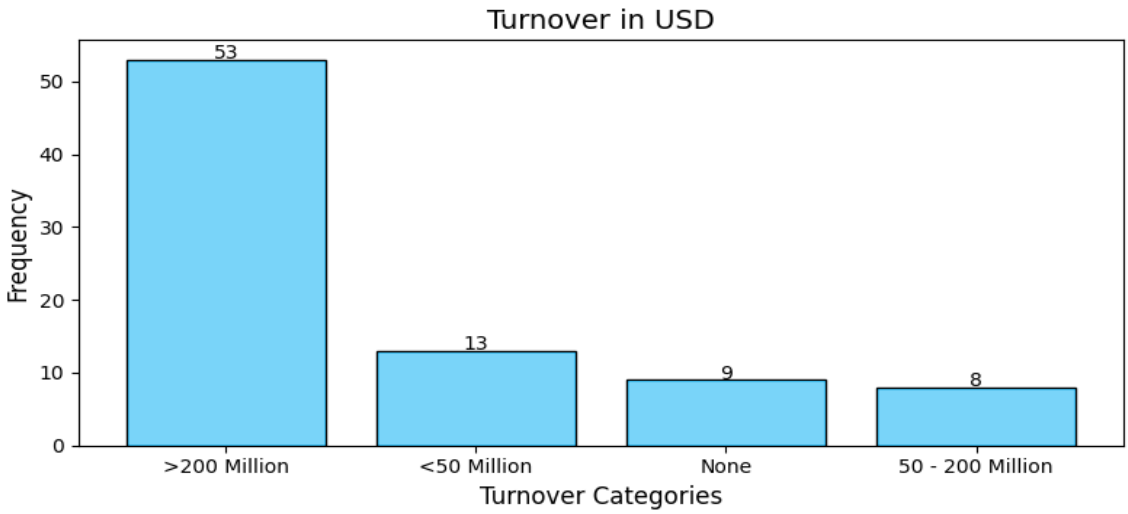
Figure 5.2 - Distribution of buyers and non-buyers



5.1.3 Respondents Turnover

Most of the respondent entities were fairly large. 63% of the respondents reported that their company’s turnover is over USD200 million. Please see Figure 5.3 below for the graphical breakdown of the company turnover.

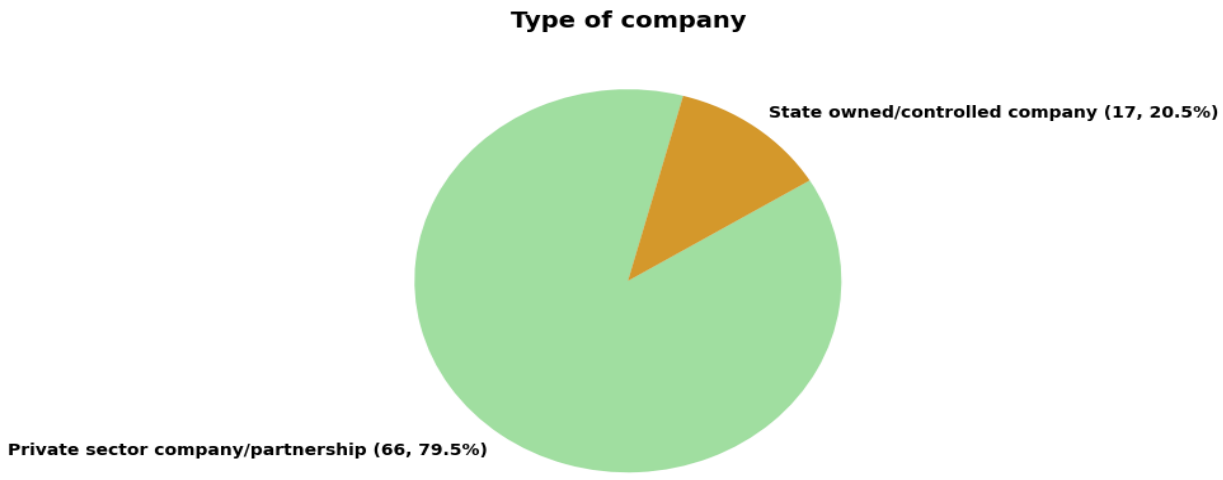
Figure 5.3 - Distribution by company turnover



5.1.4 Private versus Public Company

A large majority, 66 (78%) of the companies, identified as private sector companies/partnerships, and 28% identified themselves as public entities. The split is a good reflection of the players in the infrastructure financing industry. The financiers, risk solution providers, and construction /project developers are mainly private sector entities.

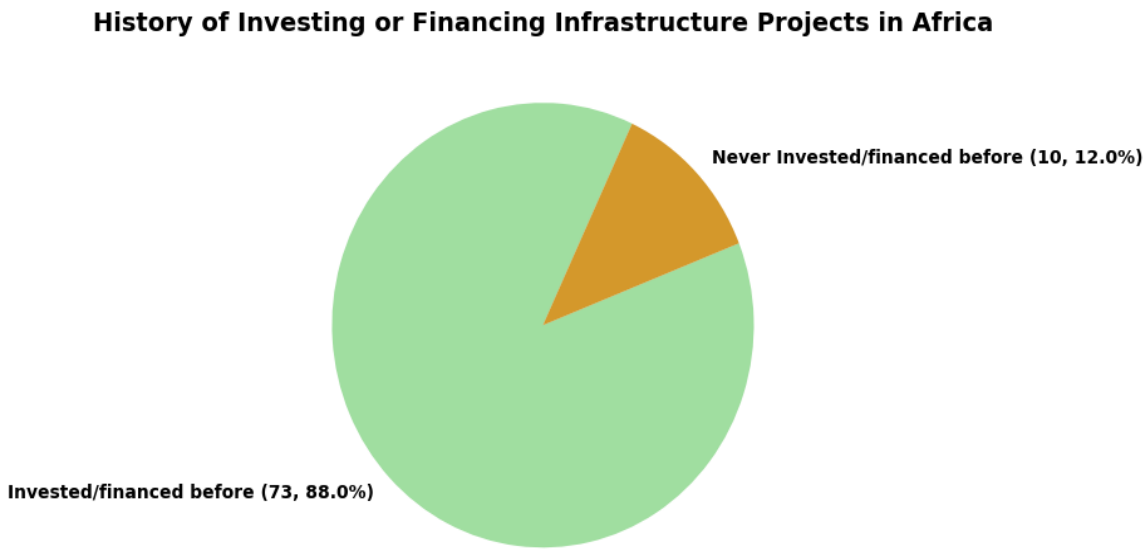
Figure 5.4 - Distribution of Private and State-owned/Controlled Entities



5.1.5 Invested in /or Financed Infrastructure Projects in Africa

Regarding experience in doing business in Africa, 73 (88%) respondents had previously invested in or financed infrastructure projects in Africa, with 27% reporting no experience in Africa.

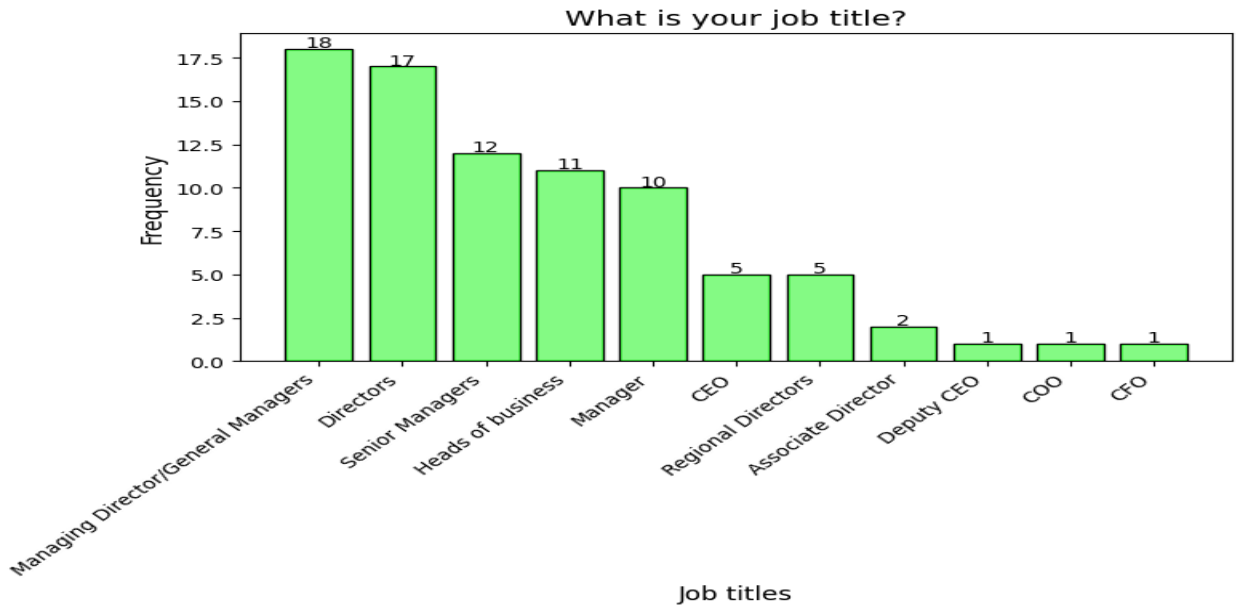
Figure 5.5 - Invested in /or Financed Infrastructure Projects in Africa



5.1.6 Job Hierarchy of Respondents

Most respondents were executives and senior officials of their respective organizations, including CEOs of their entities. Of the respondents, 6% were CEOs, 22% were at the Managing Director/General Manager level, 21% were at the Director level,14% were Senior Managers, and 13% were Heads of Business. Others, such as Managers and Regional Directors, were 12% and 6% respectively. The fewest were the Associate Director, 2.4%; the Deputy CEO, COO, and CFO, each at 1.2%; and only 1 respondent.

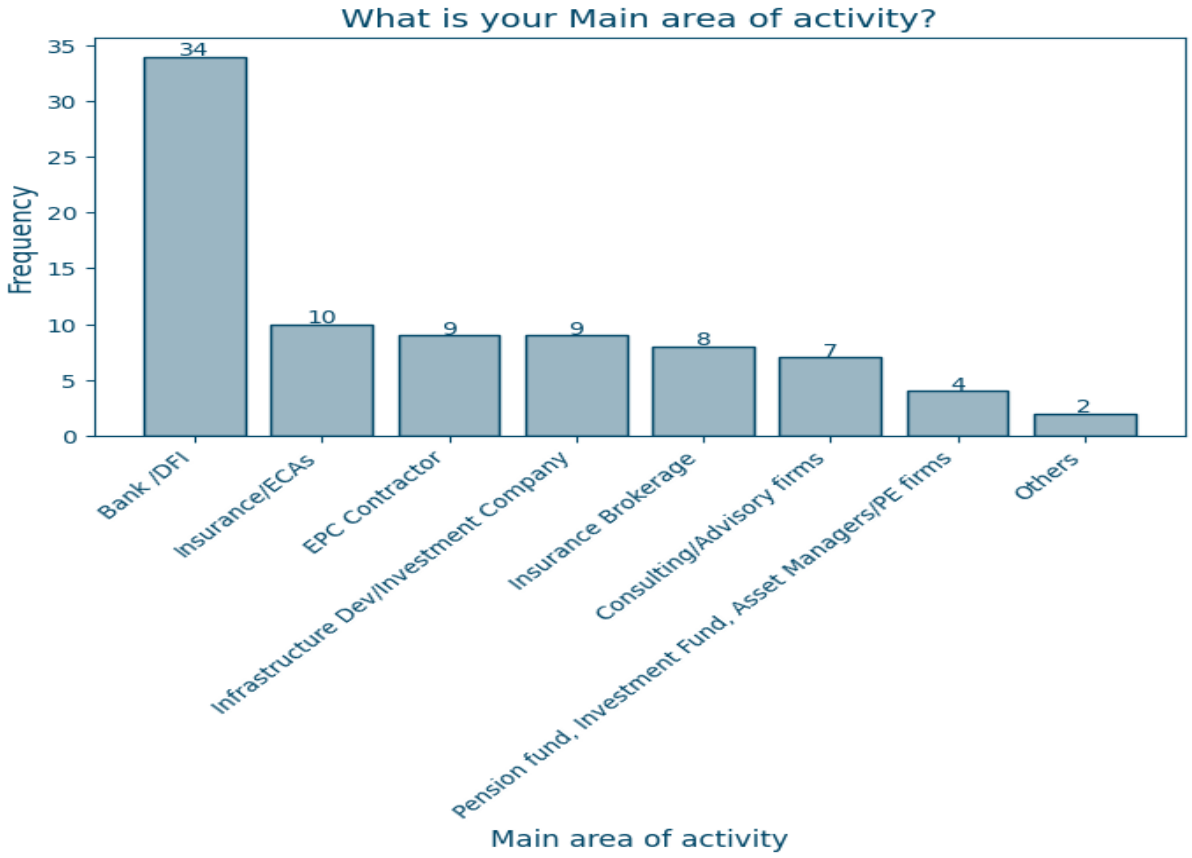
Figure 5.6 - Respondents Job Title



5.1.7 Main Areas of Respondent's Activities

The respondents came from entities actively involved in infrastructure investment/ development and suppliers of infrastructure development services, including advisers, financiers, and risk mitigation providers. Most respondents were Banks/DFIs, accounting for 41%, followed by Insurance / Export Credit Agencies (ECAs) and EPC Contractors, accounting for 12% and 10.8%, respectively. This implies that banks and ECAs are Africa's major infrastructure project financiers. The others were infrastructure investment companies (10.8%), advisory firms (8.4%), institutional investors (4.8%), and others (2.4%). Figure 5.7 depicts a graphical presentation of the respondent's areas of activity. Overall the sample covers the critical industry players involved in the development, and financing/investment in infrastructure activities.

Figure 5.7 - Main Areas of Activities

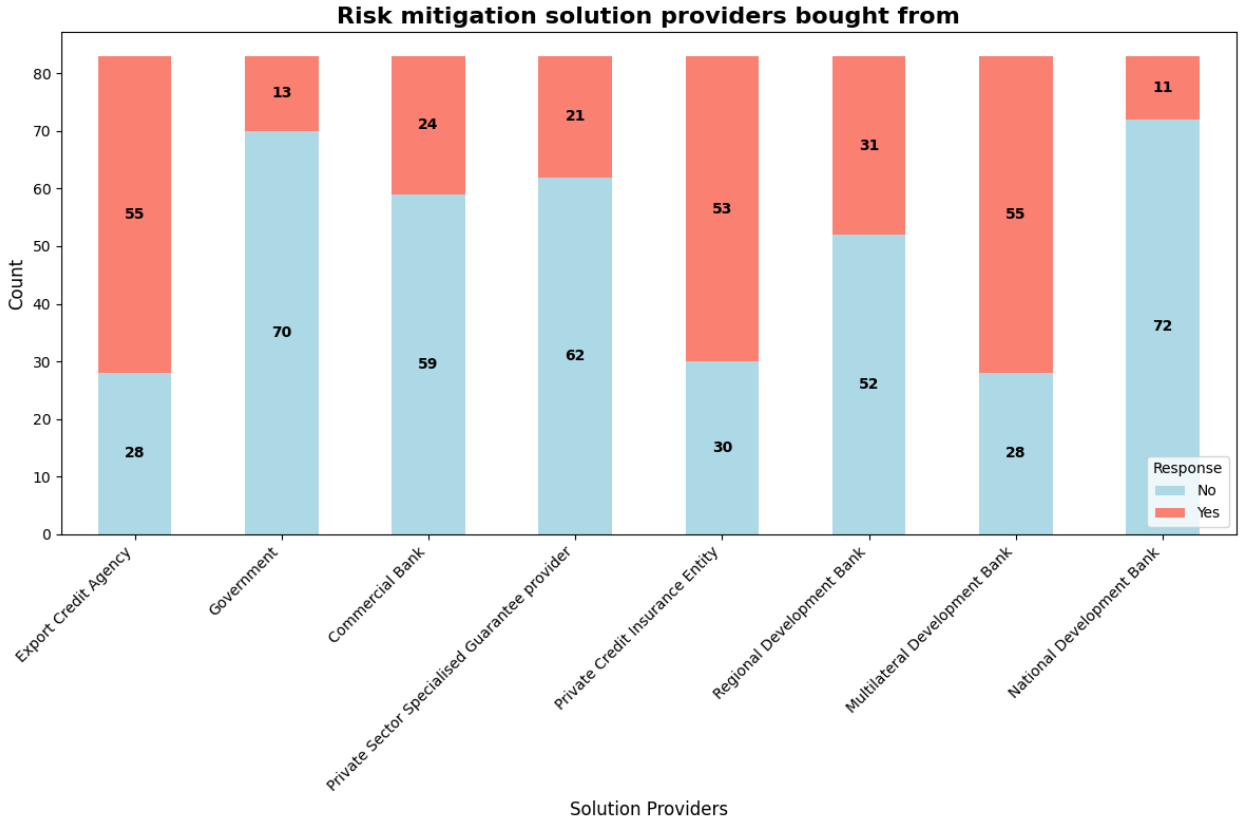


5.1.8 Suppliers of Risk Mitigation Solutions (Guarantee/ Insurance)

The respondents reported that they source their guarantee solutions from Export Credit Agencies (ECAs), Multilateral Development Banks(MDBs), Regional Development Finance Institutions (Regional DFIs), private credit and political risk insurance markets, national development banks, specialized guarantee institutions, commercial banks, and governments. 55 of the respondents reported that they use the ECA guarantee and that of the MDB guarantee solutions for their infrastructure projects. The Regional DFIs accounted for 31 of the respondents. This implies that officially supported entities and agencies like ECAs, DFIs, and MDBs play significant roles in facilitating infrastructure

investments. Another industry whose role is worthy of mention is the private insurance market. 53 respondents reported using Private Credit and Political Insurance Markets as sources for their risk mitigation solutions. This is followed by Regional DFIs accounting for 31 of the respondents. The rest were commercial banks(24 said yes), national development banks (11 said yes), and government guarantees 13 said yes.

Figure 5.8 - Risk Mitigation Solution Providers

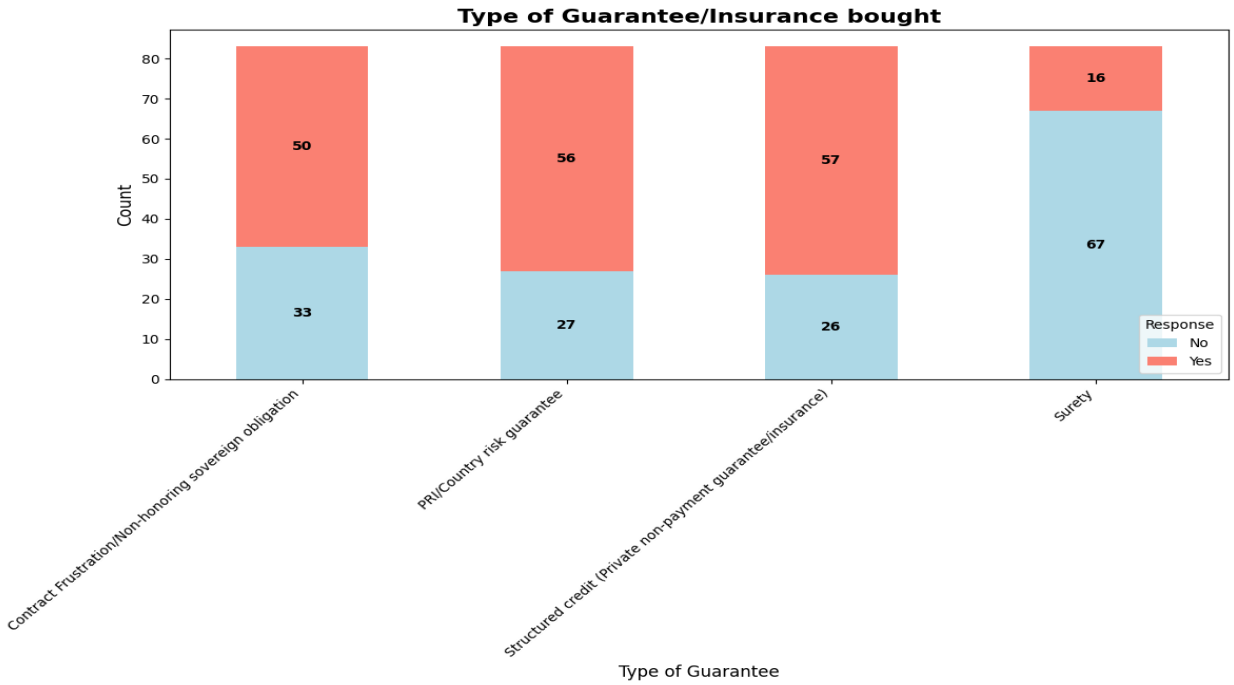


5.1.9 Type of Guarantee/Insurance Purchased

Among the types of guarantee instruments purchased, 58 respondents indicated that they buy non-honoring sovereign obligation guarantees (Contract Frustration Insurance), 56 respondents buy Country Risk Guarantees (Political Risk Insurance), and 57 respondents

buy non-payment guarantees for private sector risk (Structured Credit Insurance). Only 11 of the 83 respondents mentioned buying bonding facilities (Surety Cover).

Figure 5.9 - Type of guarantee instruments purchased



5.1.10 Types of Risks Covered

When asked which type of risks they purchase the guarantee solutions for, 72 respondents indicated that they buy the guarantee solutions mainly to cover commercial risks. 64 of the respondents also mentioned that they buy the guarantee solutions to cover political risks. Figure 5.10 depicts the graphical presentation of the kind of risks the respondents purchase guarantee /insurance to cover.

Figure 5.10 - Kind of Risk covered

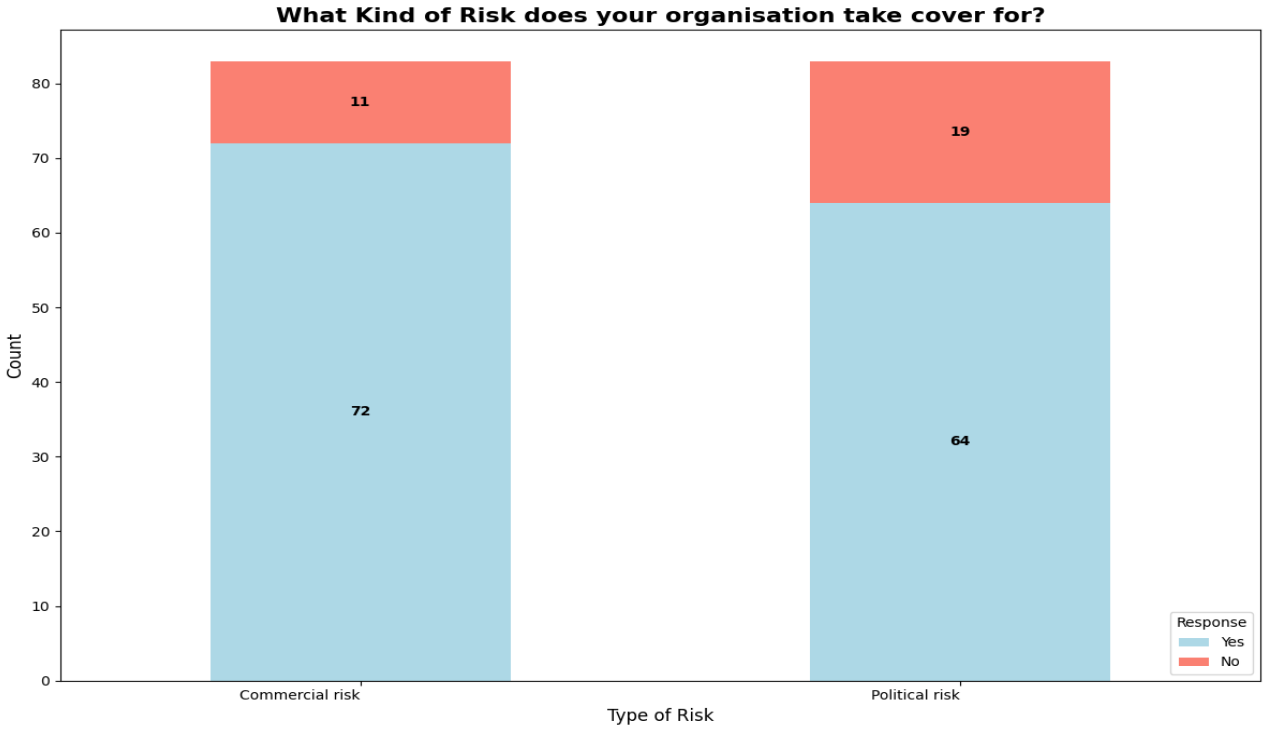


Table 5.1 below shows a summary of the sample composition as described above.

Table 5.1: Sample Composition

Variable	Overall (N = 83)		Buyers (n = 67)		Non Buyers (n = 16)	
Country	No	Per Cent	No	Per Cent	No	Per Cent
BRAZIL	1	1.2	1	1.5	0	0
COTE D'IVIORE	1	1.2	1	1.5	0	0
DUBAI	1	1.2	1	1.5	0	0
EGYPT	9	10.8	8	11.9	1	7.7
FINLAND	1	1.2	1	1.5	0	0
FRANCE	6	7.2	2	3.0	2	15.4
GABON	1	1.2	1	1.5	0	0
GERMANY	4	4.8	3	4.5	1	7.7
GHANA	2	2.4	2	3.0	0	0
KENYA	3	3.6	1	1.5	2	15.4
NIGERIA	1	1.2	1	1.5	0	0
PORTUGAL	1	1.2	1	1.5	0	0
SIERRA LEONE	1	1.2	1	1.5	0	0
SOUTH AFRICA	6	7.2	5	7.5	1	7.7
SPAIN	2	2.4	2	3.0	0	0
SWITZERLAND	3	3.6	3	4.5	0	0
THE NETHERLANDS	2	2.4	2	3.0	0	0
TOGO	1	1.2	1	1.5	0	0

TURKEY	4	4.8	4	6.0	0	0
UAE	5	6.0	5	7.5	0	0
UGANDA	1	1.2	1	1.5	0	0
UNITED KINGDOM	23	27.7	18	26.9	4	30.8
USA	4	4.8	2	3.0	2	15.4
What Is your Title?						
Associate Director	2	2.4	2	12.5	0	0
Directors	17	20.5	1	6.2	16	23.9
Heads of business	11	13.3	2	12.5	9	13.4
Manager	10	12.0	1	6.2	9	13.4
Managing Director/General Managers	18	21.7	5	31.2	13	19.4
Senior Managers	12	14.5	5	31.2	7	10.4
CEO	5	6.0	0	0	5	7.5
CFO	1	1.2	0	0	1	1.5
COO	1	1.2	0	0	1	1.5
Deputy CEO	1	1.2	0	0	1	1.5
Regional Directors	5	6.0	0	0	5	7.5
Turnover in USD						
50 - 200 Million	8	9.6	6	9.0	2	12.5
<50 Million	13	15.7	10	14.9	3	18.8
>200 Million	52	62.7	42	62.7	10	62.5
Did not Disclose	10	12.0	9	13.4	1	6.2

Are you a:						
Private sector company/partnership	66	79.5	52	77.6	14	87.5
State owned/controlled company	17	20.5	15	22.4	2	12.5
Have you been involved in investing or financing infrastructure projects in Africa before?						
Yes	73	88.0	60	89.6	13	81.2
No	10	12.0	7	10.4	3	18.8
Main Area of activity						
Bank /DFI	34	41.0	30	44.8	4	25.0
Consulting/Advisory firms	7	8.4	4	6.0	3	18.8
EPC Contractor	9	10.8	8	11.9	1	6.2
Insurance Brokerage	8	9.6	2	3.0	6	37.5
Insurance/ECAs	10	12.0	8	11.9	2	12.5
Infrastructure Dev/Investment Company	9	10.8	9	13.4	0	0
Pension fund, Investment Fund, Asset Managers / Private Equity firms	4	4.8	4	6.0	0	0
Others	2	2.4	2	3.0	0	0

Note: This table displays the composition of the sample of 83 respondents who participated in our survey. The data, grouped by buyers and non-buyers, are categorized by country of origin, Turnover, the respondent's title, history of investing/financing in Africa, the main area of activity, and whether the company is private or public. Buyers are those who responded that they buy risk mitigation solutions to support their business.

Table 5.2 Risk Coverage and Suppliers amongst buyers

	Yes		No	
	n	per cent	n	per cent
Which risk mitigation solution providers do you buy from?				
Solution provider: Export Credit Agency	47	70.15%	20	29.85%
Solution provider: Government	13	19.40%	54	80.60%
Solution provider: Commercial Bank	22	32.84%	45	67.16%
Solution provider: Private Sector Specialised Guarantee provider	16	23.88%	51	76.12%
Solution provider: Private Credit Insurance Entity	47	70.15%	20	29.85%
Solution provider: Regional Development Bank	27	40.30%	40	59.70%
Solution provider: Multilateral Development Bank	49	73.13%	18	26.87%
Solution provider: National Development Bank	8	11.94%	59	88.06%
What kind of risks does your organization take out cover for?				
Risk type: Commercial risk	60	89.55%	7	10.45%
Risk type: Political risk	53	79.10%	14	20.90%
What kind of guarantee does your organization buy?				

Guarantee kind: Contract Frustration/Non-honoring sovereign obligation	40	59.70%	27	40.30%
Guarantee kind: PRI/Country risk guarantee	45	67.16%	22	32.84%
Guarantee kind: Structured credit (Private non-payment guarantee/insurance)	46	68.66%	21	31.34%
Guarantee kind: Surety	11	16.42%	56	83.58%

Note: This table breaks down risk coverage and suppliers amongst only buyers, by the providers, risk type, and kind of guarantee purchase

5.2 Results of Exploratory Factor Analysis

Before estimating the logistic regression model, we conduct an EFA to extract a set of latent constructs from the observed variables in our sample. To assess whether the data is suitable for EFA, we first calculated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. KMO returns values between 0 and 1. The KMO values between 0.8 and 1.0 indicate that the sample is well-suited for the methodology. Values between 0.6 and 0.8 are good, while small KMO values below 0.6 indicate that the sampling is inadequate. If the value is below 0.5, the results of the EFA will not be suitable(Kaiser,1974). We utilized the KMO measure to determine whether the variables in our sample were sufficient for EFA. Following an iterative process, variables with KMO value < 0.5 were dropped, thus dropping 12 out of 48 variables to get to 36 with an overall KMO score of 0.72, indicating an acceptable result (Shrestha,2021).

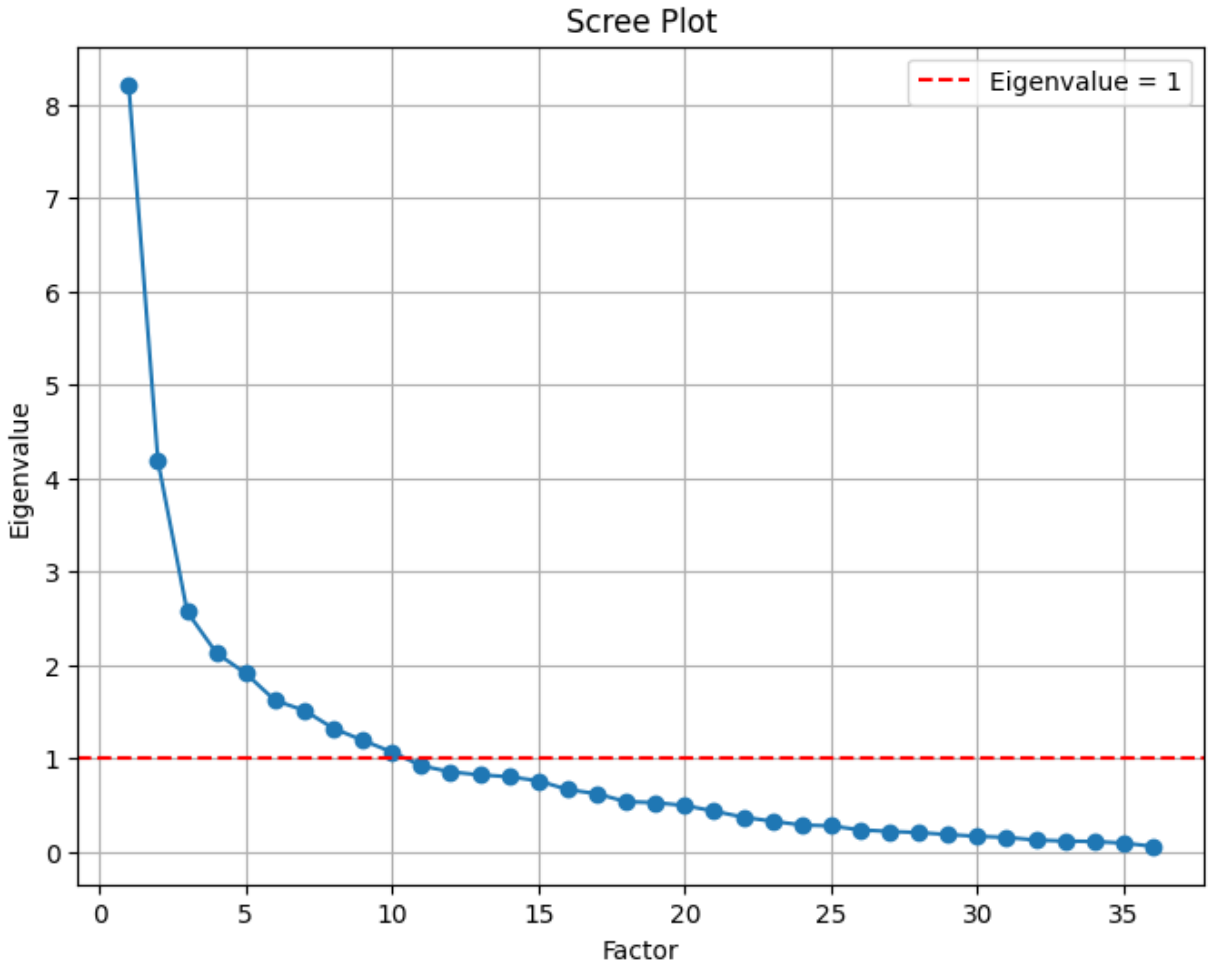
Additionally, we performed Bartlett's test of sphericity to ensure that the correlation matrix differs significantly from an identity matrix (Snedecor & Cochran, 1994). The results being a χ^2 The test statistic of 1,648, with 630 degrees of freedom and a p-value of 0.00, implies that the correlation matrix is not an identity matrix. The KMO value and Bartlett's test indicate that EFA can be run on the sample.

Next, we did a test for normality, with each variable tested separately using the Kolmogorov-Smirnov goodness of fit test and the Shapiro-Wilk W test. Both the tests reject the null hypothesis of normality across all variables. We further tested for multivariate normality using the Henze-Zirkler test, which yielded an H-Z test statistic of 1.01 and a p-value of <0.05. Hence, we also reject the hypothesis of multivariate normality. The

respective results confirm the non-normality of the data; hence, factor extraction was done using the minimum residuals extraction method (minres); results using Maximum Likelihood Estimation (MLE), however, were similar.

The Kaiser criterion suggests only using factors whose eigenvalue is greater than 1. As visualized in the scree plot (Figure 5.11), 10 factors can be selected. The factor structure is rotated using the varimax approach.

Figure 5.11 - Scree Plot Showing Eigenvalues



However, as inferred from the rotated factor matrix, we decided to favor a six-factor model compatible with our hypotheses. The VSS criterion reaches a value of 0.57 for the 1st 6 factors, and Velicer's Minimum Average Partial (MAP) criterion reaches a minimum of 0.02 for 6 factors. In summary, the factors selected account for more than 57% of the variation in the data, with all factors having high values for Cronbach's α, indicating that the six factors selected are well-suited to describe our data.

In summary, our factor structure can be interpreted as follows

- Factor 1: Perception of country risk (Hypothesis 6)
- Factor 2: Infrastructure project's upstream risks (Hypothesis 3a)
- Factor 3: Operating Environment Uncertainty (Hypothesis 3b)
- Factor 4: Uncertain revenue/cashflows due to country and project-specific concerns (Hypothesis 2)
- Factor 5: Knowledge, understanding, relationship and expertise of advisors (Hypothesis 5)
- Factor 6: Perceived left-tail risk of the project (Hypothesis 1)

Table 5.3 Rotated factor loadings matrix

The results of the EFA are displayed in Table 5.3 below.

Table 5.3: Rotated factor loadings matrix

	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*	*Factor 6*
Availability of guarantee/ risk mitigation products						0.617
Credit Rating of the guarantee/ risk mitigation solution provider						0.420
Demand rationale category: Internal Investment requirements						0.515
Construction Risk category:						
Licensing/Permits						0.463
Logistics & Procurement issues		0.423				0.418
Cost overrun		0.409				
Performance		0.616				
Engineering		0.674				
EPC Contractor		0.585				
Change of control/ transition risk		0.636				
Completion certification (inadequate performance and delay)		0.698				
Engineering		0.724				
Logistics & Assembly issues		0.446				
Operational Risk category:						
Technology & change of standards		0.413			0.669	
Operation and maintenance including local experience					0.632	
Supply of throughput (including cost)					0.724	
Off take (including demand/user risk)					0.626	
Construction Risk category: Insolvency				0.738		
Operational Risk category: Insolvency				0.543		
Completion Risk category: Insolvency				0.521		
Operational Risk category:						
Refinancing Risk			0.600			
Payment (billing & collection)			0.448			
Country risk events			0.489			

Commercial, Political and Country Risk category:						
Interest rate risk			0.682			
Exchange rate risk			0.760			
Inflation risk			0.664			
Non-Payment risk	0.438		0.526			
Change of law	0.467					
Expropriation (All forced government action/hostilities)	0.833					
War and civil disturbances	0.721					
Forced Abandonment	0.858					
Eigenvalues	8.21	4.18	2.57	2.13	1.91	1.62
Explained variance (%)	22.81	11.61	7.13	5.9	5.29	4.49
Cumulative Explained variance (%)	22.81	34.42	41.55	47.45	52.74	57.23
Cronbach's alpha	0.88	0.84	0.85	0.74	0.8	0.68

Note: The items were measured using a 5-point Likert scale. KMO measure of sampling adequacy: 0.72. Bartlett's test of sphericity: χ^2 test statistic of 1,648 with 630 degrees of freedom and a p-value of 0.00, Extraction method: minimum residuals (minres). Rotation method: varimax. Dimensionality: 6 factors determined according to the Kaiser criterion. To better display the results of EFA to the reader, factor loadings below 0.4 have been suppressed. Cronbach's alpha represents the internal consistency of each item battery. The negative factor loadings imply that there is an inverse relationship between the observed variable and the factor. In other words, as the factor increases, the observed variable tends to decrease, and vice versa. This inverse relationship can be interpreted as the observed variable measuring the factor in the opposite direction. Factor reliability: Tucker Lewis Index = 0.744

5.3 Results of the Logistic Regression Analysis

The EFA output assisted in testing 5 of the 6 hypotheses within a logistic regression model.

To control for the remaining potential determinants, a dummy variable was coded for Regulated Institutions (Bank/DFI, Pension fund, Investment Fund, Asset Managers/PE firms, Insurance/ECAs) to cater to hypothesis 4.

The logistic regression results are presented in Table 5.4; we observe statistically significant positive coefficients for the predictors, uncertain revenue/cashflows due to country and project-specific concerns, Infrastructure project's upstream risks, and regulated institutions. These results confirm hypotheses 2, 3, and 4. The coefficients of the rest of the factors are not statistically significant and, therefore, do not seem to be relevant drivers for purchasing decisions of guarantees/risk mitigation solutions.

The Likelihood ratio test for the model, which tests whether the model is statistically significant, has a p-value of 0.036, implying that the model is significant. We also perform the Hosmer-Lemeshow (HL) test, designed to assess the goodness of fit for models with dichotomous response variables. We failed to reject the null hypothesis based on the HL value with a p-value of 0.987, hence, confirming that the model fits the data well. We also consider the pseudo R2 measures (Cox and Snell, MacFadden and Nagelkerke) and present a classification table indicating an acceptable model fit. The classification table shows that our model correctly predicts 97% of the buyers of guarantees, 19 per cent of non-buyers, and overall, 82% of all responses in the sample whilst the pseudo R2 measures (Cox and Snell, Nagelkerke and McFadden) indicate an acceptable model fit.

Table 5.4: Logistic regression results, including all potential drivers

	β	Exp (b)	s.e	Wald	p-value
Constant	0.9639	2.6216	0.437	4.867	0.027
Perception of country risk	-0.1044	0.9009	0.307	0.116	0.734
Infrastructure project's upstream risks	0.7368	2.0593	0.336	4.807	0.028**
Operating Environment uncertainty	0.1957	1.2161	0.329	0.354	0.552
Uncertain revenue/cashflows due to country and project-specific concerns	0.7969	2.2186	0.351	5.150	0.023**
Knowledge, understanding, relationship and expertise of advisors	0.0457	1.0468	0.327	0.019	0.889
Perceived left-tail risk of the project	-0.1152	0.8913	0.381	0.091	0.763
Regulated institutions	1.4493	4.2604	0.677	4.577	0.0324**
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	66.768				
$-2LL_m$ (Considered model)	81.375				
LLR (Likelihood Ratio Test)	14.607		7		0.041**
Hosmer-Lemeshow Test	1.7863		8		0.9869
Pseudo R2 measure					value
Cox and Snell					0.179
Nagelkerke					0.258
McFadden					0.161

Note: Results of the logistic regression analysis indicate how each predictor variable influences the logit through its coefficient (Coef). The term "d.f." refers to the degrees of freedom in the distribution. The likelihood ratio (LR) tests the null hypothesis that all logit coefficients in the model are equal to zero. The Hosmer–Lemeshow (HL) statistic assesses the null hypothesis that the observed event rates do not differ from the predicted rates in each category of the dependent variable. Pseudo R^2 measures range from 0 to 1, with values above 0.200 indicating acceptable results, and values above 0.400 indicating a good model fit. The asterisk denotes the significance level: **5%

Table 5.5: Classification table for the model with all potential drivers/determinants

Observed	Predicted		
	Buyers of guarantees/Insurance	**Non-buyers of guarantees/Insurance**	**% Correct**
Buyers of guarantees/Insurance	65	2	97
Non-buyers of guarantees/Insurance	13	3	19
Overall			82

Note: The classification table is utilized to assess the predictive accuracy of the logistic regression model from Table 5.4. The figures are derived by rounding the probability of buying to a zero-digit number. Hence, when the probability of buying stays strictly below 0.500, a firm is considered a non-buyer of guarantee/insurance.

In Table 5.6, we present the results of a second logistic regression model in which we have removed all independent variables that did not exhibit a statistically significant logit coefficient in the 1st model. In this model, all the variables that were significant in the model with all variables retain statistical significance and have a similar impact on the probability of buying guarantees. The classification table of the second model has a reduced accuracy of 80%, with the model correctly predicting 97% of the buyers and 6% of the non-buyers.

Table 5.6: Logistic regression results including all significant determinants.

	β	**Exp (β)**	**s.e**	**Wald**	**p-value**
Constant	1.0232	2.782	0.411	6.196	0.013
Infrastructure project's upstream risks	0.7198	2.054	0.326	4.868	0.027**
Uncertain revenue/cashflows due to country and project -and project-specific concerns	0.8133	2.255	0.345	5.572	0.018**
Regulated institutions	1.3476	3.848	0.643	4.397	0.024**
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	67.338				
$-2LL_m$ (Considered model)	81.375				
LLR (Likelihood Ratio Test)	14.035		2		0.003**
Hosmer-Lemeshow Test	1.194		8		0.997
Pseudo R2 measure					value
Cox and Snell					0.099
Nagelkerke					0.158
McFadden					0.106

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with significant predictors from table 5.4. The coefficient β indicates the magnitude of the effect of each independent variable on the logit, exp(β) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is used to assess the significance of the logit coefficients. The abbreviation "d.f." represents the degrees of freedom of the distribution. The likelihood ratio (LR) tests the null hypothesis that all logit

coefficients in the model are equal to zero. The Hosmer–Lemeshow (HL) statistic evaluates the null hypothesis that the observed and predicted event rates do not differ across each category of the dependent variable. Pseudo R^2 measures range from 0 to 1, with values above 0.200 indicating acceptable results and values above 0.400 indicating a good model fit.The asterisk denotes the significance level: **5%

Table 5.7: Classification table for the model with significant determinants

Observed	**Predicted**		
	Buyers of guarantees/Insurance	**Non-buyers of guarantees/Insurance**	**% Correct**
Buyers of guarantees/Insurance	64	3	96
Non-buyers of guarantees/Insurance	13	3	19
Overall			81

Note: The classification table is used to assess the predictive accuracy of the logistic regression model from Table 5.6. The figures are derived by rounding the probability of buying to a zero-digit number. Hence, when the probability of buying stays strictly below 0.500, a firm is considered a non-buyer of guarantee/insurance.

The goodness-of-fit statistics, as well as the pseudo R2 measures, changed slightly from the initial model, and the classification tables show a slight reduction in the correctly predicted buyers and non-buyers.

Overall, our results show evidence for hypotheses 2, 3, and 4, implying that Uncertain revenue/cashflows due to country and project-specific concerns, regulations impacting regulated institutions' decisions, and Infrastructure projects' upstream risks are key determinants in the demand for guarantees. The remaining hypotheses, however, cannot be confirmed.

To further respond to our research question on type of guarantee purchased, we fit the factors from the EFA to logistic regression models for buyers of commercial risk see table 5.8 and buyers of political risk guarantee see table 5.9 below.

Table 5.8: Logistic regression for buyers of commercial risk guarantee

	β	Exp (b)	s.e	Wald	p-value
Constant	1.441	4.225	0.474	9.25	0.002
Perception of country risk	-0.487	0.614	0.408	1.422	0.233
Infrastructure project's upstream risks	0.247	1.280	0.328	0.564	0.452
Operating Environment uncertainty	0.273	1.314	0.361	0.574	0.449
Uncertain revenue/cashflows due to country and project-specific concerns	-0.384	0.681	0.464	0.685	0.408
Knowledge, understanding, relationship and expertise of advisors	-0.664	0.515	0.472	1.977	0.16
Perceived left-tail risk of the project	0.614	1.848	0.426	2.082	0.149
Regulated institutions	1.708	5.518	0.81	4.44	0.035**
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	54.39				
$-2LL_m$ (Considered model)	64.94				
LLR (Likelihood Ratio Test)	10.55		7		0.159
Hosmer-Lemeshow Test	1.807		8		0.986
Pseudo R2 measure					value
Cox and Snell					0.119
Nagelkerke					0.22
McFadden					0.162

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with all predictors. The coefficient β indicates the magnitude of the effect of each independent variable on the logit, exp (b) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is used to assess the significance of the logit coefficients. The abbreviation "d.f." stands for degrees of freedom in the distribution. The likelihood ratio (LR) tests the null hypothesis that all logit coefficients of the model are equal to zero. The Hosmer–Lemeshow (HL) statistic examines the null hypothesis that the observed and predicted event rates do not differ within each category of the dependent variable. Pseudo R^2 measures range from 0 to 1, where values above 0.200 indicate an acceptable model fit, and values above 0.400 suggest a good model fit. An asterisk (*) denotes the significance level: **5%.

Table 5.9: Logistic regression for buyers of Political risk guarantee

	β	Exp (b)	s.e	Wald	p-value
Constant	1.32	3.743	0.462	8.176	0.004
Perception of country risk	-0.238	0.788	0.319	0.559	0.455
Infrastructure project's upstream risks	-0.078	0.925	0.315	0.007	0.805
Operating Environment uncertainty	0.824	2.280	0.32	6.631	0.01**
Uncertain revenue/cashflows due to country and project-specific concerns	-0.446	0.640	0.346	1.665	0.197
Knowledge, understanding, relationship and expertise of advisors	-0.413	0.662	0.357	1.337	0.248
Perceived left-tail risk of the project	0.194	1.214	0.35	0.306	0.58
Regulated institutions	0.168	1.183	0.611	0.076	0.783
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	76.62				
$-2LL_m$ (Considered model)	89.3				
LLR (Likelihood Ratio Test)	9.68		7		0.207
Hosmer-Lemeshow Test	1.087		8		0.998
Pseudo R2 measure					value
Cox and Snell					0.11
Nagelkerke					0.167
McFadden					0.108

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with all predictors. The coefficient (β) indicates the magnitude of the effect of each independent variable on the logit, exp(β) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is employed to test the significance of the logit coefficients. The abbreviation d.f stands for the degree of freedom of the distribution. The likelihood ratio (LR) is used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo R2-measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit. The asterisk denotes the significance level: **5%

The results here show evidence for hypothesis 3, implying that Operating Environment uncertainty is a key determinant in demand for political risk guarantee. The logistic model predicting buyers of commercial risk guarantees shows evidence for hypothesis 4, implying that whether institutions are regulated or not is a key determinant in purchasing commercial risk guarantees. For both models, the other hypotheses could not be confirmed.

To respond to our question on whether these factors are peculiar to African investment risks, we added a dummy variable on African Investment, coded as 1 for investors with operational experience and/or history in Africa and 0 for those without any operation or history of investing in Africa, and included it as a control variable in the larger logistic regression model, to assess the effect of the factors, controlling for Africa investment history. The logistic regression results presented in tables 5.10, 5.11, and 5.12 below indicate that even when accounting for African investment history in our models, the same predictors that were significant remain significant, implying that the factors associated with buying risk mitigation solutions and the factors associated with the type of risk mitigation solution purchased (Political or Commercial) are not peculiar to investments in Africa.

Table 5.10: Logistic regression predicting buyers controlling for investment in Africa

	β	Exp (b)	s.e	Wald	p-value
Constant	0.6727	1.96	0.538	1.5609	0.2115
Perception of country risk	-0.0937	0.91	0.305	0.0944	0.7587
Infrastructure project's upstream risks	0.7639	2.15	0.347	4.861	0.0275**
Operating Environment uncertainty	0.1273	1.14	0.34	0.1407	0.7076
Uncertain revenue/cashflows due to country and project-specific concerns	0.7876	2.2	0.351	5.0466	0.0247**
Knowledge, understanding, relationship and expertise of advisors	0.0685	1.07	0.332	0.043	0.8364
Perceived left-tail risk of the project	-0.1026	0.9	0.388	0.07	0.7916
Regulated institutions	1.4012	4.06	0.682	4.224	0.039**
Africa Investment History	0.5733	1.77	0.647	0.784	0.3758
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	65.98				
$-2LL_m$ (Considered model)	81.38				
LLR (Likelihood Ratio Test)	15.4		8		0.052
Hosmer-Lemeshow Test	2.4726		8		0.963
Pseudo R2 measure					value
Cox and Snell					0.1693
Nagelkerke					0.271
McFadden					0.1892

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with all predictors (controlling for history of investing in Africa). The coefficient β indicate the magnitude of the effect of each independent variable on the logit, exp(β) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is employed to test the significance of the logit coefficients. The abbreviation d.f stands for the degree of freedom of the distribution. The likelihood ratio (LR) is used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo R^2-measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit. The asterisk denotes the significance level: **5%

Table 5.11: Logistic regression predicting buyers of commercial risk factors, controlling for investment in Africa

	β	Exp (b)	s.e	Wald	p-value
Constant	1.6433	5.17	0.659	6.226	0.013**
Perception of country risk	-0.5236	0.59	0.424	1.5242	0.2169
Infrastructure project's upstream risks	0.2651	1.3	0.326	0.6597	0.4167
Operating Environment uncertainty	0.308	1.36	0.369	0.6979	0.4035
Uncertain revenue/cashflows due to country and project-specific concerns	-0.4134	0.66	0.477	0.7513	0.3861
Knowledge, understanding, relationship and expertise of advisors	-0.6627	0.52	0.47	1.989	0.1584
Perceived left-tail risk of the project	0.5959	1.81	0.425	1.9679	0.1607
Regulated institutions	1.7754	5.9	0.83	4.5803	0.032**
Africa Investment History	-0.356	0.7	0.77	0.2135	0.6441
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	54.17				
$-2LL_m$ (Considered model)	64.93				
LLR (Likelihood Ratio Test)	10.7628		8		0.2155
Hosmer-Lemeshow Test	0.928		8		0.9987
Pseudo R2 measure					value
Cox and Snell					0.1216
Nagelkerke					0.2241
McFadden					0.1657

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with all predictors (controlling for history of investing in Africa). The coefficient β indicate the magnitude of the effect of each independent variable on the logit, exp(β) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is employed to test the significance of the logit coefficients. The abbreviation d.f stands for the degree of freedom of the distribution. The likelihood ratio (LR) is used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo R^2-measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit. The asterisk denotes the significance level: **5%

Table 5.12: Logistic regression predicting buyers of Political risk factors, controlling for investment in Africa

	β	Exp (b)	s.e	Wald	p-value
Constant	1.623	5.07	0.598	7.377	0.007
Perception of country risk	-0.279	0.76	0.33	0.7138	0.398
Infrastructure project's upstream risks	-0.053	0.95	0.313	0.028	0.865
Operating Environment uncertainty	0.8614	2.37	0.326	6.9849	0.008**
Uncertain revenue/cashflows due to country and project-specific concerns	-0.411	0.66	0.354	1.3488	0.245
Knowledge, understanding, relationship and expertise of advisors	-0.3987	0.67	0.352	1.2864	0.257
Perceived left-tail risk of the project	0.2057	1.23	0.347	0.3517	0.553
Regulated institutions	0.233	1.26	0.621	0.1408	0.708
Africa Investment History	-0.5261	0.59	0.618	0.7256	0.394
Goodness of fit	X^2		d.f		p value
$-2LL_0$ (null model)	78.87				
$-2LL_m$ (Considered model)	89.3				
LLR (Likelihood Ratio Test)	10.42		8		0.236
Hosmer-Lemeshow Test	2.863		8		0.943
Pseudo R2 measure					value
Cox and Snell					0.118
Nagelkerke					0.179
McFadden					0.117

Note: Results of the logistic regression analysis of the dichotomous dependent variable (buyers/non-buyers) with all predictors (controlling for history of investing in Africa). The coefficient β indicate the magnitude of the effect of each independent variable on the logit, exp(β) represents the corresponding impact on the odds, and s.e. is the standard error of the parameter. The Wald statistic is employed to test the significance of the logit coefficients. The abbreviation d.f stands for the degree of freedom of the distribution. The likelihood ratio (LR) is used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo R^2-measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit. The asterisk denotes the significance level: **5%

5.4 Further Analytical Results

5.5 Type of Buyers

There was an observed statistically significant association between the type of buyers and whether they buy risk mitigation solutions (X2 statistic = 23.67, d.f = 7, p = 0.001). Buyers such as Infrastructure development/Investment companies, Pension funds, investment funds, and Asset managers all reported that they buy risk mitigation solutions. Insurance Brokerage at 25% and Consulting/Advisory firms at 57%, respectively, have the lowest proportion of buyers of risk mitigation solutions. See Table 5.13 below

Table 5.13: Buyers by the main area of activity

Main area of activity	Overall	Buyers of guarantee	non-buyers of guarantee	P-Value
	83	67	16	
Bank /DFI	34 (41.0)	30 (44.8)	4 (25.0)	0.001**
Consulting/Advisory firms	7 (8.4)	4 (6.0)	3 (18.8)	
EPC Contractor	9 (10.8)	8 (11.9)	1 (6.2)	
Insurance Brokerage	8 (9.6)	2 (3.0)	6 (37.5)	
Insurance/ECAs	10 (12.0)	8 (11.9)	2 (12.5)	
Infrastructure Dev/Investment Company	9 (10.8)	9 (13.4)		
Others	2 (2.4)	2 (3.0)		
Pension fund, Investment Fund, Asset Managers/PE firms	4 (4.8)	4 (6.0)		

Note: This table gives the distribution of buyers' vs non-buyers by area of activity. A chi-square test was performed to assess for association between the area of activity and buyers. There is a significant association between the two, with the same still significant with a Fisher's test p-value <0.05. **significant chi-square test.

Amongst the 67 buyers, 53 (79%) purchase risk mitigation for political risks, and 60(90%) purchase for commercial risks. There, however, isn't any statistical difference in the buying of either (p-value = 0.285) for political risk and for commercial risk (p-value = 0.434). See Tables 5.14 and 5.15 below. The findings show that the type of buyer is not a predictor of buying either political or commercial risk, pointing to the fact that buyers consider both risks important to be covered for, regardless of their activities.

Table 5.14: Buyers of political risk guarantee by type of buyer

Main area of activity	Overall	Buyers of Political risk guarantee	non-buyers of Political risk guarantee	P-Value
	67	53	14	0.285
Bank /DFI	30 (44.8)	24	6	
Consulting/Advisory firms	4 (6.0)	3	1	
EPC Contractor	8 (11.9)	5	3	
Infrastructure Dev/Investment Company	9 (13.4)	9	0	
Insurance Brokerage	2 (3.0)	2	0	
Insurance/ECAs	8 (11.9)	6	2	
Others	2 (3.0)	2	0	
Pension fund, Investment Fund, Asset Managers/PE firms	4 (6.0)	2	2	

This table gives the distribution of buyers' vs non-buyers of political risk guarantee by area of activity amongst the 67 buyers of guarantee. A chi-square test was performed to assess for association between the area of activity and buyers. There isn't a significant association between the two (p = 0.285), hence we fail to reject the null hypothesis of significant association.

Table 5.15: Buyers of commercial risk guarantee by type of buyer

Main area of activity	Overall	Buyers of Commercial risk guarantee	non-buyers of Commercial risk guarantee	P-Value
	67	60	7	0.434
Bank /DFI	30 (44.8)	29	1	
Consulting/Advisory firms	4 (6.0)	3	1	
EPC Contractor	8 (11.9)	7	1	
Infrastructure Dev/Investment Company	9 (13.4)	6	3	
Insurance Brokerage	2 (3.0)	2	0	
Insurance/ECAs	8 (11.9)	7	1	
Others	2 (3.0)	2	0	
Pension fund, Investment Fund, Asset Managers/PE firms	4 (6.0)	4	0	

Note:This table gives the distribution of buyers vs. non-buyers of commercial risk guarantee by area of activity amongst the 67 buyers of guarantee. A chi-square test was performed to assess for an association between the area of activity and buyers. There isn't a significant association between the two ($p = 0.434$). Hence, we fail to reject the null hypothesis of a significant association.

5.6 Responses to the Open-ended Survey Questions

In addition to the inferential statistics, we included open-ended questions in the survey questionnaire, allowing respondents to share their opinions on factors they consider important when purchasing guarantee solutions. Overall, the response rates varied among the different questions. The question regarding influencing factors when buying mitigation solutions received 34 out of 83 responses. In contrast, the question about the four key factors that respondents consider important when seeking risk mitigation instruments (each respondent could provide up to four responses), yielded a total of 93 unique responses. When combined, this resulted in a total of 125 unique responses.

Since the questions were similar, we organized the responses by overarching categories into one table. For efficient reporting and interpretation, we grouped the responses based on their key messages. The results are presented in Table 5.16.

Table 5.16: Open survey responses

What influencing factors are considered when buying mitigation solutions such as guarantee or insurance?	**No**	**Per Cent**
Achieve strategic objectives "...Long-Term Strategic Goals…"	1	0.80%
Commercial risk "Developer's availability of equity, transparency" "...Commercial... " “Non-payment risk”	6	4.80%
Capital relief/balance sheet optimization “Mainly risk mitigation and release of capital” “Availability of capital relief and balance sheet optimization” “RWA relief reasons” “Regulatory capital relief”	6	4.80%
Claim payment mechanism "... claim payments mechanics and track-record"	1	0.80%
Construction/Completion risk factors "Lack of construction risk appetite by EPC Contractors" “Performance Risk of contractor …..”	4	3.20%
Countries/Political risk "... countries with a high probability of political instability…" “...political uncertainty" "Civil disturbance…" "…forced abandonment.."	17	13.60%
Creating Capacity through risk sharing "Cooperation and risk sharing possibilities with financiers..." "Limits and credit rating for countries" "Sharing the risk with other parties, To manage overall exposure to the project"	7	5.60%
Credit rating "Availability of credit rating agency coverage"	4	3.20%

"... we would also consider countries with a credit rating below investment grade…"		
De-risking and Portfolio risk diversification "De-Risking the balance sheet because of big ticket size transactions" "Mainly to derisk geography" "Mainly risk mitigation …" "High Covered Loan amount and to De-Risk the Balance Sheet" "… credit risk enhancement, portfolio diversification " "Risk Probability and Impact" “Alignment of interest with project sponsors”	16	12.80%
Default history "... Default history is also relevant."	2	1.60%
Debt burdens/fiscal constraints "Historic default, External debt exposure" "... Sovereign debt distress is too high …"	3	2.40%
ESG factor "ESG is a key factor…"	2	1.60%
Experience and track record "Track record" "...Positive payment experiences of the country in question." "Credit worthiness of sovereign clients" “..Track record of the risk provider for claim payments” “Guarantor efficiency”	5	4.00%
Financing/unlocking capital "With our distribution led model, our focus is on attracting risk averse but patient capital to invest in long term infrastructure projects in Africa..." "lenders requirements…" "To crowd in capital for large scale infrastructure projects. " "Ability to crowd in international investors / financiers to come into African projects." "Lender's demand or requirement"	10	8.00%
Established relationships/ "Client relationship on the exporter or sponsor side." " Previous experience with counterparty in similar/related deals..." “..Advisor/Broker relationship and experience”	4	3.20%
Pricing/ Reduced financing costs	11	8.80%

"overall reduction on borrowing costs" "Limits issue and cost of funding" "cost.." "Reduction of capital costs..."		
Structure of the instrument, Comprehensiveness and flexibility of the guarantee "Level of coverage provided " "Level of cover, availability of cover for interest, policy wording.. " "... availability of solutions; flexibility to tailor risk mitigation instrument ..." "innovation and adaptability of guarantee / insurance solutions available"	7	5.60%
Nature of the risk and Long term nature of transaction/project "..type of risk being mitigated…" "Longer tenor..." "Tenor and amount of the project finance…"	3	2.40%
Operational risk "Performance risk" "Performance, Offtake, operational, Fx risk" "Macro-economic term stability of subject jurisdiction. " “Technology risk”	12	9.60%
Risk management requirement	2	1.60%
Risk adjusted returns	2	1.60%
Total	125	

Note: This table gives an overview of the responses to the open-ended question on factors considered when buying risk mitigation measures. The percentage is based on the 125 unique responses received. The responses are categorized by broad categories, such as where the responses lie.

Of the 125 statements, 56 statements, accounting for 44.8%% of the open-ended question responses, centered on 4 key decision motives for buying guarantees. Of the 4 decision motives, 3 centered on the country and project-related concerns, and the other was on capital relief and balance sheet optimization. The country and project-specific concerns were: political and country risk concerns, 17 statements (13.60%); construction and completion risk, 4 statements (3.2%); Operational risk concerns of the project, 12 statements (accounting for 9.6%); nature of the risk and country's fiscal/debt burden had 3 statements(2.4%) each; Commercial risks 6 statements (4.8%) and experience/ track record of the sponsor/borrower 5 statements(4%). All these country and project-related factors align well with the outcome of the regression analysis in the previous section. The construction and completion risks confirm Hypothesis 3 on upstream project risks.

The political and country-specific risks, including the country's debt burden, nature of the risk, commercial risk, and the track record of borrower/sponsor motives for buying a guarantee, also confirm our previous findings for Hypothesis 2—the impact of revenue and cash flows due to country and project-specific risks. The capital relief and balance sheet optimization due to regulatory capital requirements, as modeled in the regression analysis earlier, also confirm the findings for Hypothesis 4.

Furthermore, 11 statements out of the 125 responses, accounting for 8.8% of the total responses, centered around established relationships with advisors/brokers 4 statements (3.2%); credit risk rating 4 statements (3.2%); claim payment efficiency, long-term strategic goals, and risk management requirements were all 1 statement (0.8%) each. As the established relationship with advisors/brokers was found not to be statistically significant and rejected in the earlier logistics regression analysis of the previous section, it is assumed probably to be a decision factor for some of the buyers

of guarantee but not applicable for most of the buyers. The same isolated assumption could apply to the credit rating, long-term strategic goals, and claim payment efficiency, which is also linked to the established relationship factor.

Other quite intriguing responses from the respondents were also observed. 50 statements accounting for 40% of the responses to the open-ended questions revealed 6 important drivers of their decision to buy guarantees. The decision factors were: Derisking balance sheet and portfolio diversification 16 statements (12.8%); Unlocking capital at a reduced cost 16 statements (16.8%); Guarantee instrument structure, comprehensiveness, and flexibility 7 statements (5.6%), Creating Capacity through Risk Sharing 7 statements(5.6%); Risk-adjusted return reasons 2 statements (1.6%); and ESG factors 2 statements(1.6%). These are important issues worth considering, as they were not hypothesized in advance and were subsequently absent from the survey questionnaire administered. We need to consider these observed variables as potential decision drivers while reserving confirmation of their statistical significance for future research.

In summary, many of the observed responses to the open-ended questions supported the outcome of the empirical studies. Some answers can be associated with the key determinants identified in the previous section on the logistic regression analysis.

The observed responses to the open-ended questions have also provided us with new insights that were not covered in the survey questionnaire. This has opened up opportunities for future research into areas that our empirical studies did not explore.

6 Discussions and Conclusions

6.0 Introduction

This chapter discusses the research outcome and empirical results obtained from the analysis presented in the previous chapter. This was in furtherance of the research objectives, which were to understand the decision-making drivers of investors and financiers regarding the purchase of guarantee solutions to support their infrastructure investment projects in Africa. The research questions further sought to understand the relationship between the decision drivers and the types of guarantee solutions purchased by the investors and whether the decision factors were specific to infrastructure investments in general or peculiar to infrastructure investment risks in Africa.

It starts by discussing the overall findings from the empirical studies and outlines the outcomes and rationale behind them, along with other relevant observations from the analysis. It also discusses the implications of the study for both theory and practice, highlighting the key contributions to the literature and providing possible recommendations for industry practitioners and policymakers. Following this, the chapter addresses the limitations of the study and suggests areas for future research. It concludes with a summary that encapsulates the main points discussed.

6.1 Discussion of the Findings from the Empirical Studies

This section provides a critical analysis of the results derived from the empirical studies, focusing on the hypotheses in relation to the research questions. The goal is to gain insights into the factors that influence investors' decision-making. It evaluates the connections between these decision-making drivers and different types of guarantees, while also assessing whether these factors are generally applicable to

infrastructure investments or uniquely related to the risks associated with investing in Africa..

6.2 Factors Influencing Investor Decisions to Purchase a Guarantee

The first research question aimed to understand the factors that influence corporate decisions regarding the purchase of guarantee solutions for investments in Africa. To answer this question, we conducted Exploratory Factor Analysis (EFA) to derive factor scores for the potential determinants as hypothesized in Chapter 3. Following the EFA, we performed a logistic regression analysis to test our hypotheses. Out of the six hypotheses, three were confirmed to be statistically significant, indicating they are key driving factors in investors' decisions to purchase guarantee solutions for their investments in Africa. The motivating drivers that were supported are:

i. Uncertain revenue/cashflows due to country and project-specific concerns (Hypothesis 2)
ii. Infrastructure projects upstream risks (Hypothesis 3)
iii. Regulated institutions (Hypothesis 4).

Conversely, the coefficients for the remaining three hypotheses were not found to be statistically significant, suggesting that they do not constitute relevant drivers for the decision-making process regarding the acquisition of guarantee solutions for investments in Africa infrastructure projects. The hypotheses that were not supported are:

i. Perceived left-tail risk of the project (Hypothesis 1)
ii. Knowledge, understanding, relationship, and expertise of advisors (Hypothesis 5)
iii. Perception of country risk (Hypothesis 6)

Details of all the tested hypotheses (supported and not supported) are discussed below:

6.2.1 Uncertain Revenue/Cash Flows Due to Country and Project-Specific Concerns. (Hypothesis 2)

This hypothesis was supported. The empirical analysis results confirmed that "Uncertain Revenue/Cashflows Due to Country and Project-Specific Concerns" is a key factor influencing investors' decisions to purchase guarantee solutions for their infrastructure investments in Africa.

The logistic regression analysis reveals that this factor has a coefficient of 0.8133 ($p = 0.018$), indicating it is a significant predictor. Specifically, a unit increase in this factor boosts the likelihood of buyers opting for a guarantee solution by approximately 126% (odds ratio = 2.26, 95% C.I [1.15 – 4.43])

This finding is consistent with rational investment decision-making, as cash flow protection is crucial for business vitality (Wang, 2024; Kumar, ·2016). It also aligns well with Doherty's (2000) and Hau's (2006) findings on the rationale for buying risk mitigation solutions. Any commercial investment aims to maximize investor value or minimize losses (Bainbridge, 2023; Biesenthal & Wilden, 2014). To achieve this, the essential element is securing the cash flow (liquidity) and, by extension, the revenues from which these cash flows are derived to ensure business growth and survival (Atakul, 2022; Cui, Hastak, & Halpin, 2010).

In the context of infrastructure projects, addressing specific project concerns is pivotal to successful investments (Ferrari, Giovannini & Pompei, 2016). When investing in Africa, country-specific challenges become particularly significant due to the heightened perception of risk and real issues like political instability and

macroeconomic obstacles that investors frequently encounter on the continent (Tayo, 2024). Such risks can hinder business operations and affect cash flow generation. Operational challenges, including the unavailability or insufficiency of inputs, maintenance issues, lack of local expertise, changing technologies and standards, as well as logistics and procurement difficulties, can trigger significant business interruptions and hinder firms from fulfilling their contractual obligations. These concerns were identified by survey respondents as critical project-specific concerns motivating them to secure guarantee solutions to protect their investments. The reason is that if these concerns are left unaddressed and the risks materialize, the firm may be unable to secure resources to respond to the crisis promptly and could face bankruptcy. It is on this basis that Managers of the firms consider it a prudent strategy to purchase guarantee solutions to help mitigate against negative volatility and its impact on revenues and cash flows, ultimately reducing the likelihood of bankruptcy (Froot, Scharfstein, and Stein, 1993). This outcome resonates well with the study by Doherty (2000) and Hau (2006), which suggests that a principal risk associated with business interruption, including property damage, is the lack of liquidity and its potential effect on business survival. Another significant risk identified by respondents in the survey is non-payment risk, which can adversely affect revenues and cash flows (Peters, Subar & Martin, 2019). During the operational phase of infrastructure investments, these risks are exacerbated, as this is when users of the facility experience its benefits and must pay user fees. If the expected revenues from user tariffs or fees become politically contentious due to public outcry, and if the project company cannot charge enough to cover its operational and financing costs, or if the contract is terminated, it could lead to losses and potential bankruptcy. Therefore, buying guarantee solutions is viewed as a critical aspect of risk-averse behavior aimed

at protecting against bankruptcy (Klasen, 2014; Michel-Kerjan, Raschky, and Kunreuther, 2015).

6.2.2 Infrastructure Projects Upstream Risks (Hypothesis 3)

This hypothesis was supported as the study's outcome highlights the critical importance of upstream risks in infrastructure projects, which are vital considerations for investors when determining their engagement in such initiatives. The logistic regression analysis indicates that "uncertain upstream risks in infrastructure projects" significantly predict the likelihood of buyers pursuing risk mitigation strategies. Specifically, it reveals that this factor has a coefficient of 0.7198 ($p = 0.027$), demonstrating that a one-unit increase in perceived upstream risk is associated with an approximate 105% increase in the probability of buyers opting for risk mitigation measures, supported by an odds ratio of 2.05 (95% C.I. [1.08 – 3.89]).

Among the various upstream risks identified, the risks associated with construction and completion have surfaced as primary concerns for financiers. These considerations are particularly prominent in infrastructure projects conducted through traditional procurement methods, as established by the research of Blanc-Brude and Makovsek (2013). Notably, since cash flows are not generated during the construction phase, project companies are unable to make repayments to their financiers until the project is completed and becomes operational (Peters, Subar & Martin, 2019). Survey responses, including qualitative insights gathered from the open-ended questions, have echoed these concerns, while also uncovering additional upstream challenges such as engineering risks, technology risks, delays, cost overruns, contractor capacity, and the procurement of completion certificates.

Addressing these upstream risks is crucial for infrastructure investors. Oke et al.'s (2016) suggest that sustainable construction practices can be enhanced through the implementation of bonds and guarantees. They emphasize the universal necessity of applying construction bonds in both public and private projects to safeguard against these risks.

Financiers involved in long-term infrastructure projects greatly prioritize the timely completion of projects while adhering to budgetary constraints and operational standards. This reality underscores the need for thorough due diligence during the project development phase to assess technical, environmental, and operational feasibility. A detailed analysis of project design and specifications is essential to ensure alignment with desired operational outcomes, ultimately enabling sufficient revenue generation to fulfill financial commitments. Should performance deficiencies be identified, reliable mitigation strategies need to be established. Concerns regarding cost overruns and delays are critical, as they can lead to additional costs and potential contract breaches. These issues call for the use of guarantees and surety bonds by contractors to mitigate performance default risks, as identified in the research by Jing et al. (2020), which confirms that implementing surety bond strategies can reduce the likelihood of contractor default.

Turnkey contracts are often employed to manage construction risks, where the contractor agrees to complete the project by a specified date and within established parameters for a fixed contract price (Blanc-Brude & Makovsek, 2013). To address potential lapses, such as delays and performance issues, certain guarantees—such as liquidated damages and indemnities—are typically put in place. Furthermore, to protect financiers from dual risks associated with construction, it is a common practice for contractors to provide bonding facilities in the form of performance bonds or

guarantees (Jing et al., 2020). Additionally, guarantee instruments such as Standby Letters of Credit (SBLC) and reimbursement undertakings are often requested from contractors or their financial institutions to reinforce their obligations under project construction contracts. This approach to managing upstream risks is essential for building investor confidence and ensuring the successful development of infrastructure projects.

6.2.3 Regulated institutions (Hypothesis 4)

Supported: The empirical analysis results confirmed that regulated institutions purchase guarantee solutions to support their investments because of the regulatory capital requirements.

The results demonstrate that being a regulated institution, which must maintain specific capital adequacy ratios, significantly increases the likelihood of buyers purchasing a risk mitigation solution by approximately 285%. The odds ratio is 3.85 (95% confidence interval: [1.09 – 13.57]), with a coefficient of 1.3476 ($p = 0.036$). This finding identifies it as a positive and significant predictor. It aligns with the work of Braun, Fischer, and Schreiber-Orosz (2023), who studied structured commodity finance and the demand for credit insurance. They concluded that banks' balance sheet optimization motivates the demand for credit insurance. Infrastructure project financing primarily involves banks and institutional investors, such as insurance companies and pension funds. These institutions operate under strict regulations, and the introduction of the new Basel Accord and Solvency II rules has imposed stricter capital requirements on them. As a result, regulatory and economic capital constraints make it challenging for these institutions to invest in infrastructure projects in Africa, unless adequate mitigation and credit substitution solutions, such as guarantees, are available (Plosser and Santos, 2024; ITFA and IACPM, 2023).

In recent years, banks, as traditional lenders, have become increasingly cautious in committing to long-term loans, primarily due to increasing regulatory and economic capital charges(Plosser and Santos, 2024). They are only willing to lend if risks can be efficiently managed, often through guarantees that help optimize the use of economic and regulatory capital. The capital allocated for such projects by financiers can render them economically unviable unless credit enhancement solutions, like guarantees, are available to improve the project's creditworthiness, risk rating/weighting, and overall capital consumption (Jobst, 2018)

These concerns were confirmed by survey respondents, who frequently highlighted issues related to managing risk-weighted assets and obtaining capital relief in their open-ended responses.

Project finance is regarded as a pivotal means of financing infrastructure, but it is yet to be reflected comprehensively and consistently in most solvency regimes. For instance, solvency regulatory requirements for insurance and pension funds do not provide room for infrastructure investments. Jobst (2018) pointed out that infrastructure debts are typically treated like other forms of long-term exposure, resulting in a relatively high capital charge. To finance infrastructure projects and meet regulatory and internal capital requirements, these regulated entities demand risk mitigation solutions, such as guarantees or credit insurance. These tools help minimize the impact of the capital charge and enable them to achieve risk-adjusted returns on their investments.

6.2.4 Perceived Left-Tail Risk of the Projects (Hypothesis 1)

Not Supported. The empirical analysis presented in this study did not support the hypothesis that guarantee solutions significantly aid in managing left-tail risks

associated with infrastructure investments in Africa. The findings indicated that these solutions are not a crucial consideration for investors when assessing guarantee options. Specifically, the results from the logistic regression analysis yielded a coefficient of -0.1152 ($p = 0.763$), reinforcing the conclusion that guarantee solutions do not serve as a meaningful predictor influencing investors' decision-making processes.

Possible explanations may account for this outcome. Risk aversion is often a primary motivator for companies seeking guarantee solutions to mitigate risks (Doherty and Smith, 1993; Meyer and Power, 1983). However, many left-tail risks, characterized by extreme negative outcomes, tend to be idiosyncratic. Such risks can often be mitigated through effective portfolio diversification strategies. As a result, companies with established risk management frameworks may not view guarantee solutions as the most effective means of risk mitigation. Some organizations even implement self-insurance structures to address these risks internally rather than opting for external assurance.

Furthermore, investors may prefer alternative financial engineering strategies to protect their investments against these risks. Considering that infrastructure investments are typically long-term and designed to generate consistent revenue streams, the stability afforded by these assets is vital for economic growth and stability. Consequently, investors may feel more secure by focusing on sound financial engineering strategies and gaining thorough insights into the economic factors influencing their projects, rather than relying exclusively on third-party guarantee solutions for risk management.

6.2.5 Knowledge, understanding, relationship, and expertise of advisors (Hypothesis 5)

Not supported. The results of the empirical analysis did not support the hypothesis regarding the influence of expert advice on investors' decisions when acquiring guarantee solutions for infrastructure investments in Africa. Specifically, the logistic regression analysis revealed a coefficient of 0.0457 ($p = 0.889$), indicating that expert advice is not a significant predictor in the decision-making process. This finding contrasts with the research conducted by Braun and Fisher (2018) and Braun, Fisher, and Schreiber-Orosz (2023), which suggested that experience with credit insurance policies and the strength of broker relationships significantly influence investors' decisions.

A few possible explanations may account for this finding. Structuring optimal guarantee solutions for infrastructure projects is inherently complex, particularly when multiple risks and diverse stakeholders with varying preferences, risk appetites, and objectives are involved. As a result, expert guidance is often necessary to ensure that the terms and conditions, including claims processes and procedures, are clearly outlined in the guarantee policy documents. However, the findings suggest that not all stakeholders prioritize this expertise. Some stakeholders may have in-house professionals capable of managing these solutions independently, leading them to overlook external expert advice in their decision-making. This discrepancy highlights the variability in how different stakeholders approach the procurement of guarantee solutions in the context of infrastructure financing.

6.2.6 Perception of country risk (Hypothesis 6)

Not Supported. The empirical analysis results did not support the hypothesis that country risk perception significantly influences investors' decisions to purchase guarantee solutions for their infrastructure investments in Africa. Specifically, the logistic regression analysis revealed a coefficient of -0.1044 with a p-value of 0.0734, suggesting that this factor does not serve as a significant predictor in the models employed. This finding indicates that while investors may acknowledge country risk perception as a concern, their decision to buy guarantee solutions for infrastructure projects is more heavily influenced by other critical factors. These include upstream risk associated with project execution, the necessity for revenue and cash flow protection to safeguard returns, and the regulations governing investments. Consequently, it appears that investors prioritize these elements over their perception of country-specific risks when making decisions regarding guarantees for their investments in African infrastructure. This outcome stands in contrast to the findings of Braun and Fischer (2018), which indicated that exposure to political risk in a country has a substantial influence on corporate demand for guarantee solutions such as Political Risk Insurance (PRI). This discrepancy suggests that perhaps a more nuanced understanding of investor priorities and the complex dynamics of investing in Africa is necessary for future research.

6.3 Relationship between the Decision Drivers and the Types of Guarantees Purchased

To get answers to our research question two, which seeks to find out if there is a relationship between the decision drivers and the type of guarantee purchased, we applied the factors identified in the Exploratory Factor Analysis (EFA) to logistic regression models. This analysis focused on buyers who purchase a guarantee

solution to cover commercial risks (see Table 5.8) and those who purchase a guarantee solution to cover political risks (see Table 5.9). The results of the logistic regression show that operating environment uncertainty (Hypothesis 3) is a positively significant predictor of buyers' purchasing political risk coverage. The coefficient for this variable is 0.824 ($p = 0.01$), implying that a unit increase in operating environment uncertainty increases the odds of purchasing political risk cover by approximately 128% (odds ratio = 2.28, 95% CI [1.22 – 4.27]).

Conversely, the results show that being a regulated institution is a significant positive predictor of buying risk mitigation cover for commercial risks, with a coefficient of 1.7078 ($p = 0.035$). This further indicates that a regulated institution increases the odds of buying commercial risk cover by approximately five times (odds ratio 5.52, 95% CI (1.12 – 3.30).

The outcome of the analysis relating to the operating environment uncertainty supports investors' decision to buy political risk coverage. Operating environment concerns include political uncertainties and macroeconomic instability, early termination of contracts, and frequent renegotiation of contracts following government changes in developing markets like Africa. The financial market is less developed, making refinancing difficult in such markets. All these affect investors' ability to plan and manage their investments in such markets (Saha et al, 2018). Certainty and predictability are key to ensuring that sufficient and appropriate financing and investment are available for infrastructure development (Blundell-Wignall & Roulet, 2015).

For commercial risk buyers, their key concern is non-payment risk, as that is a key commercial risk factor (Peters, Subar & Martin, 2019). The regulatory capital implications and credit loss provision requirements motivate regulated institutions like

banks to seek a guarantee solution to help manage their portfolio and regulatory capital usage. This was consistent with Mayers and Smith's (1982) conclusion that regulations impact insurance demand; regulated companies can shift premium costs to customers, leading them to purchase more insurance than unregulated firms (Krummaker, 2019b).

6.4 Decision Factors Specific to Infrastructure Investments in General or Peculiar to Infrastructure Investment Risks in Africa.

To address research question 3, a detailed investigation was conducted to explore the factors influencing corporate decisions regarding infrastructure investments, particularly focusing on their applicability within the African context. The study aimed to determine whether these influencing factors are universally applicable or distinctly associated with the unique risks of investing in Africa.

To facilitate this analysis, a dummy variable was introduced to represent African investment. Investors with operational experience or a documented history of investing in Africa were assigned a value of 1, while those without such experience were assigned a value of 0. This dummy variable served as a control variable within the logistic regression model, allowing for an effective evaluation of various influencing factors while accounting for prior investment history in Africa.

The results of the logistic regression analyses, detailed in Tables 5.10, 5.11, and 5.12, indicated that even when accounting for prior African investment operations or history, the same significant predictors remain influential. This suggests that the factors related to the adoption of purchasing risk mitigation solutions, as well as those influencing the selection of specific types of risk mitigation solutions, are applicable not just to investments in Africa but to infrastructure investments more broadly.

Further analysis revealed that "uncertain upstream risks in infrastructure projects" had a coefficient of 0.7639 (p = 0.0275), suggesting that a one-unit increase in perceived upstream risk corresponds to approximately a 115% increase in the likelihood of buyers opting for risk mitigation measures, as indicated by an odds ratio of 2.15. This relationship was consistent across different geographical locations. Similarly, uncertain revenue and cash flow due to country and project-specific concerns exhibited a coefficient of 0.7876 (p = 0.0247), indicating that a one-unit increase leads to about a 120% rise in the likelihood of buyers choosing risk mitigation measures, also independent of project location.

The analysis further highlighted the significant role of regulated institutions in the decision-making process. With a coefficient of 1.4012 (p = 0.039), the presence of regulated institutions resulted in an approximate 306% increase in the likelihood of buyers opting for risk mitigation measures, reflected by an odds ratio of 4.06, independent of project location.

Additionally, a logistic regression was performed specifically to predict the type of guarantee solution preferred by buyers, categorizing them as either commercial or political risk cover while controlling for investments in Africa. The results indicated a positive correlation with regulated institutions, yielding a coefficient of 1.7754 (p = 0.032), which translates to an approximate 490% increase in the likelihood of buyers selecting risk mitigation measures (odds ratio = 5.9), irrespective of the geographical context of the project. For political risk coverage, controlling for investments in Africa, uncertainty in the operating environment had a positive correlation with a coefficient of 0.8614 (p = 0.008), signifying that an increase in this uncertainty correlates with around a 137% rise in the likelihood of buyers opting for risk mitigation measures (odds ratio = 2.37).

These findings suggest that the factors influencing the purchase of guarantee solutions, as well as the types of risk coverage options selected—whether political or commercial—are not limited to investments in Africa. A plausible explanation for this broad applicability is that investors, regardless of the specific investment location, face similar project-related risks, including construction, completion, and operational challenges (Kumar, 2022; Jiang et al, 2021). Furthermore, the regulatory landscape for long-term infrastructure investments remains consistent for regulated institutions, such as banks and insurance companies. These entities are often reluctant to finance projects unless sufficient credit enhancements are in place to meet regulatory capital requirements (Jobst, 2018), further underscoring the universality of these influencing factors across diverse investment environments.

6.5 Implications of the Study

6.6 Contribution to Literature

First, this study contributes to the existing literature by connecting the rationale for purchasing guarantee solutions with infrastructure investments in Africa. We addressed the knowledge gap in this crucial growth-enabling sector by identifying the key factors that drive investor demand for guarantee solutions in infrastructure projects in Africa. Through a comprehensive survey, our research revealed that infrastructure investors purchase guarantee solutions primarily to manage upstream project-related concerns, address uncertain revenue and cash flow concerns due to both country-specific and project-specific issues, and to comply with regulatory requirements that impact their operations.

Second, as this is the first study linking guarantee demand rationale for infrastructure investments in Africa, the insight from this study can also be replicated elsewhere in other developing markets to help advance further research on the topic.

Third, multiple stakeholders with different interests are involved in infrastructure development and financing. Each stakeholder might have different reasons for seeking guarantee solutions for their stake in the infrastructure project. The study, therefore, points out multiple directions of study (for each stakeholder interest rationale) that could expand the knowledge base on guarantee demand for infrastructure.

6.7 Contribution to Practice

First, the study's insights are valuable to stakeholders involved in the infrastructure investment value chain, such as financiers, developers/contractors, and guarantee providers. For example, concerns regarding upstream project issues can be addressed by using guarantees to better allocate and manage risk among construction parties, including the contractor, financiers, and risk providers. A guarantee specifically designed to tackle construction risk will enable commercial banks to finance the project's construction, especially if the construction contract is structured on a turnkey basis. This approach helps mitigate upstream risks that often deter financiers from participating in such projects, as the contractor assumes the project delivery risk, provided the necessary financing is available. By offering a construction guarantee to commercial banks, the path for financing the construction is cleared, allowing the project to be completed as planned. Once the project is finished and starts generating revenue, the construction finance provided by commercial banks can be flipped or refinanced into a long-term facility (either as a loan or a bond). This is beneficial for institutional investors seeking long-term investments that match their liabilities. These investors, who may be unable to take on construction risk, prefer to fund brownfield

projects that are operational, thus allowing construction financiers, who are typically focused on short-term risks, to exit the investment.

Second, the study is also relevant to development and policy-making bodies that aim to leverage private-sector financing to support infrastructure investments. For instance, AUDA/NEPAD is considering the establishment of a regional guarantee scheme to facilitate financing for infrastructure projects in Africa, in support of AU Agenda 2063. The findings of the study highlight key factors that investors consider when seeking guarantee solutions for their infrastructure investments. The design of the proposed regional guarantee mechanism can benefit from the insights provided in this study, ensuring that it meets the needs and expectations of its users.

Third, the government's policy interventions play a crucial role in attracting private investors to participate in infrastructure investments by addressing investor concerns identified in the research. In this regard, the government, through its policy tools, can provide robust backing to a reputable entity to manage a guarantee program on its behalf. Alternatively, it can establish national policy institutions, such as an export credit agency, Eximbank, or national development bank, which would carry the government's full faith and credit with a specific mandate to promote infrastructure development.

Fourth, akin to the points mentioned above, there is a need for existing guarantee-providing institutions, especially those focused on Africa, to reorient their programs and offerings to better meet the needs of their users. In this context, members of the Co-Guarantee platform can learn from the study to reassess their programs and approach to marketing their products, to ensure maximum uptake. For example, country-specific concerns can be addressed by introducing comprehensive yet flexible country risk guarantee solutions that allow clients to choose the specific types of country risks they

wish to cover. Additionally, the Co-guarantee platform members could expand the partnership/alliance through the establishment of joint offerings to complement each other's products. Such collaborations will create a one-stop shop for clients' needs, enabling them to access everything they require from a single provider within the partnership.

Finally, an important issue that emerged from the study is the need for guarantee solutions to address the regulatory requirements faced by institutions such as banks and other regulated investors. Specifically, these institutions purchase guarantee solutions to manage their regulatory and economic capital requirements, thereby optimizing the economic and regulatory capital charges associated with infrastructure investments in their portfolios. The critical nature of these guarantees for regulated institutions means they must be well-suited for risk mitigation objectives while also meeting strict regulatory requirements. Therefore, it is essential for guarantee providers to review their policy wording to ensure it aligns with the intended purposes for which users are purchasing the guarantees. In this context, guarantee solution providers should engage with regulators to share knowledge, exchange ideas, and discuss product offerings and user needs. This engagement is vital to ensuring mutual agreement among stakeholders for the benefit of society. Multilateral Development Banks (MDBs), such as the World Bank and regional development finance institutions, can play a pivotal role in facilitating these discussions with regulators to ensure that the use of guarantees by economic actors effectively stimulates growth and development in society.

6.7.1 Recommendations

In view of the foregoing, the following recommendations are proposed for action by guarantee solution providers, project developers/sponsors, policy makers, governments, and regulators.

a. Guarantee Solution Providers.

i. Introducing Innovative Guarantee Solutions: It is important to consider introducing innovative guarantee solutions that are aligned with the user's needs. Such innovative solutions will not only help to derisk the projects but will also unlock financing from financiers with different levels of risk appetite. A significant finding of the study pertains to the concerns regarding upstream construction risks as articulated by stakeholders within the infrastructure investment value chain, such as financiers, developers, among others. It is imperative for guarantee providers to explore innovative and tailored guarantee solutions that facilitate the better management and allocation of risks associated with upstream project issues. By implementing guarantees specifically designed to mitigate construction risks, commercial banks interested in short-term transactions, yet reluctant to assume construction risks, may be incentivized to finance the project construction, as the construction period is usually short, particularly in cases where project contracts are structured on a turnkey basis. Upon completion of the project construction and the commencement of revenue generation, the construction financing provided by the commercial banks can be flipped(transitioned) or refinanced into a long-term facility, either as a loan or a bond, by long-term financiers such as institutional investors. This approach is advantageous for institutional investors who seek long-term investments that align with their liabilities. These investors typically prefer to finance brownfield

projects that are operational, thereby allowing construction financiers, who generally concentrate on short-term risks, to exit from the investment.

ii. Reassess Offerings of Guarantee Providers, including possible Joint Product Offering: Existing institutions that provide guarantees, particularly in Africa, must re-evaluate their programs and product offerings, guarantee policy wording, and instruments of intervention to more effectively meet the needs of their users. Initiatives could include introducing flexible country risk guarantees that allow clients to select specific risks to cover.

    Additionally, fostering partnerships among guarantee providers to create joint offerings can enhance service efficiency for clients, minimizing the need for multiple sources and streamlining their experience.

iii. Align Guarantee Solutions with Regulatory Requirements: Guarantee providers are urged to ensure their solutions meet the regulatory and capital requirements of user institutions, such as banks and other regulated investors. This alignment will optimize capital charges associated with infrastructure investments.

b. Project Sponsors and Advisors.

Akin to the above is the crucial role of the project sponsors and advisors. It is recommended that the project developers and their advisors adopt a thoughtful risk allocation strategy when structuring projects to consider allocating risks to parties best able to bear them to facilitate and ease the concerns of the stakeholders in the project development and financing value chain. This ensures seamless construction and completion of the project. For instance, the project can be dimensioned into the construction and operational phases, with the construction phase done on a turnkey basis. This will ensure transfer of construction and completion risks to the EPC

contractor on a specific firm-terms basis. The management of the project company will bear operational phase risks and, to some extent, the O&M Contractors/ Suppliers.

c. Development and Policy-making Bodies

Development and policy-making bodies can leverage the study's insights to guide policy actions. For instance, AUDA/NEPAD is encouraged to utilize the study's findings to inform the design of the proposed regional infrastructure guarantee mechanism, whose main objective is to facilitate infrastructure financing in Africa. By ensuring that these mechanisms are aligned with investors' needs and expectations, these entities can enhance their effectiveness in supporting the realization of the AU Agenda 2063 relating to infrastructure development in Africa.

The study's findings are also important for policy-making bodies like the Group of G Twenty (G20), especially regarding the work of the G20 Infrastructure Working Group (IWG). The research highlights key issues for those involved in infrastructure investments in Africa. The IWG is mandated to identify innovative financial instruments, including derisking products, that can enhance financing for sustainable infrastructure projects, particularly in emerging markets and developing economies (EMDEs). By leveraging the insights derived from this study, the IWG can more effectively address the needs of stakeholders involved in infrastructure investments in EMDEs.

d. Governments :

i. Strategic steps to Address Investor concerns: Governments must take proactive and strategic steps to address the specific concerns of investors, as highlighted in the research, in order to create an environment conducive to attracting private investment in infrastructure projects. This involves comprehensive reforms in several key areas. Firstly, the procurement process for infrastructure projects

needs to be streamlined to ensure transparency and efficiency. This can be achieved by adopting standardized procurement practices and using technology to facilitate bidding processes. This can reduce bureaucratic delays and foster a competitive environment. Furthermore, it is imperative to enhance the legal systems by incorporating appropriate checks and balances to protect investor interests and ensure accountability. This includes the establishment of independent regulatory bodies that can oversee compliance and adjudicate disputes impartially. Additionally, improving the ease of doing business is critical. This can include measures such as simplifying regulatory requirements, reducing the time required to obtain permits, and enhancing the overall regulatory framework. Governments should consider establishing a single-window system that allows investors to fulfill all necessary requirements at one point, minimizing complications and expediting project initiation. Furthermore, addressing issues related to financing options is essential. Governments could collaborate with financial institutions to develop innovative financing models, such as public-private partnerships (PPPs), which can mitigate risks for investors and enhance the attractiveness of infrastructure investments. These actions by the governments can significantly improve investor confidence and stimulate increased private sector participation in infrastructure development.

ii. Strategic Government Interventions: In addition to creating the necessary enabling environment for growth and investments, governments can, utilizing their policy tools, to provide robust support for reputable entities to manage guarantee programs on their behalf, or establish national policy institutions—like export credit agencies or development banks—tasked with furthering infrastructure

development under the government's backing with its full faith and credit, thus providing assurance to investors and stakeholders.

These strategic policy actions by the governments can significantly accelerate infrastructure investments and stimulate economic growth and development.

e. Collaboration with Regulators

Collaboration with regulatory bodies is essential for achieving optimal outcomes for the good of society. It is recommended that guarantee providers, including multilateral development banks(MDBs) and regional development banks (RDBs), should engage proactively with regulators to foster open dialogues regarding product offerings and the specific needs of users. MDBs and RDBs should play a leading role in this dialogue. This collaborative approach will not only promote transparency but will also ensure that the interests of all stakeholders—including investors, regulators, risk solution providers, and end-users—are aligned for mutual benefit. Certain regulatory measures presently hinder investor participation in infrastructure investments, as the capital requirements associated with this asset class can render projects economically imprudent to finance. By working in concert, guarantee providers and regulators can identify and address these challenges, thereby crafting frameworks that facilitate investment while safeguarding public interests and ensuring that infrastructure projects are both viable and advantageous. This synergy will not only enhance the financial health of investment opportunities but will also promote a systemically robust financial system, leading to socio-economic growth and development essential for the well-being of society.

Table 6.1 provides a summary of the above recommended actions for stakeholders in infrastructure financing value chain.

Table 6.1: Summary of Recommended Actions for Stakeholders

Parties/ Stakeholders	Recommended Actions
1. Guarantee Solution Providers	• To enhance infrastructure project financing, innovative guarantee solutions—such as construction risk guarantees—should be introduced to alleviate upstream constraints. This approach would make the projects more appealing to short-term financiers, enabling them to provide the necessary construction financing. Once the projects are completed, long-term investors can take over to refinance these short-term financiers. • Existing programs and product offerings, including guarantee policy wording and intervention instruments, must be reevaluated to better serve users' evolving needs. Aligning guarantee solutions with regulatory requirements is another important step, as it can help regulated institution users, such as banks, gain regulatory capital relief. • Foster partnerships among each other and create joint product offerings to enhance service efficiency for clients. Such collaborations can also enable risk-sharing among the providers, leading to a more optimized use of their balance sheets.
2. Project Sponsors and Advisors	• To address stakeholder concerns during infrastructure projects development and financing, it's important to have a clear risk allocation strategy. This strategy assigns risks to the parties that can manage them best. Doing so not only eases these concerns but also helps ensure smooth construction and project completion. For example, project sponsors or advisors can divide the project into two phases: construction and operations. In the construction phase, they can use a turnkey method to shift construction risks to the EPC (Engineering, Procurement, and Construction) contractor. In the operational phase, the project management team, along with operations and maintenance (O&M) contractors and suppliers, can handle operational risks.
3. Development and Policy-making Bodies	• Development and policy-making bodies can use the study's insights to guide their actions. For example, AUDA/NEPAD should leverage the findings to design its proposed regional infrastructure guarantee mechanism, which aims to facilitate infrastructure financing in Africa. Aligning these mechanisms with investors' needs will enhance their effectiveness in supporting AU Agenda 2063 on infrastructure development.

Parties/ Stakeholders	Recommended Actions
	• The findings of the study are essential for the G20, especially for the Infrastructure Working Group (IWG). It identifies critical issues related to infrastructure investment in Africa. The IWG's goal is to develop innovative financial instruments, including derisking products, to enhance financing for sustainable infrastructure in emerging markets and developing economies(EMDEs). By leveraging the insights from this study, the IWG can propose creative financial solutions for the G20 to consider and adopt for implementation, as governments strive to attract private sector investments in infrastructure.
4. Governments	• The government must take strategic steps to address investors' concerns to attract private investment in infrastructure. Key reforms include streamlining the procurement process for transparency and efficiency, enhancing legal systems with independent regulatory bodies, and simplifying regulatory requirements through a single-window system. Additionally, collaborating with financial institutions to create innovative financing models, like public-private partnerships (PPPs), can mitigate risks and attract more investment. These measures can boost investor confidence and increase private sector participation in infrastructure development. • Governments should utilize their policy tools to provide robust support for reputable entities to manage guarantee programs on their behalf, or establish national policy institutions—like export credit agencies or development banks—tasked with furthering infrastructure development under the government's backing with its full faith and credit, thus providing assurance to investors and stakeholders.
5. Collaboration with Regulators	• Guarantee providers should proactively engage with regulators to discuss product offerings and user needs. The multilateral and regional development banks should lead this dialogue. This collaboration will promote transparency and align the interests of investors, regulators, risk solution providers, and end-users. Current regulatory measures can limit investor participation in infrastructure investments due to high capital requirements. By working together, guarantee providers and regulators can address these challenges, creating frameworks that facilitate investment while protecting public interests. This partnership will enhance investment viability and support a robust financial system, contributing to socio-economic growth and societal well-being.

Notes: Table 6.1 presents a summary of recommended actions for stakeholders

6.8 Limitations to the Study

The study has several limitations, the most significant of which is the sample size of the data used. This limitation may affect the study's outcomes. Although the response rate was slightly above 33%, it was lower than anticipated. A higher response rate would have increased the sample size and strengthened the overall impact of the study's results.

The second limitation pertains to a common drawback of survey research. Surveys often struggle to effectively capture complex or multifaceted issues, as they are typically structured, standardized, and less flexible. This limitation can hinder the collection of in-depth and nuanced information about a topic. This was evident in the responses to the open-ended questions. Although these questions revealed important issues that could have influenced decision-making, they were not anticipated beforehand and, therefore, were not integrated into the survey design as measurable variables of interest.

Finally, the data used for the empirical studies and their subsequent outcomes were derived from cross-sectional surveys conducted at a single point in time. This approach may introduce bias, as it does not account for the managers' decision-making behavior over time. Conducting longitudinal studies that capture comprehensive data over an extended period could help address this limitation.

6.9 Suggestions for Future Research

Future research could aim to address some of the study's limitations. It is essential for future research to increase the sample size and extend the data collection widely to encompass more African countries. This broader approach will help validate the results by providing a more comprehensive scope and scale.

Furthermore, the analysis of the responses to the open-ended questions revealed valuable insights that were not addressed in the survey questionnaire. This occurrence has created opportunities for future research into areas that our empirical studies did not cover. Future studies should focus on examining the statistical significance of the issues, which are balance sheet de-risking and portfolio diversification, the structure, comprehensiveness, and flexibility of guarantee instruments, ESG factors, risk-adjusted return objectives, capacity creation through risk sharing, and unlocking capital at a reduced cost. It should also consider the nuanced understanding of investor priorities and the complex dynamics of investing in Africa. Investigating these topics as potential determinants of guarantee purchases will significantly enhance the existing body of knowledge on this subject.

Finally, longitudinal studies with large sample size covering more African countries over a longer time horizon. This broader approach will enhance the validity, scope, and scale of the results.

6.10 Conclusion

This thesis commenced with the main objective of identifying key factors influencing investors' decision to purchase guarantee solutions for their infrastructure investments in Africa. After reviewing relevant literature and formulating hypotheses, a comprehensive survey was conducted among professionals in the infrastructure industry, including executives and senior officials from banks, export credit agencies (ECAs), development finance institutions (DFIs), insurance companies, institutional investors, advisors, and brokers, amongst others. The survey helped collect the necessary data for the study. The collected data was analyzed using Exploratory Factor Analysis (EFA) and a logistic regression model. The analysis revealed that uncertain revenue and cash flows—stemming from country-specific and project-

specific concerns, the upstream risks associated with infrastructure projects, and the regulatory capital requirements imposed on regulated institutions—significantly influence investors' decisions to purchase guarantee solutions. We observed statistically significant positive coefficients for these three variables. In contrast, the coefficients for the other factors were not statistically significant and did not appear to be relevant drivers for purchasing guarantees or risk mitigation solutions.

The implications of this study are significant for institutions that provide guarantees, such as Multilateral Development Banks (MDBs), Development Finance Institutions (DFIs), and Export Credit Agencies (ECAs). The research outlines several recommended actions that these organizations can take. Key insights into user decision-making processes are presented, which can help inform both the review and creation of innovative financial products, as well as guide necessary policy interventions. Furthermore, it encourages engagement among stakeholders, including regulators and lenders, highlighting the importance of examining the regulatory effects of using guarantees for infrastructure investments and how these affect economic growth, capital consumption, and risk-adjusted returns.

Future research should address this study's limitations by increasing the sample size and expanding data collection to include more African countries for potential cross-sectional and longitudinal studies. This approach would not only enhance the validity of the findings but also increase their overall scope, thereby contributing to a more comprehensive understanding of the decision-making processes surrounding investors' purchases of guarantee solutions. The insights obtained from the responses to the open-ended questions have identified several key areas for further research, such as balance sheet de-risking, portfolio diversification, and environmental, social, and governance (ESG) factors, among others. Future studies into these areas would

be important, as they could significantly advance knowledge and foster meaningful transformations within the broader ecosystem of infrastructure development, financing, and delivery of risk mitigation solutions, thus closing the gap between theory and practice on guarantee solution usage.

Appendix A: Government Support Package for the TTT project, UK

	Risk Mitigation Solution	Purpose
1	Market Disruption Facility	To provide short-term liquidity. In the event of disruption to capital markets, the government commits to provide a short-term loan of between £100 million and £500 million to Bazalgette (the project company).
2	Contingent Equity Support Agreement	Address issues of cost overrun. The government set a cost overrun threshold of £4.1 billion, or £960 million (30%) above the target price: if Bazalgette's costs exceed this threshold, the Department agrees (under the 'Contingent Equity Support Agreement') to either provide equity to Bazalgette; or discontinue the project and pay compensation.
3	Indemnity in the form of Supplemental Compensation Agreement'	Contingent supplementary Insurance. The government agreed to provide an indemnity to Bazalgette on commercial terms to cover liability claims that exceed the company's commercially arranged insurance limits or where insurance is unavailable.
4	Compensation for discontinuation	The government agreed to pay specified compensation to investors in the event that it decides to discontinue the project
5	Special Administration Offer Agreement'	A regime is in place if Bazalgette goes into special administration and remains there for 18 months. The 'Special Administration Offer Agreement' provides for the Department to offer to purchase Bazalgette on whatever terms the Department feels appropriate (or to discontinue the project and pay compensation, as above

Appendix B: Azura Edo IPP, Nigeria

	Risk Mitigation Solution	Purpose
1	Investment Guarantee (PRI) by MIGA	Political risk support to encourage lending from commercial lenders. The policy covers currency transfer/inconvertibility issues (given that the project's revenue stream is in naira, the local currency), asset expropriation, war and civil disturbance, and breach of contract by the Nigerian government
2	Partial Risk Guarantee by IBRD	Partial risk guarantee to encourage lender participation, which covers a breach by the Nigeria Bulk Energy Trader (NBET) of the Power Purchase Agreement (PPA) or a breach by the Government of Nigeria of the Put and Call Option Agreement (PCOA)
3	Equity Invest Guarantee by MIGA	Political risk cover to protect the equity provided by the sponsors through a MIGA equity policy
4	Partial Credit Guarantee by IBRD	Partial credit Guarantee supporting the letter of credit issued by a major investment bank on behalf of NBET to cover its payment obligations under the PPA.
5	Letters of Credit Issued by an Investment Grade Bank	To cover the payment obligations of the project company under the PPA

Appendix C: Statistical Analysis Work Sheet

Appendix C1: Risks Categories vs Guarantee Buying Decision

		Grouped by 9. Do you buy risk mitigation solution such as guarantee/insurance to support your business?			
		Overall	**No**	**Yes**	**P-Value**
n		83	16	67	
Construction Risk category: Cost overrun_risk, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.782
	Rating - 2	8 (9.6)	2 (12.5)	6 (9.0)	
	Rating - 3	24 (28.9)	5 (31.2)	19 (28.4)	
	Rating - 4	35 (42.2)	6 (37.5)	29 (43.3)	
	Rating - 5	14 (16.9)	2 (12.5)	12 (17.9)	
Construction Risk category: Performance_risk, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.300
	Rating - 2	6 (7.2)	2 (12.5)	4 (6.0)	
	Rating - 3	21 (25.3)	6 (37.5)	15 (22.4)	
	Rating - 4	32 (38.6)	5 (31.2)	27 (40.3)	
	Rating - 5	22 (26.5)	2 (12.5)	20 (29.9)	
Construction Risk category: Delays_risk, n (%)	Rating - 2	2 (2.4)	1 (6.2)	1 (1.5)	0.143
	Rating - 3	23 (27.7)	7 (43.8)	16 (23.9)	
	Rating - 4	42 (50.6)	8 (50.0)	34 (50.7)	
	Rating - 1	1 (1.2)		1 (1.5)	
	Rating - 5	15 (18.1)		15 (22.4)	
Construction Risk category: Licensing/Permits_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.049
	Rating - 2	9 (10.8)	3 (18.8)	6 (9.0)	
	Rating - 3	29 (34.9)	8 (50.0)	21 (31.3)	
	Rating - 4	23 (27.7)	2 (12.5)	21 (31.3)	
	Rating - 5	21 (25.3)	2 (12.5)	19 (28.4)	
Construction Risk category: Engineering_risk, n (%)	Rating - 2	20 (24.1)	4 (25.0)	16 (23.9)	0.144
	Rating - 3	38 (45.8)	11 (68.8)	27 (40.3)	
	Rating - 5	6 (7.2)	1 (6.2)	5 (7.5)	
	Rating - 1	3 (3.6)		3 (4.5)	
	Rating - 4	16 (19.3)		16 (23.9)	
Construction Risk category: Logistics & Procurement issues_risk, n (%)	Rating - 2	19 (22.9)	5 (31.2)	14 (20.9)	0.424
	Rating - 3	37 (44.6)	8 (50.0)	29 (43.3)	
	Rating - 4	19 (22.9)	3 (18.8)	16 (23.9)	
	Rating - 5	8 (9.6)		8 (11.9)	
Construction Risk category: EPC Contractor_risk, n (%)	Rating - 1	5 (6.0)	2 (12.5)	3 (4.5)	0.233
	Rating - 2	9 (10.8)	2 (12.5)	7 (10.4)	
	Rating - 3	18 (21.7)	6 (37.5)	12 (17.9)	
	Rating - 4	33 (39.8)	4 (25.0)	29 (43.3)	
	Rating - 5	18 (21.7)	2 (12.5)	16 (23.9)	
Construction Risk category: Insolvency_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.040
	Rating - 2	4 (4.8)	1 (6.2)	3 (4.5)	
	Rating - 3	18 (21.7)	3 (18.8)	15 (22.4)	

	Rating - 4	35 (42.2)	10 (62.5)	25 (37.3)	
	Rating - 5	25 (30.1)	1 (6.2)	24 (35.8)	
Completion Risk category: Change of control/ transition risk_risk, n (%)	Rating - 2	9 (10.8)	2 (12.5)	7 (10.4)	0.682
	Rating - 3	58 (69.9)	13 (81.2)	45 (67.2)	
	Rating - 4	12 (14.5)	1 (6.2)	11 (16.4)	
	Rating - 1	1 (1.2)		1 (1.5)	
	Rating - 5	3 (3.6)		3 (4.5)	
Completion Risk category: Completion certification (inadequate performance and delay)_risk, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.393
	Rating - 2	5 (6.0)	2 (12.5)	3 (4.5)	
	Rating - 3	61 (73.5)	11 (68.8)	50 (74.6)	
	Rating - 4	15 (18.1)	2 (12.5)	13 (19.4)	
Completion Risk category: Final approvals, licensing and permits_risk, n (%)	Rating - 2	4 (4.8)	2 (12.5)	2 (3.0)	0.332
	Rating - 3	58 (69.9)	11 (68.8)	47 (70.1)	
	Rating - 4	17 (20.5)	3 (18.8)	14 (20.9)	
	Rating - 5	4 (4.8)		4 (6.0)	
Completion Risk category: Engineering_risk, n (%)	Rating - 2	10 (12.0)	4 (25.0)	6 (9.0)	0.348
	Rating - 3	58 (69.9)	11 (68.8)	47 (70.1)	
	Rating - 4	11 (13.3)	1 (6.2)	10 (14.9)	
	Rating - 1	2 (2.4)		2 (3.0)	
	Rating - 5	2 (2.4)		2 (3.0)	
Completion Risk category: Logistics & Assembly issues_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.334
	Rating - 2	9 (10.8)	2 (12.5)	7 (10.4)	
	Rating - 3	62 (74.7)	11 (68.8)	51 (76.1)	
	Rating - 4	10 (12.0)	2 (12.5)	8 (11.9)	
	Rating - 5	1 (1.2)		1 (1.5)	
Completion Risk category: Insolvency_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.145
	Rating - 2	4 (4.8)	1 (6.2)	3 (4.5)	
	Rating - 3	55 (66.3)	9 (56.2)	46 (68.7)	
	Rating - 4	12 (14.5)	4 (25.0)	8 (11.9)	
	Rating - 5	11 (13.3)	1 (6.2)	10 (14.9)	
Operational Risk category: Operation and maintenance including local experience_risk, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.642
	Rating - 2	8 (9.6)	1 (6.2)	7 (10.4)	
	Rating - 3	23 (27.7)	6 (37.5)	17 (25.4)	
	Rating - 4	36 (43.4)	6 (37.5)	30 (44.8)	
	Rating - 5	14 (16.9)	2 (12.5)	12 (17.9)	
Operational Risk category: Technology & change of standards_risk, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.446
	Rating - 2	15 (18.1)	4 (25.0)	11 (16.4)	
	Rating - 3	33 (39.8)	7 (43.8)	26 (38.8)	
	Rating - 4	24 (28.9)	2 (12.5)	22 (32.8)	
	Rating - 5	9 (10.8)	2 (12.5)	7 (10.4)	
Operational Risk category: Supply of throughput (including cost) _risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.187
	Rating - 2	8 (9.6)	2 (12.5)	6 (9.0)	
	Rating - 3	39 (47.0)	9 (56.2)	30 (44.8)	
	Rating - 4	20 (24.1)	2 (12.5)	18 (26.9)	

	Rating - 5	15 (18.1)	2 (12.5)	13 (19.4)	
Operational Risk category: Off take (including demand/user risk) _risk, n (%)	Rating - 2	2 (2.4)	1 (6.2)	1 (1.5)	0.372
	Rating - 3	18 (21.7)	1 (6.2)	17 (25.4)	
	Rating - 4	28 (33.7)	7 (43.8)	21 (31.3)	
	Rating - 5	34 (41.0)	7 (43.8)	27 (40.3)	
	Rating - 1	1 (1.2)		1 (1.5)	
Operational Risk category: Early termination_risk, n (%)	Rating - 2	5 (6.0)	2 (12.5)	3 (4.5)	0.316
	Rating - 3	32 (38.6)	4 (25.0)	28 (41.8)	
	Rating - 4	28 (33.7)	8 (50.0)	20 (29.9)	
	Rating - 5	17 (20.5)	2 (12.5)	15 (22.4)	
	Rating - 1	1 (1.2)		1 (1.5)	
Operational Risk category: Refinancing Risk_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.290
	Rating - 2	13 (15.7)	3 (18.8)	10 (14.9)	
	Rating - 3	24 (28.9)	4 (25.0)	20 (29.9)	
	Rating - 4	35 (42.2)	7 (43.8)	28 (41.8)	
	Rating - 5	10 (12.0)	1 (6.2)	9 (13.4)	
Operational Risk category: Payment (billing & collection)_risk, n (%)	Rating - 2	3 (3.6)	1 (6.2)	2 (3.0)	0.851
	Rating - 3	21 (25.3)	4 (25.0)	17 (25.4)	
	Rating - 4	38 (45.8)	8 (50.0)	30 (44.8)	
	Rating - 5	21 (25.3)	3 (18.8)	18 (26.9)	
Operational Risk category: Country risk events_risk, n (%)	Rating - 3	7 (8.4)	2 (12.5)	5 (7.5)	0.768
	Rating - 4	31 (37.3)	5 (31.2)	26 (38.8)	
	Rating - 5	43 (51.8)	9 (56.2)	34 (50.7)	
	Rating - 2	2 (2.4)		2 (3.0)	
Operational Risk category: Insolvency_risk, n (%)	Rating - 2	6 (7.2)	1 (6.2)	5 (7.5)	0.940
	Rating - 3	19 (22.9)	3 (18.8)	16 (23.9)	
	Rating - 4	31 (37.3)	7 (43.8)	24 (35.8)	
	Rating - 5	27 (32.5)	5 (31.2)	22 (32.8)	
Commercial, Political and Country Risk category: Change of law_risk, n (%)	Rating - 2	6 (7.2)	1 (6.2)	5 (7.5)	0.201
	Rating - 3	9 (10.8)	4 (25.0)	5 (7.5)	
	Rating - 4	32 (38.6)	4 (25.0)	28 (41.8)	
	Rating - 5	36 (43.4)	7 (43.8)	29 (43.3)	
Commercial, Political and Country Risk category: Interest rate risk_risk, n (%)	Rating - 3	27 (32.5)	8 (50.0)	19 (28.4)	0.269
	Rating - 4	34 (41.0)	6 (37.5)	28 (41.8)	
	Rating - 5	15 (18.1)	2 (12.5)	13 (19.4)	
	Rating - 2	7 (8.4)		7 (10.4)	
Commercial, Political and Country Risk category: Exchange rate risk_risk, n (%)	Rating - 3	13 (15.7)	3 (18.8)	10 (14.9)	0.810
	Rating - 4	28 (33.7)	6 (37.5)	22 (32.8)	
	Rating - 5	39 (47.0)	7 (43.8)	32 (47.8)	
	Rating - 2	3 (3.6)		3 (4.5)	
Commercial, Political and Country Risk category: Inflation risk_risk, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.114
	Rating - 2	7 (8.4)	2 (12.5)	5 (7.5)	
	Rating - 3	24 (28.9)	5 (31.2)	19 (28.4)	
	Rating - 4	31 (37.3)	7 (43.8)	24 (35.8)	

	Rating - 5	20 (24.1)	1 (6.2)	19 (28.4)	
Commercial, Political and Country Risk category: Currency transfer and convertibility_risk, n (%)	Rating - 3	8 (9.6)	2 (12.5)	6 (9.0)	0.827
	Rating - 4	25 (30.1)	5 (31.2)	20 (29.9)	
	Rating - 5	47 (56.6)	9 (56.2)	38 (56.7)	
	Rating - 2	3 (3.6)		3 (4.5)	
Commercial, Political and Country Risk category: Expropriation (All forced government action/hostilities)_risk, n (%)	Rating - 2	4 (4.8)	1 (6.2)	3 (4.5)	0.946
	Rating - 3	10 (12.0)	2 (12.5)	8 (11.9)	
	Rating - 4	24 (28.9)	4 (25.0)	20 (29.9)	
	Rating - 5	43 (51.8)	9 (56.2)	34 (50.7)	
	Rating - 1	2 (2.4)		2 (3.0)	
Commercial, Political and Country Risk category: War and civil disturbances_risk, n (%)	Rating - 2	5 (6.0)	2 (12.5)	3 (4.5)	0.502
	Rating - 3	13 (15.7)	4 (25.0)	9 (13.4)	
	Rating - 4	23 (27.7)	4 (25.0)	19 (28.4)	
	Rating - 5	41 (49.4)	6 (37.5)	35 (52.2)	
	Rating - 1	1 (1.2)		1 (1.5)	
Commercial, Political and Country Risk category: Forced Abandonment_risk, n (%)	Rating - 2	7 (8.4)	1 (6.2)	6 (9.0)	0.855
	Rating - 3	12 (14.5)	3 (18.8)	9 (13.4)	
	Rating - 4	35 (42.2)	8 (50.0)	27 (40.3)	
	Rating - 5	28 (33.7)	4 (25.0)	24 (35.8)	
	Rating - 1	1 (1.2)		1 (1.5)	
Commercial, Political and Country Risk category: Non-Payment risk_risk, n (%)	Rating - 4	24 (28.9)	7 (43.8)	17 (25.4)	0.373
	Rating - 5	53 (63.9)	9 (56.2)	44 (65.7)	
	Rating - 2	2 (2.4)		2 (3.0)	
	Rating - 3	4 (4.8)		4 (6.0)	

Appendix C2: Availability versus Buying Guarantee

		Grouped by 9. Do you buy risk mitigation solution such as guarantee/insurance to support your business?			
		Overall	**No**	**Yes**	**P-Value**
n		83	16	67	
11. How do you assess availability of risk mitigation solutions such as guarantees, specialty insurance, etc in the market aimed specifically at supporting infrastructure globally? Availability means suppliers and such risk mitigation solutions are in the market. Please indicate from a scale of 1-5, with 5 representing extremely available , and 1 representing extremely unavailable. availability, n (%)	Rating - 2	14 (16.9)	2 (12.5)	12 (17.9)	0.577
	Rating - 3	42 (50.6)	7 (43.8)	35 (52.2)	
	Rating - 4	25 (30.1)	6 (37.5)	19 (28.4)	
	Rating - 5	2 (2.4)	1 (6.2)	1 (1.5)	
12. Do you consider existing risk mitigation products such as guarantees and insurance adequate to meet the needs of the market? Please indicate from a scale of 1-5, with 5 representing extremely adequate, and 1 representing extremely inadequate. _availability, n (%)	Rating - 2	22 (26.5)	4 (25.0)	18 (26.9)	0.795
	Rating - 3	33 (39.8)	6 (37.5)	27 (40.3)	
	Rating - 4	22 (26.5)	4 (25.0)	18 (26.9)	
	Rating - 5	5 (6.0)	2 (12.5)	3 (4.5)	
	Rating - 1	1 (1.2)		1 (1.5)	
13. Do you consider availability of guarantee/ risk mitigation products in your decision to buy such products? Please indicate, importance of availability in your decision, from a scale of 1-5, with 5 representing extremely important in the decision, and 1 representing extremely less important in the decision. availability, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.232
	Rating - 2	3 (3.6)	1 (6.2)	2 (3.0)	
	Rating - 3	22 (26.5)	5 (31.2)	17 (25.4)	
	Rating - 4	32 (38.6)	6 (37.5)	26 (38.8)	
	Rating - 5	25 (30.1)	3 (18.8)	22 (32.8)	
14. How complex is the existing guarantee/ other risk mitigation instruments for your various infrastructure projects? Complex here means easy to use and understand the guarantee instrument. Please	Rating - 2	18 (21.7)	2 (12.5)	16 (23.9)	0.766
	Rating - 3	33 (39.8)	8 (50.0)	25 (37.3)	
	Rating - 4	24 (28.9)	5 (31.2)	19 (28.4)	
	Rating - 5	6 (7.2)	1 (6.2)	5 (7.5)	
	Rating - 1	2 (2.4)		2 (3.0)	

indicate from a scale of 1-5, with 5 representing extremely complex, and 1 representing extremely less complex._availability, n (%)					
15. Do you believe the complexity of existing guarantee/ other risk mitigation instruments affects your decision in buying guarantee instruments to manage your risks in infrastructure projects?. Please indicate from a scale of 1-5, with 5 representing extremely no impact on decision, and 1 representing extremely high impact on decision._availability, n (%)	Rating - 2	24 (28.9)	5 (31.2)	19 (28.4)	0.134
	Rating - 3	28 (33.7)	9 (56.2)	19 (28.4)	
	Rating - 4	23 (27.7)	1 (6.2)	22 (32.8)	
	Rating - 5	5 (6.0)	1 (6.2)	4 (6.0)	
	Rating - 1	3 (3.6)		3 (4.5)	
16. How important is your relationship with advisors/brokers in your decision to buy risk mitigation solutions such as guarantee/insurance? Please indicate from a scale of 1-5, with 5 representing extremely important, and 1 representing extremely less important._availability, n (%)	Rating - 1	8 (9.6)	2 (12.5)	6 (9.0)	0.165
	Rating - 2	15 (18.1)	1 (6.2)	14 (20.9)	
	Rating - 3	16 (19.3)	1 (6.2)	15 (22.4)	
	Rating - 4	20 (24.1)	4 (25.0)	16 (23.9)	
	Rating - 5	24 (28.9)	8 (50.0)	16 (23.9)	
17. Do you believe the existing guarantee/ other risk mitigation instruments reduces net financing cost of your business in Africa. Please indicate from a scale of 1-5, with 5 representing extremely no impact on financing cost, and 1 representing extremely reduces financing cost_availability, n (%)	Rating - 1	15 (18.1)	4 (25.0)	11 (16.4)	0.349
	Rating - 2	23 (27.7)	7 (43.8)	16 (23.9)	
	Rating - 3	14 (16.9)	2 (12.5)	12 (17.9)	
	Rating - 4	19 (22.9)	2 (12.5)	17 (25.4)	
	Rating - 5	12 (14.5)	1 (6.2)	11 (16.4)	
18. How important is the Credit Rating of the guarantee/ risk mitigation solution provider in your decision to buy such products? Please indicate, importance of the Credit Rating in your decision, from a scale of 1-5, with 5 representing extremely important, and 1 representing extremely less important_availability, n (%)	Rating - 1	1 (1.2)	1 (6.2)		0.250
	Rating - 4	25 (30.1)	5 (31.2)	20 (29.9)	
	Rating - 5	52 (62.7)	10 (62.5)	42 (62.7)	
	Rating - 2	1 (1.2)		1 (1.5)	
	Rating - 3	4 (4.8)		4 (6.0)	
	Rating - 2	4 (4.8)	3 (18.8)	1 (1.5)	0.032

19. How important is pricing (premium or guarantee fees) of the guarantee/ risk mitigation solution in your decision to buy such products? Please indicate, importance of the pricing in your decision, from a scale of 1-5, with 5 representing extremely important, and 1 representing extremely less important_availability, n (%)	Rating - 4	25 (30.1)	4 (25.0)	21 (31.3)	
	Rating - 5	44 (53.0)	9 (56.2)	35 (52.2)	
	Rating - 1	1 (1.2)		1 (1.5)	
	Rating - 3	9 (10.8)		9 (13.4)	

Appendix C3: Decision Rationale versus Buying Guarantee.

		Grouped by 9. Do you buy risk mitigation solution such as guarantee/insurance to support your business?			
		Overall	**No**	**Yes**	**P-Value**
n		83	16	67	
Demand rationale category: Regulatory/Balance Sheet requirements (Basel, Solvency 2, etc)_response, n (%)	Rating - 1	8 (9.6)	2 (12.5)	6 (9.0)	0.855
	Rating - 3	16 (19.3)	2 (12.5)	14 (20.9)	
	Rating - 4	31 (37.3)	7 (43.8)	24 (35.8)	
	Rating - 5	26 (31.3)	5 (31.2)	21 (31.3)	
	Rating - 2	2 (2.4)		2 (3.0)	
Demand rationale category: Internal Investment requirements_response, n (%)	Rating - 1	2 (2.4)	1 (6.2)	1 (1.5)	0.226
	Rating - 2	13 (15.7)	5 (31.2)	8 (11.9)	
	Rating - 3	22 (26.5)	4 (25.0)	18 (26.9)	
	Rating - 4	26 (31.3)	4 (25.0)	22 (32.8)	
	Rating - 5	20 (24.1)	2 (12.5)	18 (26.9)	
Demand rationale category: Internal Risk Management requirements_response, n (%)	Rating - 2	6 (7.2)	3 (18.8)	3 (4.5)	0.154
	Rating - 3	14 (16.9)	4 (25.0)	10 (14.9)	
	Rating - 4	30 (36.1)	6 (37.5)	24 (35.8)	
	Rating - 5	32 (38.6)	3 (18.8)	29 (43.3)	
	Rating - 1	1 (1.2)		1 (1.5)	
Demand rationale category: Access to finance_response, n (%)	Rating - 2	7 (8.4)	1 (6.2)	6 (9.0)	0.806
	Rating - 3	13 (15.7)	2 (12.5)	11 (16.4)	
	Rating - 4	23 (27.7)	4 (25.0)	19 (28.4)	
	Rating - 5	37 (44.6)	9 (56.2)	28 (41.8)	
	Rating - 1	3 (3.6)		3 (4.5)	
Demand rationale category: Size of Business /Portfolio of Africa Projects_response, n (%)	Rating - 1	6 (7.2)	1 (6.2)	5 (7.5)	0.052
	Rating - 2	7 (8.4)	4 (25.0)	3 (4.5)	
	Rating - 3	35 (42.2)	8 (50.0)	27 (40.3)	
	Rating - 4	15 (18.1)	1 (6.2)	14 (20.9)	
	Rating - 5	20 (24.1)	2 (12.5)	18 (26.9)	
Demand rationale category: Nature of Investment/ specific	Rating - 1	4 (4.8)	2 (12.5)	2 (3.0)	0.057
	Rating - 2	11 (13.3)	5 (31.2)	6 (9.0)	
	Rating - 3	17 (20.5)	3 (18.8)	14 (20.9)	

project factors_response, n (%)	Rating - 4	27 (32.5)	3 (18.8)	24 (35.8)	
	Rating - 5	24 (28.9)	3 (18.8)	21 (31.3)	
Demand rationale category: Expertise of, and relationship with Advisors/Brokers _response, n (%)	Rating - 1	7 (8.4)	1 (6.2)	6 (9.0)	0.995
	Rating - 2	15 (18.1)	3 (18.8)	12 (17.9)	
	Rating - 3	25 (30.1)	5 (31.2)	20 (29.9)	
	Rating - 4	24 (28.9)	5 (31.2)	19 (28.4)	
	Rating - 5	12 (14.5)	2 (12.5)	10 (14.9)	

Appendix C4: Survey Questionnaire

Section I: General Information

1. Location of your Company:

   City _____ Country _____

2. Which best describes your company's main areas of activity? (Check one or more boxes)

   - ☐ Infrastructure Development/Investment Company _____
   - ☐ EPC Contractor _____
   - ☐ Bank /DFI
   - ☐ Pension fund, Investment Fund and Asset Managers including Private Equity firms
   - ☐ Insurance
   - ☐ Insurance Brokerage
   - ☐ Consulting/Advisory firms
   - ☐ Government including Municipalities_____
   - ☐ Utility company
   - ☐ Others. Please indicate the type of activity _____

3. Are you a:

   - ☐ State owned company
   - ☐ State controlled company
   - ☐ Private sector company

4. Your company's annual turnover is (US$ or US$ equivalent) is

The value of your company's total assets is (US$ or US$ equivalent) is:

_____

5. Have you been involved in investing or financing infrastructure projects in Africa before? If yes, when (which year) and where (which country)?

If No, please provide the reasons for your company not participating (investing or Financing) in infrastructure projects in Africa.

6. What obstacles or major issues does your business encounter in developing and or financing infrastructure projects in Africa?

7. What are the other major geographic/economic/ regulatory issues which impact your current operations or are likely to affect your business in Africa?

8. Do you see the need for risk mitigation solution such guarantee/ insurance, as a possible solution to address obstacles and other major geographic/economic/ regulatory issues affecting your ability to invest or support your business in Africa (current/ future)?
   If yes, please provide details

9. Do you buy risk mitigation solution such as guarantee/ insurance to support your business?

   Yes

   No

Section II: Decision Drivers of Buying Guarantee/ Risk Mitigation Instruments

10. What influencing factors or elements are considered when buying guarantee or insurance solution. Please indicate from a scale of 1-5, with 5 representing extremely important consideration, and 1 representing extremely less important consideration

Demand rationale category	**Scale of Importance**				
Regulatory/Balance Sheet requirements (Basel, Solvency 2, etc)	1	2	3	4	5
Internal Investment requirements	1	2	3	4	5
Internal Risk Management requirements	1	2	3	4	5
Access to finance	1	2	3	4	5
Size of Business /Portfolio of Africa Projects	1	2	3	4	5

Nature of Investment/ specific project factors	1	2	3	4	5
Expertise of, and relationship with Advisors/Brokers	1	2	3	4	5
Others (mention the influencing factors)	1	2	3	4	5

Section III: Availability and Understanding of Guarantee/ Risk Mitigation Instruments

11. How do you assess availability of risk mitigation solutions such as guarantees, specialty insurance, etc in the market aimed specifically at supporting infrastructure globally? Availability means suppliers and such risk mitigation solutions are in the market. Please indicate from a scale of 1-5, with 5 representing **extremely available** , and 1 representing **extremely unavailable**.

    ☐ _____

12. Do you consider existing risk mitigation products such as guarantees and insurance adequate to meet the needs of the market? Please indicate from a scale of 1-5, with 5 representing **extremely adequate,** and 1 representing **extremely inadequate.**

    ☐ _____

13. Do you consider availability of guarantee/ risk mitigation products in your decision to buy such products? Please indicate, importance of availability in your decision, from a scale of 1-5, with 5 **representing extremely important in the decision**, and 1 representing **extremely less important in the decision.**

    ☐ _____

14. How complex is the existing guarantee/ other risk mitigation instruments for your various infrastructure projects? Complex here means easy to use and understand the guarantee instrument. Please indicate from a scale of 1-5, with 5 representing **extremely complex**, and 1 representing **extremely less complex**.

    ☐ _____

15. Do you believe the complexity of existing guarantee/ other risk mitigation instruments affects your decision in buying guarantee instruments to manage your risks in

infrastructure projects?. Please indicate from a scale of 1-5, with 5 representing **extremely no impact on decision**, and 1 representing **extremely high impact on decision**.

☐ _____

16. Do you believe the existing guarantee/ other risk mitigation instruments reduces net financing cost of your business in Africa. Please indicate from a scale of 1-5, with 5 representing **extremely no impact on financing cost**, and 1 representing **extremely reduces financing cost**

☐ _____

17. How important is the Credit Rating of the guarantee/ risk mitigation solution provider in your decision to buy such products? Please indicate, importance of the Credit Rating in your decision, from a scale of 1-5, with **5 representing extremely important**, and **1 representing extremely less important**

☐ _____

18. How important is pricing(premium or guarantee fees) of the guarantee/ risk mitigation solution in your decision to buy such products? Please indicate, importance of the pricing in your decision, from a scale of 1-5, with **5 representing extremely important**, and **1 representing extremely less important**

☐ _____

Section IV: Risk Identification, Exposure & Mitigants

19. Regarding the following categories of risks in infrastructure transactions in Africa, which ones do you feel carry the most deterring factors in your decision to participate in and/ or finance infrastructure investments in Africa? Please indicate from a scale of 1-5, **with 5 representing highest deterring factor**, and **1 representing lowest deterring factor**.

Construction Risk category	**Scale of Importance**				
Cost overrun	1	2	3	4	5
Performance	1	2	3	4	5

Delays	1	2	3	4	5
Licensing/permits	1	2	3	4	5
Engineering	1	2	3	4	5
Logistics &Procurement issues	1	2	3	4	5
EPC Contractor	1	2	3	4	5
Insolvency	1	2	3	4	5
Others(mention the risk)	1	2	3	4	5

Please insert additional comments if any:

20. Regarding Completion/Commissioning Risk, Please indicate from a scale of 1-5, with 5 **representing highest deterring factor**, and **1 representing lowest deterring factor :**

Completion Risk category	**Scale of Importance**				
Change of control/ transition risk	1	2	3	4	5
Completion certification (inadequate performance and delay)	1	2	3	4	5
Final approvals, licensing and permits	1	2	3	4	5
Engineering	1	2	3	4	5
Logistics &Assembly issues	1	2	3	4	5
Insolvency	1	2	3	4	5
Others(mention the risk)	1	2	3	4	5

Please insert additional comments if any:

21. Regarding Risk relating to operational phase of the project, please indicate from a scale of 1-5, with 5 **representing highest deterring factor**, and 1 **representing lowest deterring factor** :

Operational Risk category	**Scale of Importance**				
Operation and maintenance including local experience	1	2	3	4	5
Technology & change of standards	1	2	3	4	5
Supply of throughput(including cost	1	2	3	4	5
Off take (including demand/user risk)	1	2	3	4	5
Early termination	1	2	3	4	5
Refinancing Risk	1	2	3	4	5
Payment (billing & collection)	1	2	3	4	5
Country risk events	1	2	3	4	5
Insolvency	1	2	3	4	5
Others (mention the risk)	1	2	3	4	5

Please insert additional comments if any:

22. Regarding market specific risk such as macro-economic risks, political and regulatory risks affecting infrastructure projects, please indicate from a scale of 1-5, **with 5 representing highest deterring factor,** and **1 representing lowest deterring factor** :

Commercial, Political and country Risk category	**Scale of Importance**				
Change of law	1	2	3	4	5
Interest rate risk	1	2	3	4	5
Exchange rate risk	1	2	3	4	5
Inflation risk	1	2	3	4	5

Currency transfer and convertibility	1	2	3	4	5
Expropriation(All forced government action/hostilities)	1	2	3	4	5
War and civil disturbances	1	2	3	4	5
Forced Abandonment	1	2	3	4	5
Non-Payment risk	1	2	3	4	5
Others (mention the risk)	1	2	3	4	5

Please insert additional comments if any:

23. Please list the top four risks which in your experience, cause(s) the most problems in investing or financing infrastructure transaction in Africa and which influences your decision to seek risk mitigation instruments when investing in such projects? Ranking is not necessary.

    ☐ Risk 1
    ☐ Risk2
    ☐ Risk 3
    ☐ Risk 4

24. Please list the top four other factors other than above, which in your experience, influences your decision to seek risk mitigation instruments? Ranking is not necessary.

    ☐
    ☐
    ☐
    ☐

Section V: Types of Risk Coverage and Suppliers

25. Which of the following risk mitigation solution providers do you buy your risk mitigation cover such as guarantee/ insurance from (check all that apply)?

    Export Credit Agency (List Name(s) _____

    ☐ Multilateral Development Bank (List Name(s))_____
    ☐ Regional Development Bank (List Name(s))_____
    ☐ National Development Bank (List Name(s)_____
    ☐ Private Credit Insurance Entity (List Name(s)):_____

- ☐ Private Sector Specialised Guarantee provider (List Name(s):_____
- ☐ Commercial Bank_____
- ☐ Government

26. For what kind of risks does your organization take out cover? (Check all that apply).

- ☐ Political risk
- ☐ Commercial risk
- ☐ Other:_____

27. For what kind of guarantee/ insurance policy does your organization buy ? (Check all that apply).

- ☐ Contract Frustration/Non-honoring sovereign obligation
- ☐ PRI
- ☐ Structured credit
- ☐ Surety
- ☐ Other: please specify_____

Section VI: Other Comments

28. Please provide any additional comments you feel may be relevant:

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