Impact of Investment Efficiency, Investment Scale and Financial Flexibility on Risk-Taking Behaviour in an Emerging Market

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List of abbreviatons and acronyms

CFOs	Chief Financial Officers
COVID-19	Corona Virus Disease 2019
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
NPVs	Net Present Values
PPE	Property Plant and Equipment
SDG	Sustainable Development Goal
VIF	Variance Inflation Factor
WDI	World Development Indicators

Abstract

There is limited number of studies that explore the concepts of investment efficiency, financial flexibility, and investment scale globally. Moreover, in the African context, these areas continue to be grey areas with limited knowledge on the effect they have on the risk-taking behaviour of listed non-financial firms. Using a data set of 264 firms across 17 countries in Africa over the period 2007–2018, this study explores the effect of investment efficiency and financial flexibility, as well as the effect of investment scale and financial flexibility on the risk-taking behaviour of firms. The analysis was conducted using the two-step system generalized method of moments (System-GMM), with the robust option. With the z-score as a measure for risk-taking behaviour, the results show that investment efficiency is paramount for enhancing financial stability, but investment scale reduces the financial stability of firms. This nexus is moderated by firm size, and the effect of firm size on financial stability is found to be inverted U-shaped. The finding also shows the decreasing relevance of tangible assets against the growing relevance of intangible assets as the drivers of firm stability. The impact of other factors such as financial leverage, cash flow growth, revenue growth, GDP growth, and inflation are discussed in detail. The results have relevant implications for policy, practice, and future research.

Key words: *Investment efficiency; Investment scale; Risk-taking behaviour; Financial flexibility; Africa; Stock market.*

JEL classification codes: *E44; G31; G32; N27; O16.*

1. Introduction

In Africa, the financial system continues to be underdeveloped as compared with the financial systems of other continents. Nevertheless, the capital market continues to grow and it is vital in providing economic supports that complement bank financing. Before 1989, there were only five stock exchanges in sub-Saharan Africa and three in North Africa. Currently, there are 29 stock exchanges in Africa, representing capital markets in 38 nations. There has been a significant increase in the trade volumes and the number of shares traded in the stock markets across the continent. For example, the market capitalization of the stock markets in the continent was about US$133 billion in 1992, but has since increased to over US$1.13 trillion in 2018 (Soumaré et al., 2021). The changes evident in the African continent are driven by years of focus on improvement in automation, demutualization, regional integration, institutional investment, regulation and supervision, education and capacity building, as well as foreign participation (Yartey & Adjasi, 2007).

There is a unique context to corporate finance that is enhanced by the involvement of the capital market, which is also evident in Africa. The increasing development of the stock market in Africa is a signal that research is increasingly needed to explore the various problems that bedevil firms, and also to provide a relevant extension of theory, policy guidance and practical alternatives. Exploring the corporate finance literature over the past 50 years, researchers have provided relevant empirical and theoretical contributions to literature. Studies have explored various corporate finance concepts like capital structure and firm value (Antill & Grenadier, 2019; Khémiri & Noubbigh, 2018), dividend policy (Manos et al., 2012), investment decision and uncertainty (Duho et al., 2020b; Kanga et al., 2020; Lensink & Murinde, 2006), corporate control (Aminadav & Papaioannou, 2020; Obaydin et al., 2021), and mergers and acquisition (Rao & Mishra, 2020), among others.

In the corporate context where decision-making on investment could be negatively affected by the agency problem, there are many implications for shareholders, managers and policy makers in general. Yet, research on this aspect of corporate finance is globally scant despite the relevance. Specifically, there is limited knowledge on financial flexibility, investment efficiency and investment scale, as well as the implications on the risk-taking behaviour of firms. To provide a context, financial flexibility relates to the extent to which a firm can effectively respond to unanticipated shocks to investment opportunities or cash flows. It is also the extent to which a firm

can access and restructure corporate finances at a low cost. Financial flexibility is linked to the puzzle in the capital structure literature where, averagely, the actual leverage of firms is lower than the expected leverage, due to the trade-off between bankruptcy costs and tax shields (De Jong et al., 2012). There are arguments globally that financial flexibility is a fundamental driver of the capital structure of firms (Bancel & Mittoo, 2011; Garmaise & Natividad, 2021). Also, a survey of Chief Financial Officers (CFOs) by Graham and Harvey (2001) found that financial flexibility is the sole driver of capital structure, yet research on this relevant corporate finance concept remains scarce after two decades. Financial flexibility is unobservable and difficult to measure, and thus only a few studies explore it or its nexus with other corporate finance variables.

The concept of investment efficiency is another aspect of corporate finance that has limited studies in the extant literature. Investment efficiency is argued to be a function of the total cost, return and risk of investment management, based on the existing constraints to investors. Investment efficiency relates to the investment management structure of firms and its main drivers are financial efficiency and non-financial efficiency (Hodgson et al., 2000). Investment efficiency emanates from estimations of the Net Present Values (NPVs) of investments, which is a widely used investment appraisal technique. In investment appraisal, an investment could either record a positive, negative or a zero NPV. The firm will be regarded as experiencing overinvestment where there is negative NPV; and where there is positive NPV, the investment may be regarded as underinvestment. The depth and extent of the overinvestment or underinvestment of corporate investment explain the concept of investment efficiency. Similar to financial flexibility, investment efficiency is difficult to measure, and studies on the concept are few in the extant literature.

Investment scale, which is sometimes subsumed under the concept of investment efficiency, is another concept that has been explored in the extant literature, albeit scant (Gao & Yu, 2020; Goodman et al., 2014; He et al., 2019). Essentially, the two concepts are different and the investment scale is specifically the growth in the non-cash assets of firms. The impact of investment efficiency and investment scale on corporate factors like performance and risk-taking behaviour could differ. For example, Ma and Jin (2016) found that the impact of investment scale on the performance of firms is different from the impact of investment scale on performance. Corporate finance literature has extensively explored the concept of risk and risk-taking behaviours of corporate managers globally. There are both market-based measures and accounting-based measures of risk. Understanding the risk profile of firms is very relevant in attaining financial stability, and the increasing complexity of corporate activities, and financial instruments have been accompanied with increasing calls for risk management.

The motivation of this study is driven by clear gaps in the literature regarding the effect of investment efficiency (or investment scale) and financial flexibility on the risk-taking behaviour of non-financial listed firms in Africa. There is clear non-existence of this relationship in the literature and for the limited related studies, the findings are inconclusive. For example, Xu and Zhou (2016) explored the impact of

overinvestment on credit risk which is just a risk type, and the findings relate only to a part of the concept of investment efficiency. Also, Ma and Jin (2016) explored the impact of investment efficiency on the performance of firms, without exploring the investment efficiency nexus. Besides the evident issue gap, there is a vast context gap due to the limited data and research on the concepts in Africa.

Most of the research conducted on investment efficiency relates to stock markets in developed economies (Cao et al., 2020; Cook et al., 2019; Gao & Yu, 2020; Ma & Jin, 2016; Majeed et al., 2018; Menshawy et al., 2021; Naeem & Li, 2019; Samet & Jarboui, 2017; Shahzad et al., 2018; Tran, 2020). Some of these studies examined one side of investment efficiency, while others examined both but neglected the effect that investment efficiency and financial flexibility have on risk-taking behaviour. This study aims to fill the gap by using robust methods based on Afro-centric financial information on the stock markets. The unique context of African firms, which are located in developing or emerging economies, differs from the context of the UK, US, and other developed countries. This is evident with the relatively weak governance context, underdeveloped markets, highly volatile equity markets and the lack of transparency in emerging or developing economies (Yusuf et al., 2018). These suggest that the application of theories and empirical analyses need to be context-specific so as to develop practical and policy-relevant insights. In doing so, the study is carved in a way to provide insightful information on the concepts that will be relevant to managers, policy makers, academics, and others in the emerging market context.

This research, therefore, seeks to improve on the existing limited literature on investment efficiency, investment scale, and financial flexibility. It also provides a more detailed analysis of the impact that investment efficiency (or investment scale) and financial flexibility have on the risk-taking behaviour of listed non-financial firms. Specifically, the study addresses the following research questions: 1) What is the effect of investment efficiency and financial flexibility on the risk-taking behaviour of non-financial firms in Africa? 2) What are the effects of investment scale and financial flexibility on the risk-taking behaviour of non-financial firms in Africa?

This study, which is based on a recent data set covering the period 2007–2018, provides insightful results that are relevant for policy, regulation, practice, and future research. The study shows that, regarding the first research question, in a model with both investment efficiency and financial flexibility, the impact of both variables on the risk-taking behaviour of firms is significant. Specifically, investment efficiency increases the financial stability of firms, while financial flexibility reduces the financial stability of firms. As regards the second research question, the study found that both investment scale and financial flexibility significantly affect the risk-taking behaviour of firms. In this case, both investment scale and financial flexibility reduces the financial stability of firms. These findings, and many others, have been discussed in detail. The findings are useful to financial analysts, investment bankers, corporate executives, policy makers, regulators, and researchers.

The remainder of the article is structured as follows. The next section provides a

brief review of the literature on investment efficiency, investment scale, and financial flexibility. There is also a discussion of the theoretical underpinning of the study. Section 3 provides a brief description of the methodology and methods adopted to conduct the analysis. Section 4 presents the results and provides a discussion of the findings. Section 5 discusses the conclusions from the study; while Section 6 provides the implications for policy, practice, and future research.

2. Literature review

This section provides a review of the literature on agency theory to present the theoretical underpinnings of the study. In addition, related studies on investment efficiency, financial flexibility, investment scale, and risk-taking behaviour are explored.

Theoretical review: Agency theory

Agency theory has become one of the theories used to explain the relationship between managers and owners or shareholders of corporations (Eisenhardt, 1989; Jensen & Meckling, 1976b; Shapiro, 2005; Tran, 2020). The success of a firm lies in the relationship that exists between the agents who manage the resources of the firm entrusted to them by the owners or the principals. The agency problem arises from the division of ownership and control in modern companies, which leads to knowledge asymmetry between management and owners. The agency theory arises as a result of the lack of trust from shareholders in managers to put shareholder resources or funds into good use. Shareholders expect managers to put shareholder interests first in all the dealings of managers, but sometimes the gap in the flow of information from managers to shareholders gives rise to a conflict of interest from managers.

The issues of the agency theory suggest that, in the absence of effective corporate monitoring and corporate governance, managers tend to overinvest in projects that have negative Net Present Value (NPV) (Naeem & Li, 2019). Managers who seek to pursue their interests at the expense of their principals (shareholders), tend to promote overinvestment and underinvestment in the firm, which results in investment inefficiency. Research has shown that, the issues of the agency theory cause managers to overinvest in firms or industries that are declining instead of investing in industries that are increasing or projects that have positive NPV (Naeem & Li, 2019). Again, firms may pursue financial flexibility in their quest to mitigate exposures to shocks and drive corporate value. However, there is an argument that financial flexibility could be at a cost (Garmaise & Natividad, 2021). In the context of the agency problem, when firms have too little debt, managers may end up making suboptimal investment decisions as well as pursuing private perks. In such cases, financial flexibility will rather lead to inefficient investment decisions which will eventually reduce the financial stability

of firms. This study dwells on the earlier studies which used the agency theory and so applied the theory in explaining the relationship between the variables (Cao et al., 2020; Gao & Yu, 2020; Menshawy et al., 2021; Tran, 2020).

Empirical review

This section provides a discussion of related literature on the various concepts under investigation. Essentially, it has been pointed out that findings are inconsistent and literature is significantly outside the African context.

Financial flexibility

Financial flexibility has gained attention since its introduction by Modigliani and Miller (1963). It refers to the ability of a company to hold on to a certain substantial level of unused borrowing power. Modigliani and Miller (1963) argued that, despite the tax benefits of larger debt levels, businesses with considerable liabilities are more likely to experience financial difficulties. Myers (1984a) corroborates that, firms intend to borrow to fund some of their investments, but adds that they will exercise caution to minimize the costs of financial difficulty. DeAngelo and DeAngelo (2007) posit that financial flexibility is the vital missing link in the quest to provide a theory to explain the weaknesses of the pecking order theory and the trade-off theory. Financially flexible firms have unused debt capacity, are liquid enough to react to cash flow shocks, pursue investment opportunities in a timely manner, and are unconstrained in their issuance decision (Graham & Harvey, 2002).

Additionally, Byoun (2011) examined the significance of financial flexibility and came up with one of the first distinct definitions of financial flexibility, arguing that it is the degree of capacity and speed at which the firm can mobilize its financial resources to take reactive, preventive, and exploitive actions to maximize firm value. The study found financial flexibility as a tool or mechanism needed as a shock absorber in the event of financial crisis or financial difficulties. This means that, when management is faced with the problem of choosing where to invest, the first financial indicator they look at is the financial strength of the firm because the strength of the firm will inform management how flexible the firm will be if their investment yields negative returns (Ma & Jin, 2016).

Financial flexibility describes a firm's ability to effectively manage unanticipated shocks or take advantage of unanticipated investment opportunities at a low cost (Gamba & Triantis, 2008). The financial flexibility of firms usually depends on their financing cost, potential cash inflows and cash holdings (Ma & Jin, 2016). The financial flexibility of firms comes in the form of spare debt capacity to meet large positive shocks to investment opportunities. Financially flexible firms can easily access external capital markets to meet funding needs that may arise from new growth opportunities or unexpected earnings shortfalls. They are also positioned to avoid events that result in overinvestment or underinvestment and poor performance (Arslan-Ayaydin et al., 2014).

Financial flexibility improves the financial performance of firms. Financially flexible firms can readily fund investment when opportunities presented are profitable, and they are also able to avoid financial distress in the presence of negative shocks (Ma & Jin, 2016). Thus, financially flexible firms can invest more in the future than firms that are not financially flexible, which leads to improved firm performance (De Jong et al., 2012; Ma & Jin, 2016). However, Ma and Jin (2016) posit that the effect of financial flexibility on firm performance is through investment. Thus, financial flexibility improves investment initially, which then improves firm performance. De Jong et al. (2012) reports that, firms with high unused debt capacity invest more in the future than those with low unused debt capacity.

Overinvestment, underinvestment and investment efficiency

We discuss the concepts of overinvestment, underinvestment, and investment efficiency as has been applied in the extant literature.

Overinvestment is one of the investment efficiency components that affect managers. It happens when investment expenditures go beyond expenditures required to maintain assets and to finance new investments in positive NPV projects (Richardson, 2006). Biddle et al. (2009) found that companies with a lot of cash and little debt are more likely to overinvest. The theory of overinvestment suggests that firms with a lower level of debt and higher amounts of cash holdings are large firms, and this is because large firms are more likely to attract external funding at a very low rate as compared to smaller firms. This means that larger companies are positioned in a way that allows them to get access to a lot of financing sources as compared to smaller firms (Hadlock & Pierce, 2010). Biddle et al. (2009) indicate that small firms that have too much cash holdings and low leverage can be described as overinvesting. Yet, Naeem and Li (2019) disagree with them by stating that, small businesses that have a lot of room for growth can spend actively without going overboard.

Underinvestment is the flip side of the coin of overinvestment, which may also arise as a result of information asymmetry in the firm. Franzoni (2009) suggested that the main reason managers of public firms overinvest is that they have too much cash at their disposal to waste, but managers of firms that are financially constrained do not have enough cash to indulge in overinvesting, and as a result, they underinvest. Majeed et al. (2018) also posit that managers of firms underinvest when the cost of capital rises. Underinvestment usually occurs because managers are so vested in building empires for themselves. Underinvestment may occur as a result of managers' risk-averse investment behaviour or because they are too lazy to look at new investment opportunities.

Investment efficiency combines the concepts of overinvestment and underinvestment of firms. Zhang et al. (2016) defined investment efficiency as a situation in which the degree of overinvestment and underinvestment in

companies has decreased over time. Various studies have explored the concept, linking it to financial reporting (Biddle et al., 2009; Chen et al., 2011a; Gomariz & Ballesta, 2014), corporate social responsibility (Cook et al., 2019; Samet & Jarboui, 2017; Shahzad et al., 2018), and performance (Ma & Jin, 2016). There is little knowledge about the impact of the investment efficiency and financial flexibility of the risk profile of firms.

An investment decision is one of the essential responsibilities of finance managers aside from capital structure decisions and working capital decisions. It has a significant influence on the future potential of the corporation (Gao et al., 2021). Thus, managers are expected by shareholders to invest efficiently by accepting projects with positive NPV while rejecting those with negative NPV (Modigliani & Miller, 1958). However, it is not an easy task for firms since a poor assessment by the manager could lead to overinvestment or underinvestment. Either of these scenarios could have an adverse effect on the shareholders' value maximization and the firms' ability to settle debt obligations when they fall due. Ideally, the optimal point for firms to invest is when the marginal benefit of investment equals the marginal cost. Any firm operating at the optimal level is said to be investment efficient. However, firms may depart from this optimal level resulting in either overinvestment or underinvestment as a result of market frictions (Chen et al., 2017).

A firm is described as being investment efficient when its managers undertake projects that provide a positive NPV under the condition where there is no agency cost or adverse selection (Biddle et al., 2009). Consequently, a firm can be described to have underinvested when the manager rejects investment opportunities with positive NPV under the scenario of no market frictions such as agency costs and adverse selection. On the contrary, a firm is also described to have overinvested if the manager accepts projects with negative NPV. Overinvestment is associated with cash-rich and unlevered firms whose managers select negative projects to expropriate the free cash flow of the firm. Conversely, underinvestment is associated with cash strapped and highly levered firms.

In real financial markets, frictions that cause overinvestment or underinvestment may arise from agency problems (Jensen & Meckling, 1976a; Jensen & Meckling, 1976b), adverse selection (Myers & Majluf, 1984), and managerial overconfidence (Malmendier & Tate, 2005a, 2005b). The extant research has identified adverse selection and moral hazard as the two main market imperfections caused by information asymmetry that arises between the managers and the providers of funds (Stein, 2003). These market imperfections tend to affect the investment efficiency of a firm (Chen et al., 2011b). As described by the agency theory, the manager who serves as an agent may not always act in the best interests of the shareholders (principal). The managers also seek to maximize their welfare and thus would sometimes make suboptimal investment decisions that are not in the interest of the shareholders (Jensen & Meckling, 1976b). Moral hazard can result in either underinvestment or overinvestment, subject to the availability of cash (Biddle et al., 2009).

While cash-rich firms tend to overinvest, which creates excess investment, providers of capital are likely to identify this issue and ration capital which may result in underinvestment (Gao & Yu, 2020; Myers, 1984b; Stiglitz & Weiss, 1981; Tsai et al., 2021). Similarly, adverse selection can lead to overinvestment and underinvestment. The models of adverse selection posit that, if managers are well informed than providers of capital about the prospects of the firm, they will attempt to time the issuance of capital to trade overpriced securities (Baker & Wurgler, 2013). These managers may overinvest the proceeds if they are successful. However, the providers of capital may also respond by capital rationing which may result in underinvestment. Thus, while models of moral hazard mostly posit overinvestment for empire building, models of costly debt and equity financing suggest underinvestment due to adverse-selection problems (Chen et al., 2011b).

Investment scale

Investment scale is considered as the alternative or a companion to investment efficiency. When a company is not investing efficiently, it is either overinvesting or underinvesting. Investment scale rather can be the right investment to any firm investing inefficiently, because investment scale requires managers to be more meticulous in selecting the kind of projects to invest in. Ma and Jin (2016) found that investment efficiency does not drive performance and that it is, rather investment scale. The study observed that Chinese listed firms pay more attention to investment scale expansion than investment efficiency. This is because the investment scale drives financial performance more than investment efficiency. Rapid expansion in investment scale leads to high-speed economic development.

Financial managers involved in investment decision-making face a trade-off between increasing their scale of investment and improving the efficiency of their investment. The investment scale usually describes a firm's level of cash paying for fixed assets, intangible assets, and other long-term assets (Han et al., 2019). That is, it looks at total capital or investment expenditure on investment opportunity sets that firms take with less focus on whether it has been underinvested or overinvested. Thus, high cash spent on fixed assets, intangible assets, and other long-term assets denote a high investment scale. Conversely, a low amount of cash spent on fixed assets, intangible assets, and other long-term assets denote a low investment scale.

Managers in their quest to prove their competence in discovering investment opportunities may expand their investment scale without recourse to the returns and other factors (He et al., 2019). Thus, managers, as corporate agents, tend to expand the firm's scale of investment and may also pursue personal interests when they have excess cash on hand. This results in empire building by most managers. The extant literature reveals that the nexus explored is on investment scale and performance, but little is known about the effect on risk-taking behaviour.

Risk-taking behaviour

There is no universally accepted definition of risk and risk management (Duho et al., 2021a; Duho et al., 2020b). Understanding the risk profile of firms provides insights into their stability and their risk-taking behaviour.

In the literature, Aven and Renn (2009) contend that the definitions of risk differ covering the concept of expected value, probability distribution, uncertainty, while others regard risk as an event. For example, Kaplan and Garrick (1981) and Kaplan (1991) define risk as scenarios that have probability and a consequence, while Willis (2007) equates risk to expected loss. Also, Rosa (1998, 2003) defines risk as a situation or an event where humans and things of human value are at stake and where the outcome is uncertain. Aven and Renn (2009) find risk as uncertainty about and severity of the consequences (or outcomes) of activities concerning something of value to humans. Corporate risk-taking is also about analysing and selecting investment projects that have different uncertainties associated with their expected returns and associated cash flows. Palmer and Wiseman (1999) describes risk under managerial risk-taking and organizational risk. Managerial risk-taking involves managerial decisions and choices that are associated with varying and uncertain outcomes. Organizational risk is also described as the situation when the organization experiences volatile cash flows.

From the above definitions, it is clear that some of the issues to consider in understanding risk are (1) both undesirable and desirable outcomes; (2) addressing uncertainties instead of probabilities and expected values; and (3) not being restricted to specific consequences and quantities. In the extant literature, while there have been studies that used complex methods to measure risk, others have used accounting measures. One such approach is the use of z-score (Asare et al., 2021; Duho, 2020a).

Although the primary objective of managers is to maximize the value of the firm, this may not always be the case due to agency conflicts that may arise. Managers may behave conversely to the expectations of shareholders. Managers usually consider their personal goals and reputation first instead of the shareholders' goal when making decisions. Firms' risk-taking behaviour depends on the risk-taking behaviour of the manager, who spearheads decision-making in the organization. In most cases, managers would want to take on more risk to increase the firm's return and, to some extent, their interest. Risk-averse managers tend to reject projects that are profitable to avoid potential failure, which may be costly to shareholder value. On the other hand, risk-loving managers tend to also accept projects that are not profitable for their private interest.

There is little knowledge about how investment efficiency, investment scale, and financial flexibility affect the risk and risk-taking behaviour of firms.

Hypotheses development

There are some insights from the empirical review and theoretical review of the literature on financial flexibility, investment efficiency, investment scale, and risk-taking behaviour of firms. This section provides a discussion of the studies vis-a-vis the agency theory to develop three testable hypotheses.

Financial flexibility and risk-taking behaviour

The concept of financial flexibility and risk-taking behaviour can be discussed within the context of agency theory. There are various reasons why managers keep a low debt profile, including the purpose to reduce risk (Marchica & Mura, 2010), reduce pressure from interest payment commitments (Jensen, 1986), and protect the undiversified human capital of firms (Fama, 1980). On the contrary, managers may decide to keep a high debt profile as a basis of minimizing takeover risk (Berger et al., 1997) and to pursue empire building (i.e., managerial entrenchment) (Zwiebel, 1996). In effect, both conservative leverage and high investment are attributes of greater agency costs. Ma and Jin (2016) posit that, from the perspective of the agency theory, financial flexibility may either enhance or reduce the performance of firms and thus the efficiency of investment decisions. Dreyer and Grønhaug (2004) posit that financial flexibility is a requirement for survival in the long term. Gregory (2020) argues that, when controlling for political risk, financial flexibility can be linked with increased firm value. It is against this backdrop that various studies in the literature contend that firms keep unused debt capacity deliberately as a way to avoid costs of financial distress amidst negative shocks (De Jong et al., 2012; Gamba & Triantis, 2008; Graham & Harvey, 2001; Gregory, 2020; Marchica & Mura, 2010). Based on these arguments, we propose the following hypothesis.

H1. *The degree of financial flexibility has a positive effect on the risk-taking behaviour of firms.*

Investment efficiency or investment scale and risk-taking behaviour

There is evidence of investment efficiency being associated with risk-taking behaviour. Chen et al. (2021) found that uncertainty at the macro-level is associated with investment efficiency. González (2020) argues that managers anticipate high losses in situations in which firms become distressed. In response, the managers will aim to act effectively to reduce the likelihood of bankruptcy. Panousi and Papanikolaou (2012) also indicate that investment efficiency and corporate idiosyncratic risk have a negative link. Also, Gulen and Ion (2016) found that firm-level capital investment and the level of uncertainty with future regulatory outcomes and policies are negatively

associated. However, other studies like Baum et al. (2006) also reported a positive relationship between investment efficiency and uncertainty, while Leahy and Whited (1996) found no significant link between investment efficiency and uncertainty. Again, Lai and Liu (2018) insinuate that the risk-taking preference of top management is associated with the investment efficiency of firms. Based on these findings in the literature, we propose the following hypothesis.

H2. *Investment efficiency (over investment or underinvestment) affects the risk-taking behaviour of firms.*

In a similar vein, the investment scale is also a key aspect of investment that has the potential to impact the risk-taking behaviour of firms. Ma and Jin (2016) provide evidence of a relationship between investment scale and the performance of firms. This suggests that there can be long-term effects of investment scale on the financial stability of firms. Based on this, we propose the following hypothesis.

H3. *Investment scale affects the risk-taking behaviour of firms.*

3. Methodology and methods

This section discusses the details of the methodology and methods employed to conduct the analyses of the study.

Data and data source

The study used panel data of 264 listed non-financial firms in 17 African countries from 2007 to 2018. The countries with the respective number of firms are: Algeria (3), Botswana (16), Côte d'Ivoire (19), Egypt (43), Ghana (11), Kenya (16), Mauritius (22), Morocco (21), Namibia (6), Nigeria (32), South Africa (15), Swaziland (or Eswatini) (3), Tanzania (6), Tunisia (20), Uganda (3), Zambia (11), and Zimbabwe (17). The firm-level financial data for this study is sourced from Bureau van Dijk (ORBIS) database, while the macroeconomic data is sourced from the World Bank Group's World Development Indicators (WDI). The firms operate as non-financial firms (non-banking or non-insurance firms) and these include firms that operate in the following sectors: Basic Materials (26), Consumer Goods (69), Consumer Services (48), Industrial (55), Oil & Gas (13), Telecom/Technology (11), Health (12), and Real Estate (30).

Estimation of the main variables of the study

The study used a multi-stage approach to measure the various variables for the analysis, while estimations are generally done based on the robust approaches employed in the extant literature. The four main variables of focus are: financial flexibility, investment efficiency, investment scale, and risk-taking behaviour. Succinctly, two first-stage models were run, the first being a leverage model and the other an investment model which enabled the researcher to measure financial flexibility and investment efficiency, respectively. Investment scale and risk-taking behaviour are measured using a direct proxy, which has been discussed in detail.

Financial flexibility (based on leverage model)

Studies have shown that financial flexibility is preserved principally through the use of leverage considerations (Bancel & Mittoo, 2011; Graham & Harvey, 2001). What this means is that, for a firm to be classified as financially flexible, its leverage decisions must reflect strong future growth in terms of its spare debt capacity; but mathematically, financial flexibility is ascertained as a component that contributes to the disparity between expected and observed leverage levels. The first step is to predict leverage scores of firms based on a baseline model (see Equation 1).

To estimate financial flexibility, the baseline leverage in Equation 1 was estimated. This was used to compute the estimated leverage figure. Later, the estimated leverage was deducted from the actual leverage to compute the deviation. A binary coding was then used on the deviation score to define financial flexibility. In this case, where the deviation is negative, we provide a binary score of 1, otherwise 0. Firms with a negative change in real leverage and the expected leverage are thought to have unused debt capacity (DeAngelo et al., 2011; Denis & McKeon, 2012). Thus, firms that have a negative difference between their actual and predicted leverage are assumed to have spare debt capacity. Consequently, it means that such businesses can take advantage of increased debt financing. The mathematical equation is specified in Equation 1 as follows.

$$LEV_{it} = \alpha_1 + \beta_1 LEV_{it-1} + \beta_2 MLEV_{it} + \beta_3 MTB_{it} + \beta_4 SIZE_{it} + \beta_5 TANG_{it} + \beta_6 PROF_{it} + \beta_7 FINF_{it} + \mu_{it} \quad (1)$$

Where, LEV is leverage, MLEV is the median of industry-wide leverage, MTB is the market-to-book ratio, SIZE is the firm size, TANG is the asset tangibility, PROF is profitability measured by return to assets, and FINF is expected inflation. Refer to the Appendix A and Table A1 for the regression results and the discussions thereof.

Investment efficiency (based on investment model)

Some studies have shown that financially flexible firms can take advantage of investment opportunities without worrying about sacrificing future growth opportunities because the firm can decide on whether to use debt to finance its business operations without putting the company into financial distress. The level of overinvestment and underinvestment is used to determine investment efficiency (Gao & Yu, 2020; Gomariz & Ballesta, 2014; Goodman et al., 2014; Richardson, 2006). This is presented mathematically in Equation 2.

$$INV_{it} = \alpha_1 + \beta_1 INV_{it-1} + \beta_2 CF_{it} + \beta_3 Tobin's\ Q_{it} + \beta_4 FF_{it} + \beta_5 (CFxFF)_{it} + \mu_{it} \quad (2)$$

Where, INV is the investment as measured by the ratio of net cash flow from operating activities to total assets; CF is the ratio of operating income before interest and tax plus depreciation, depletion and amortization divided by total assets; Tobin's Q is calculated as the ratio of market capitalization divided by total assets; and FF is the availability of spare debt. Refer to the Appendix A and Table A1 for the regression results and the discussion thereof. The residuals from this model will reflect the firm's level of unanticipated investment. Also, positive residuals will indicate overinvestment, while negative residuals will indicate underinvestment (Ma & Jin, 2016). In this study, we use the absolute score to reflect the overall investment inefficiency of the firms. In this way, better investment decisions are represented by smaller deviations from expected levels of investment and vice versa. For interpretational convenience, the deviations are typically multiplied by negative 1 in order to make them increasing in efficiency.

Yet, the measure of investment efficiency, as derived from the deviations from expected levels of investment, is prone to measurement errors (Erickson & Whited, 2000). The underlying assumption in the approach is that firms can instantaneously adjust their investments to the expected or optimal level. This assumption is unrealistic. To address the measurement errors, the researcher used a dichotomous representation of the derived and transformed deviation (where the transformation is as described previously) based on the median values across the distribution at the industry and year level (Gao & Yu, 2020; Goodman et al., 2014). Thus, the indicator variable for measuring investment efficiency takes a value of 1 where the firm has an unexpected investment level that is below the median distribution of unexpected investment, and a value of 0 if otherwise.

Investment scale

The other investment-related metric is the investment scale which has been explored by Ma and Jin (2016). The equation to measure investment scale is mathematically presented in Equation 3 as follows.

$$Investment\ Scale_{it} = \frac{\Delta(Total\ Assets_{it} - Cash_{it})}{(Total\ Assets - Cash)_{it-1}} \quad (3)$$

The definition is based on the argument that the growth of the non-cash assets of firms is usually for enhancing production capacity. Therefore, we argue that the investment scale is the growth of non-cash assets of firms. This metric has been applied in the extant literature (He et al., 2019; Ma & Jin, 2016).

Risk-taking behaviour

For consistency in the discussion of the results, risk-taking behaviour in this study is measured using the z-score which is used in the extant literature. High z-scores suggest better risk management of firms while low z-scores suggest high-risk exposure or possible financial distress. But the term, risk-taking behaviour, in this study shall be applied generically for both high and low z-scores. Again, risk-taking behaviour shall be applied to mean high z-score or financial stability or better risk management. In line with the extant literature, this study applies the z-score to measure the risk-taking behaviour of firms (Cao et al., 2021; Cheng et al., 2013; Duho et al., 2020a; Phan et al., 2021; Samet et al., 2018). This is specified mathematically in Equation 4 as follows.

$$z - score_{it} = \frac{ROA_{it} + ETA_{it}}{\sigma ROA_{it}} \tag{4}$$

Where, ROA represents the return on asset, ETA represents the ratio of equity to total assets and σROA represents the standard deviation of return on assets. The metric is based on accounting ratio and the variables vary by year and by the firm as the data is panel data.

Control variables

The study has also inculcated control variables into the analysis in the quest to explore the relationship among the main variables. This includes firm size, asset tangibility, financial leverage, cash flow, revenue growth, economic growth, and inflation. Table 1 presents the description of the variables of the study. First of all, it is worth noting that, across the corporate finance literature, various studies have explored the determinants of the risk-taking behaviour of firms, although not directly related to investment efficiency, investment scale or financial flexibility. The general notion from the extant literature shows that there are some firm-level or economy-wide factors that affect the risk-taking behaviour of firms.

First of all, it is essential to control for the effect of *firm size* in exploring the impact of the main variables on corporate risk-taking behaviour (Cao et al., 2021). In the extant literature, size has been used as a control, and the findings are mixed: negative, positive or inconclusive. Bargeron et al. (2010) posit that small firms engage in aggressive and risky investment activities as compared to large firms. Besides, the risk-taking behaviour of firms can be driven by the intangible value at their disposal, and in that context, various studies have controlled for the *asset tangibility* of firms (Duho et al., 2020a; Tran, 2020). The risk profile of firms that depend heavily on tangible

assets will differ as compared with the firms that have more intangibles. Chen et al. (2017) and Tran (2020) posit that asset tangibility is relevant in corporate investment decisions and that firms with high asset tangibility are likely to have better access to external funds. Cao et al. (2021) posit that, although a positive nexus could be argued between asset tangibility and risk-taking behaviour, the relatively low intangibles recorded in the Chinese context suggest that there is no clear direction of impact. Similarly, Duho and Agomor (2021) found low levels of intangibles in the asset structure of firms in West Africa. Based on this argument, we do not provide a clear direction of impact for the link between asset tangibility and risk-taking behaviour.

In line with the pecking order theory, there is a common position that firms with low leverage, large size, and high asset tangibility are more able to raise funds from external sources (McLean et al., 2012; Tran, 2020). In a similar vein, *financial leverage* has been utilized in the extant literature as a control variable. On one hand, leverage can negatively affect corporate risk-taking behaviour on the basis that high debt in the capital structure of a firm can restrict corporate investment (Li et al., 2013). Conversely, leverage can positively affect corporate risk-taking behaviour as high debt in the capital structure is also an indication of the willingness to take a risk. This is because firms with higher leverage are more likely to expropriate their creditors. Based on these two scenarios, the study does not provide a specific direction of impact of financial leverage on corporate risk-taking behaviour (Cao et al., 2021).

Cash flow, revenue growth, economic growth, and inflation are other control variables utilized. This study controls for *cash flow* in addressing the research question. This is in line with studies like Tran (2020) that argue that firms with high cash flow tend to have high corporate investment. Also, there is risk implications of holding cash flow based on the agency theory. The study also includes *revenue growth* as a control measure, based on a point similar to the one raised about cash flow levels. The firms with high revenue growth may follow more investment opportunities and may tend to take more risk (Boubakri et al., 2013; John et al., 2016; Tran, 2019). *Economic growth* and *inflation* are the two macroeconomic indicators that are used as controls. Firms located in countries with high GDP growth tend to take more risks because they have access to external finance at lower costs (Bargeron et al., 2010; Phan et al., 2021; Tran, 2019). Finally, the study also included inflation as a control variable in line with earlier studies such as Samet et al. (2018) and Phan et al. (2021).

Table 1: Description of the variables in the study

Notation	Description	Explanation	
RTB	z-score	Risk-taking behaviour (see Equation 4)	(Cao et al., 2021; Cheng et al., 2013; Duho et al., 2020a; Phan et al., 2021; Samet et al., 2018)
CIE	Investment Efficiency	Binary code of 1 when unexpected investment level is below the median of the distribution of unexpected investment, otherwise 0 (see Equation 2)	(Gao & Yu, 2020; Goodman et al., 2014; Richardson, 2006)
INS	Investment Scale	Equation 3	(He et al., 2019; Ma & Jin, 2016)
FF	Financial Flexibility	Dummy of 1 when the deviation of actual and predicted debts is negative, otherwise 0 (see Equation 1)	(Byoun, 2011; Ma & Jin, 2016)
SIZE	Firm Size	Natural logarithm of total assets	(Bargeron et al., 2010; Cao et al., 2021)
TANG	Asset Tangibility	Property, plants and equipment to total assets	(Chen et al., 2017; Duho et al., 2020a; Tran, 2020)
LEV	Leverage	Total liabilities to total assets	(Cao et al., 2021; Li et al., 2013)
CF	Cash flow	Growth in cash flow	(Tran, 2020)
GROWTH	Revenue Growth	Growth in sales or revenue	(Boubakri et al., 2013; John et al., 2016; Tran, 2019)
GDPG	Economic Growth	Gross domestic product growth	(Bargeron et al., 2010; Phan et al., 2021; Tran, 2019)
INF	Inflation	Consumer price index	(Phan et al., 2021; Samet et al., 2018)

Source: Authors' Conceptualization.

Econometric model for analysing the nexus

In the extant literature, both static and dynamic panel models have been employed to explore relationships between variables. However, in cases where there is existence of the issues of endogeneity and serial correlation, the static models are not the best to use. This study utilized the dynamic panel data estimation, specifically the two-step system generalized method of moments (System-GMM) with robust results. The models used the orthogonal deviations in panels which maximized the sample size, since the study used an unbalanced panel with gaps. The model for analysing the relationship that the study aims to explore is presented below. Equation 5 is for the investment efficiency model, while Equation 6 is for the investment scale model.

$$RTB_{it} = \alpha_0 + \delta RTB_{it-1} + \beta_1 CIE_{it} + \beta_2 FF_{it} + \varphi X_{it} + \eta_i + \nu_i \quad (5)$$

$$RTB_{it} = \alpha_0 + \delta RTB_{it-1} + \beta_1 INS_{it} + \beta_2 FF_{it} + \varphi X_{it} + \eta_i + \nu_i \quad (6)$$

Where, RTB represents insolvency risk (risk-taking behaviour) as measured by the z-score; CIE represents the investment efficiency; INS represents investment scale; and FF represents financial flexibility. Also, X_{it} is the vector of control variables that capture the observable firm-specific effects and country heterogeneity; and η_i is the firm-specific effect that stands for the heterogeneity of individual firms, and it is dependent and identically distributed [$\eta_i \approx IID(0, \sigma_\eta^2)$]. Again, ν_i represents the disturbances or idiosyncratic shocks which are independent and identically distributed [$\nu_i \approx IID(0, \sigma_\nu^2)$]. The variables vary by firm, *i*, and year, *t*. Also, α represents the constant term, while δ, β, and φ represent the coefficients of the variables. The control variables are SIZE which represents the firm size, TANG, which represents asset tangibility, LEV, which represents financial leverage, CF, which represents cash flow, GROWTH, which represents revenue growth, GDPG which represents gross domestic product growth, and INF, which represents inflation. The regression analysis is conducted using the two-step system-GMM regression, while various sensitivity analyses were included to check the robustness of the results.

Model estimation

The system-GMM model was used to test the dynamic linkages between investment efficiency or investment scale, financial flexibility, and risk-taking behaviour. There are five broader merits of using the system-GMM approach as compared with other panel models like the pooled ordinary least-square regression model, fixed effect model, and the random effect model. First, the system-GMM of Arellano and Bover (1995) and Blundell and Bond (1998) corrects possible inconsistency and bias of parameter estimates because of the presence of lagged-dependent variable (i.e., lagged RTB) or possibility of endogeneity created by the explanatory variables (Harris & Mátyás, 2004; Nickell, 1981). Secondly, the system-GMM estimator gives consistent and efficiency estimates even where there is autocorrelation and heteroscedasticity or where the explanatory variables are not strictly exogenous.

Thirdly, the system-GMM estimator addresses the endogeneity and fixed effects problems with the use of instruments of lagged dependent variables and endogenous variables with their lags in levels which is referred to as first difference (Ahn & Schmidt, 1995). Fourth, the difference GMM estimator can be inconsistent and biased, but the system-GMM addresses this since it combines regressions in first differences and in levels. It allows for the researcher to use more instruments and besides there is an option to choose one-step or two-step system-GMM estimators (Roodman, 2009a, 2009b). Lastly, the GMM estimator is consistent based on two specification tests vis-a-vis Hansen or Sargan tests for over-identification and a test for serial correlation in the error terms. Failure to reject the Hansen test suggests that the instruments are valid,

not correlated with the disturbances, and the model is specified correctly. Roodman (2009a) notes that although the Hansen test is superior to the Sargan test, there could be the possibility of errors, and p-values between 0.1 and 0.25 should be regarded as safe. This notwithstanding, p-values beyond this range have been reported in the extant literature, but with caution. Also, it is essential to test serial correlation, and the null hypothesis of no first-order serial correlation [AR (1)] should be rejected while the null hypothesis of no second-order serial correlation [AR (2)] should not be rejected.

In line with the guidance of Roodman (2009a), the relevant specification choices are reported for clarity and comparability. In this study, the two-step system-GMM estimator has been used. The specification choices made include orthogonal deviations, collapse option and robust option, suggesting that the Windmeijer (2005) corrected standard errors are computed. There was no use of additional instrumental variables, and all the instrumental variables are those included in the model specification.

4. Results and discussions

In this section, we present and discuss the results of the preliminary statistical tests and regression models for addressing the hypotheses of the study.

Descriptive statistics

First of all, Table 2 provides descriptive statistics of the dependent variable, independent variables, and the control variables that the study used. The result shows that, on average, the risk-taking behaviour, measured by the z-score, is 15.186, which vary across firms and years. Refer to Table B1 in Appendix B for industrial variations in the z-scores. The average investment efficiency score is 0.498, suggesting that there are about 49.8 instances that the firms achieved investment efficiency over the period. The investment scale shows an overall average of 0.054, which shows the scale at which investments are conducted by the firms. The result also reveals that the financial flexibility has an average of 0.499, indicating that a little lower than 50% of the firms are financially flexible. Overall, the firm size, measured by the average natural logarithm of total assets, is 11.213, which represents an average of about US$1,250,000 in nominal values. The results show that asset tangibility is 0.339, which shows that 34% of total assets is property, plants and equipment. Financial leverage is 0.543, which suggest that over 54.3% of total assets are liabilities. Cash flow shows an average of 0.152, which suggest that operating cash flow grows at 15.2%. The average growth rate for revenues is 1.630, which represents a 163% growth across firms and years. Macroeconomic records show that the average gross domestic product growth is 4.402 while the average inflation score is 7.591.

Table 2: Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
RTB	2500	15.186	19.357	-101.897	357.682
CIE	1282	0.498	0.500	0.000	1.000
INS	2141	0.054	0.557	-16.186	5.217
FF	1966	0.499	0.500	0.000	1.000
SIZE	2547	11.213	1.785	4.127	19.587
TANG	2547	0.339	0.258	0.000	2.505
LEV	2547	0.543	1.349	-39.316	36.608
CF	1751	0.152	0.244	-1.050	2.975
GROWTH	2195	1.630	53.603	-1.000	2375.292
GDPG	2575	4.402	3.402	-17.669	19.675
INF	2308	7.591	6.423	-2.431	156.960
ASSETS (US$)	2548	1250000	1.51e+07	0.000	3.21e+08

Notes: RTB represents insolvency risk (z-score), which measures risk-taking behaviour; CIE represents investment efficiency; INS represents investment scale; FF represents financial flexibility; SIZE represents the firm size; TANG represents asset tangibility; LEV represents financial leverage; CF represents cash flow; GROWTH represents revenue growth; GDPG represents gross domestic product growth; INF represents inflation; and ASSET represents the US$ nominal value of the average total assets of the firms.
Source: Authors' Computations in STATA14.

Correlation and multicollinearity

In furtherance of conducting a robust analysis, the correlation and multicollinearity tests were conducted. The results indicate that the correlation coefficients are generally not high. However, to confirm whether the correlation could affect the inclusion of a combination of some variables, we conducted the variance inflation factor (VIF) test. This test is accompanied by a rule of thumb that a VIF score of more than 10 suggests there is the possibility of multicollinearity, which suggests the need to either exclude some variables or not (Duho et al.,, 2021b; Duho et al., 2020b; Wooldridge, 2016). The results of the VIF test, which is shown in Table 3, reveal that the scores are below the threshold and the inclusion of the explanatory variables does not violate any statistical axiom.

Table 3: Correlation and variance inflation factor tests

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) CIE	1.05	1.000									
(2) INS[1]		-0.014	1.000								
(3) FF	1.79	-0.055*	-0.038	1.000							
(4) SIZE	1.77	0.111***	0.050**	-0.604***	1.000						
(5) TANG	1.11	0.117***	-0.145***	-0.099***	0.075***	1.000					
(6) LEV	1.21	0.028	0.061***	-0.057**	-0.019	-0.129***	1.000				
(7) CF	1.22	-0.128***	-0.003	-0.148***	-0.003	0.087***	-0.278***	1.000			
(8) GROWTH	1.02	0.037	0.051**	-0.030	0.019	0.016	0.000	0.098***	1.000		
(9) GDPG	1.02	0.011	0.103***	-0.018	-0.078***	0.067***	-0.005	0.010	0.004	1.000	
(10) INF	1.06	-0.030	-0.039*	0.102***	-0.088***	0.120***	-0.017	-0.076***	-0.002	-0.062***	1.000

Notes: CIE represents investment efficiency; INS represents investment scale; FF represents financial flexibility; SIZE represents the firm size; TANG represents asset tangibility; LEV represents financial leverage; CF represents cash flow; GROWTH represents revenue growth; GDPG represents gross domestic product growth; and INF represents inflation. Also, ***, **, and * represent significant levels of 1%, 5%, and 10%, respectively.
Source: Authors' Computations in STATA14.

Investment efficiency and risk-taking behaviour

Our first hypothesis touches on the nexus between investment efficiency and the risk-taking behaviour of non-financial firms in Africa. To test this, the results of Table 4 are presented based on analysis under various conditions to ensure the conclusions are robust. We observe that our results meet the relevant diagnostic checks of running a two-step system-GMM. We observe that the p-value of the AR (1) is significant while the p-value of AR (2) is insignificant. This means that first-order serial correlation (AR1) exists while second-order serial correlation (AR2) is absent. Also, the number of instruments is 78 while the total number of groups is 170, and it is appropriate that the number of instruments is less than the number of groups. Essentially, the Hansen J test shows p-values that are within acceptable ranges, suggesting the validity of the instruments. The results in Table 4 provide relevant analysis to address *H1, H2* and *H3*, which were developed as hypotheses. The results show that the one-year lag of risk-taking behaviour has a positive and significant effect on risk-taking behaviour. This suggests that financial stability persists, and firms that are stable achieve that status over time.

First of all, we found that investment efficiency generally has a positive significant effect on risk-taking behaviour (z-score). This suggests that firms with high investment efficiency have high stability and better risk-taking behaviour. This means that firms with relatively lower unexpected investment tend to be more stable than those with higher deviations from their expected investment levels. In the extant literature, studies like Baum et al. (2006) argue that investment efficiency and uncertainty are positively related, while Panousi and Papanikolaou (2012) posit that the nexus between investment efficiency and idiosyncratic risk is negative. Also, Leahy and Whited (1996) found no significant nexus, but our results show that investment efficiency of firms drive the risk-taking behaviour as a way of enhancing financial stability. This also suggests that managers that aim to pursue financial stability have to be committed to enhancing their investment efficiency.

In contrast with the hypothesized relationship, the effect of financial flexibility on the risk-taking behaviour of the firms is negative and statistically significant. This shows that firms that have more unused debt capacity tend to have high risk exposures and so do not attain financial stability. This is key with concerns of the agency problem very common in the African context. Financial flexibility gives managers the leeway to pursue objectives that are beneficial to them but to the detriment of the financial stability of the firms. This finding is in line with earlier studies that argue that financial flexibility could be a conduit for managers to pursue empire building (Zwiebel, 1996). The result shows that, although various arguments have been made about the relevance of keeping unused debt capacity as a means to address shocks (De Jong et al., 2012; Gamba & Triantis, 2008; Graham & Harvey, 2001; Gregory, 2020; Marchica & Mura, 2010), it leaves room for agency problems that reduce the financial stability of the firms. Thus, critical attention must be paid on the magnitude and level

of unused debt capacity at the disposal of managers, and there must be corporate controls to mitigate possible misuse. Moreover, Garmaise and Natividad (2021) argue that financial flexibility reduces financial stability especially in contexts where firms borrow from new markets thereby degrading the relationship with existing lenders.

The results of the control variables also show some interesting insights. The firm-level factors that significantly affect risk-taking behaviour are asset tangibility, financial leverage, and cash flow. First of all, asset tangibility has a negative and significant effect on risk-taking behaviour. This suggests that firms with high asset stock in the form of property plant and equipment (PPE) tend to have higher risk exposure. On the contrary, the firms with fewer tangible assets in their asset structure tend to have high financial stability. In the current context, where intangible capital is regarded as a key driver of corporate value and performance, this result shows the decreasing importance of tangible assets as the driver of value and financial stability. The findings are in line with earlier studies that show the relevance of intangibles in driving corporate performance (Duho, 2020b; Duho et al., 2020a; Tran, 2020).

The findings show that financial leverage has a negative effect on risk-taking behaviour. This means that firms with high financial leverage tend to have a weak risk-taking behaviour, which results in financial instability. This also means that firms with more liabilities in their capital structure tend to be more exposed to risk. This is because the debts have risk implications and could result in agency problems. In this case, leverage is increasing corporate risk, as high debt in the capital structure is also an indication of the willingness to take a risk. This is because firms with higher leverage are more likely to expropriate their creditors.

The result also shows that the growth in cash flow has a positive and significant effect on the risk-taking behaviour of firms. This suggests that firms that record growth in their cash flow tend to be financially stable. This supports the relevance of cash in enhancing the financial stability of the firms. It can be explained by the relevant role that cash plays in addressing shocks in the corporate context.

The results show that, generally, firm size and revenue growth do not have a statistically significant effect on risk-taking behaviour.

To further understand the effect of macroeconomic factors on risk-taking behaviour, we present the results for gross domestic product growth which measure economic growth. The effect of inflation has also been included. The result indicates that gross domestic product growth has a positive and insignificant effect on risk-taking behaviour. This suggests that firms that are in countries with high economic growth tend to achieve financial stability, but this is not statistically significant. In addition, the results show that inflation has a positive and significant effect on risk-taking behaviour. This also reveals that the general rise in the prices of goods and services in the economy reduces the risk exposure of the firms, which increases their financial stability.

The result shows that, when investment efficiency is interacted with variables such as firm size, growth in cash flow and gross domestic product growth, the impact on risk-taking behaviour is statistically significant. However, there are no strong changes in the impact of the variables as recorded in the basic model.

Table 4: Results on investment efficiency and risk-taking behaviour (two-step system-GMM estimator)

VARIABLES	(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
L.RTB	0.717***	0.707***	0.692***	0.656***	0.712***	0.558***	0.663***	0.726***	0.677***	0.717***
	(0.081)	(0.087)	(0.086)	(0.080)	(0.083)	(0.145)	(0.080)	(0.080)	(0.103)	(0.081)
CIE	5.102***	5.023***	3.589*	20.402**	4.791**	8.189***	0.078	5.120***	-0.325	5.228**
	(1.554)	(1.583)	(2.061)	(8.180)	(2.360)	(3.032)	(2.431)	(1.546)	(3.209)	(2.632)
FF	-3.406***	-3.476***	-4.401***	-3.905***	-3.438***	-2.542**	-2.660***	-3.458***	-3.450**	-3.393***
	(0.989)	(0.980)	(1.559)	(0.873)	(1.029)	(1.018)	(0.887)	(0.999)	(1.345)	(1.017)
SIZE	-0.276	4.203	0.135	0.817	-0.267	-0.133	-0.275	-0.288	-0.366	-0.279
	(0.688)	(7.708)	(0.714)	(0.758)	(0.687)	(0.716)	(0.551)	(0.631)	(0.670)	(0.695)
TANG	-7.875***	-7.975***	-7.335**	-7.937***	-8.440*	-11.236***	-5.847**	-7.898***	-9.892***	-7.905***
	(2.931)	(2.746)	(3.043)	(2.766)	(4.632)	(3.545)	(2.340)	(2.850)	(3.535)	(3.004)
LEV	-1.224**	-1.204**	-1.323**	-1.413**	-1.239**	-1.292**	-1.198***	-1.182**	-1.178*	-1.225**
	(0.591)	(0.582)	(0.593)	(0.580)	(0.599)	(0.504)	(0.297)	(0.506)	(0.686)	(0.595)
CF	7.961*	8.335*	7.261*	7.455**	7.822*	9.793**	0.802	7.355*	8.286*	7.987*
	(4.345)	(4.330)	(3.772)	(3.683)	(4.297)	(4.643)	(2.845)	(4.026)	(4.706)	(4.324)
GROWTH	-1.098	-1.069	-1.279*	-1.268*	-1.115	-0.736	-1.232	-0.464	-0.884	-1.102*
	(0.667)	(0.665)	(0.691)	(0.712)	(0.702)	(0.629)	(0.769)	(1.302)	(0.712)	(0.659)
GDPG	0.068	0.053	0.073	0.098	0.067	0.027	-0.003	0.073	-0.669	0.067
	(0.083)	(0.085)	(0.083)	(0.085)	(0.084)	(0.094)	(0.097)	(0.082)	(0.446)	(0.090)
INF	0.135**	0.140**	0.171***	0.152**	0.133**	0.138**	0.106*	0.127**	0.139**	0.140
	(0.059)	(0.058)	(0.057)	(0.065)	(0.063)	(0.056)	(0.063)	(0.059)	(0.060)	(0.087)

continued next page

Table 4 Continued

VARIABLES	(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
SIZE x SIZE		-0.206								
		(0.352)								
CIE x FF			2.765							
			(2.914)							
CIE x SIZE				-1.420*						
				(0.739)						
CIE x TANG					0.908					
					(4.557)					
CIE x LEV						-6.215				
						(5.466)				
CIE x CF							37.277***			
							(11.674)			
CIE x GROWTH								-0.891		
								(2.088)		
CIE x GDPG									1.599*	
									(0.888)	
CIE x INF										-0.014
										(0.234)
_cons	6.965	-16.489	2.961	-3.957	7.180	8.365	8.417	7.092	11.768	6.957
	(8.251)	(40.860)	(8.453)	(8.724)	(8.386)	(9.557)	(6.779)	(7.638)	(8.421)	(8.265)

continued next page

Table 4 Continued

VARIABLES	(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
Obs.	1259	1259	1259	1259	1259	1259	1259	1259	1259	1259
Firms	170	170	170	170	170	170	170	170	170	170
Countries	17	17	17	17	17	17	17	17	17	17
Instruments	78	78	78	78	78	78	78	78	78	78
AR (1): p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2): p-value	0.839	0.948	0.861	0.425	0.817	0.415	0.688	0.904	0.429	0.844
Hansen J test: p-value	0.126	0.149	0.181	0.191	0.099	0.254	0.237	0.101	0.111	0.110
Wald (χ2)	1882.28***	1995.70***	1609.53***	1412.10***	1862.46***	1424.24***	1472.26***	1938.67***	1921.19***	1884.44***

Notes: RTB represents insolvency risk (z-score), which measures risk-taking behaviour; CIE represents investment efficiency; FF represents financial flexibility; SIZE represents the firm size; TANG represents asset tangibility; LEV represents financial leverage; CF represents the cash flow; GROWTH represents revenue growth; GDPG represents gross domestic product growth; and INF represents inflation. The Windmeijer (2005) corrected robust standard errors are in parentheses; while ***, **, and * represent significant levels of 1%, 5%, and 10%, respectively.
Source: Authors' Computations in STATA14.

Investment scale and risk-taking behaviour

The second hypothesis explores the effect of investment scale on the risk-taking behaviour of listed non-financial firms. The results are presented in Table 5 for the basic models and the models with the interactions between variables. We observe that our results meet the relevant diagnostic checks of running a two-step system-GMM. We observe that the p-value of the AR (1) is significant while the p-value of AR (2) is insignificant. This means that we cannot reject the null hypothesis of no second-order serial correlation. Also, the number of instruments is 49 while the total number of groups is 173, and it is appropriate that the number of instruments is less than the number of groups. Essentially, the Hansen J test shows p-values that are within acceptable ranges. The results in Table 5 provide relevant analysis to address *H1, H2* and *H3*, which were developed as hypotheses. The results reiterate that the one-year lag of risk-taking behaviour has a positive and significant effect on risk-taking behaviour. This suggests that financial stability persists, and firms that are stable achieve that status over time.

First of all, investment scale affects the risk-taking behaviour of listed non-financial firms in Africa. Specifically, the results show that, for most of the models, the investment scale has a negative and significant effect on financial stability (z-score). This suggests that, when the investment scale is high, the financial stability of the firms decline. In effect, large investments in the firms tend to increase the probability of insolvency and thus affect risk-taking behaviour. Yet, it is noteworthy to observe the sensitivity of these results to the impact of firm size and asset tangibility. The result shows that when firm size or asset tangibility interacts with the investment scale in the same model, the direction of effect changes. The impact of firm size is statistically significant, but the effect of asset tangibility is not significant. This means that the investment scale could reduce risk exposures, but this depends on the firm size.

There is evidence of a negative and statistically significant effect of financial flexibility on the risk-taking behaviour of listed non-financial firms. This suggests that firms that have high financial flexibility tend to have lower stability status. This means that financial flexibility increases risk exposure and reduces the financial stability of firms. The results magnify the impact of the agency problem in holding unused debt capacity, and they are in contrast to the arguments for financial flexibility as evident in the literature (De Jong et al., 2012; Gamba & Triantis, 2008; Graham & Harvey, 2001; Gregory, 2020; Marchica & Mura, 2010). This is also in line with the finding of Garmaise and Natividad (2021), which argues that financial flexibility reduces the financial stability of firms, especially where firms borrow from new markets.

Table 5: Results on investment scale and risk-taking behaviour (two-step system-GMM estimator)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
L.RTB	0.615***	0.483***	0.490***	0.496***	0.477***	0.433***	0.427***	0.547***	0.469***	0.479***	0.488***
	(0.094)	(0.079)	(0.094)	(0.094)	(0.095)	(0.093)	(0.103)	(0.108)	(0.095)	(0.093)	(0.092)
INS	-0.399*	-0.294	-0.715**	-0.339	4.731***	0.407	-0.861***	-0.141	-0.981***	-0.274	-1.195
	(0.220)	(0.253)	(0.356)	(0.268)	(1.703)	(0.451)	(0.299)	(0.255)	(0.342)	(0.475)	(1.049)
FF	-1.434**	-2.096***	-1.806***	-1.791***	-1.934***	-2.203***	-1.562***	-2.091***	-1.741***	-1.876***	-2.058***
	(0.603)	(0.621)	(0.539)	(0.590)	(0.542)	(0.566)	(0.572)	(0.558)	(0.537)	(0.524)	(0.545)
SIZE	1.701*	11.639**	0.642	0.636	0.611	1.082	0.786	0.574	0.676	0.504	0.248
	(0.951)	(5.928)	(0.895)	(0.952)	(0.792)	(0.871)	(0.764)	(1.050)	(0.773)	(1.068)	(1.020)
TANG	-6.840***	-8.211***	-7.238***	-7.049***	-7.200***	-8.088***	-8.053***	-7.191***	-8.472***	-7.417***	-7.902***
	(1.533)	(1.574)	(1.729)	(1.910)	(1.552)	(1.791)	(1.593)	(1.802)	(1.718)	(2.018)	(1.983)
LEV	-0.879***	-1.102***	-0.886***	-0.877***	-0.922***	-0.921***	-1.562***	-0.816***	-0.975***	-0.916***	-0.917***
	(0.186)	(0.215)	(0.199)	(0.214)	(0.200)	(0.213)	(0.318)	(0.289)	(0.184)	(0.222)	(0.232)
CF	6.697***	4.603**	5.099**	5.145**	5.110*	5.386**	5.393**	2.941	4.480*	5.039*	4.941*
	(2.454)	(2.215)	(2.531)	(2.591)	(2.632)	(2.540)	(2.675)	(2.825)	(2.312)	(2.713)	(2.609)
GROWTH	-0.606	-0.852*	-0.386	-0.448	-0.331	-1.107	-0.067	-0.473	-0.493*	-0.394	-0.753
	(0.412)	(0.488)	(0.405)	(0.453)	(0.315)	(0.763)	(0.276)	(0.435)	(0.277)	(0.529)	(0.635)
GDPG	0.326***	0.322**	0.387***	0.399***	0.384***	0.368***	0.338***	0.407***	0.431***	0.364***	0.314***
	(0.104)	(0.129)	(0.119)	(0.120)	(0.122)	(0.130)	(0.118)	(0.131)	(0.126)	(0.118)	(0.118)
INF	0.126**	0.078	0.067	0.060	0.075	0.059	0.077	0.071	0.068	0.055	0.034
	(0.055)	(0.066)	(0.058)	(0.059)	(0.057)	(0.059)	(0.055)	(0.066)	(0.055)	(0.062)	(0.061)

continued next page

Table 5 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
SIZE x SIZE		-0.530*									
		(0.279)									
INS x INS			-0.031*								
			(0.018)								
INS x FF				-0.652							
				(0.842)							
INS x SIZE					-0.507***						
					(0.178)						
INS x TANG						-0.620**					
						(0.257)					
INS x LEV							-0.669***				
							(0.229)				
INS x CF								-3.644			
								(3.803)			
INS x GROWTH									0.730***		
									(0.223)		
INS x GDPG										-0.081	
										(0.222)	
INS x INF											0.126
											(0.171)

continued next page

Table 5 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB	RTB
_cons	-13.291	-52.678	1.216	1.182	1.760	-2.105	0.993	1.587	1.583	3.301	6.846
	(11.634)	(32.092)	(10.783)	(11.547)	(9.604)	(10.437)	(8.959)	(12.574)	(9.316)	(12.792)	(12.285)
Obs.	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288
Firms	173	173	173	173	173	173	173	173	173	173	173
Countries	17	17	17	17	17	17	17	17	17	17	17
Instruments	49	49	49	49	49	49	49	49	49	49	49
AR (1): p-values	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000
AR (2): p-values	0.509	0.582	0.521	0.424	0.738	0.957	0.801	0.496	0.617	0.381	0.409
Hansen J test: p-value	0.162	0.568	0.242	0.271	0.179	0.179	0.162	0.191	0.220	0.269	0.196
Wald ($\chi 2$)	2331.21***	1673.55***	1963.53***	1974.04***	2158.60***	3905.88***	2053.29***	2031.27***	2014.45***	1797.90***	1977.56***

Notes: RTB represents insolvency risk (z-score), which measures risk-taking behaviour; INS represents investment scale; FF represents financial flexibility; SIZE represents the firm size; TANG represents asset tangibility; LEV represents financial leverage; CF represents cash flow; GROWTH represents revenue growth; GDPG represents gross domestic product growth; and INF represents inflation. The Windmeijer (2005) corrected robust standard errors are in parentheses; while ***, **, and * represent significant levels of 1%, 5%, and 10%, respectively.
Source: Authors' Computations in STATA14.

Moreover, the size of the firms has a positive and significant effect on risk-taking behaviour (z-score). This shows that, large firms tend to be financially stable as compared to their smaller counterparts. This also links to the idea that there is a sort of economies of scale that firms enjoy as a result of the magnitude of transactions they engage in. Yet, for the quadratic model, where size squared is embedded in the equation, the result indicates that size has an inverted U-shaped relationship with risk-taking behaviour (z-score). This means that large firms may have increased stability initially but this will change in the long run when diminishing returns sets in.

The result shows that financial leverage has a negative and significant effect on risk-taking behaviour (z-score) at a 1% level. This suggests that firms with a high level of liabilities in their capital structure tend to have low financial stability. This also means that there is a benefit of holding equity, as doing so serves as a risk-mitigating strategy to reduce the agency cost of managers and thus reduces the risk exposures. Moreover, debt serves as an incentive for managers to take sub-optimal decisions which increase the risk exposure of firms.

In this study, there is evidence that suggests that the cash flow ratio has a positive significant effect on risk-taking behaviour. This portrays the fact that firms with high cash flow also tend to be financially stable. It is worth noting that in financial management, cash is said to be king and cash flow is a key factor in enhancing the stability of firms.

Moreover, there is evidence that asset tangibility has a negative and significant impact on the risk-taking behaviour (z-score) of firms. The results show that asset tangibility does not drive financial stability; it rather worsens it. This means that the level of property plant and equipment held by the firms inhibits their financial stability, especially in the current context where there is a growing relevance of intangibles. This is very indicative of the recent focus on intangible value creation among firms. Thus, intangibles instead of tangible resources are now regarded as key drivers of value and stability.

The findings show the strong impact of macroeconomic factors on the risk-taking behaviour of firms. Specifically, both GDP growth and inflation have a positive significant effect on financial stability. This suggests that the right business climate and economic conditions are paramount for firm stability. Also, while inflation may not be good all the time, there are instances where it drives the stability of firms. This depends on the general rise in prices and the unique pricing strategies that the firms put in place.

The findings reveal that, when variables like firm size, asset tangibility, financial leverage, and revenue growth interacts with investment scale, the impacts are statistically significant. However, it was only in the cases of firm size and asset tangibility that the effect of investment scale changed to be positive. Yet, like the case of the investment efficiency model, the interaction of size resulted in a positive significant effect of investment scale on risk-taking behaviour. This means that firm size moderates the relationship between investment (or investment scale) and risk-taking behaviour.

5. Conclusions of the study

There are only a few studies that explore the concepts of investment efficiency and investment scale, and these have produced inconclusive results. This study is unique in exploring the concept in the context of emerging economies with an understanding of how it impacts the risk-taking behaviour of the firms. The study analyses data of 264 non-financial firms in 17 countries in Africa covering the period 2007–2018. The results show that financial stability persists, and that firms that are stable achieve that status over time but not as a one-off event.

Three main hypotheses were tested by exploring the effect of investment efficiency on risk-taking behaviour, and also by exploring the effect of investment scale on risk-taking behaviour. The third hypothesis tested the impact of financial flexibility on the risk-taking behaviour of firms. The other variables of interest include firm size, asset tangibility, financial leverage, cash flow, revenue growth, GDP growth, and inflation. The study used the two-step system-GMM regression on a panel data set of non-financial firms. Various sensitivity analyses were conducted to enhance the robustness of the results. Generally, the results indicate that investment efficiency drives the risk-taking behaviour of firms by increasing financial stability, but the investment scale of firms reduces the financial stability. The result suggests that investment efficiency is paramount for firms in their quest to increase financial stability. The findings also suggest that increasing investment scale tends to increase the risk exposure of firms, and smaller investment scales tend to have better risk profiles. Essentially, the impact of investment efficiency or investment scale on risk-taking behaviour is moderated by firm size. Generally, financial flexibility has a negative effect on risk-taking behaviour, suggesting that financial flexibility reduces financial stability. This also means that in the African context, firms with unused debt capacity, liquidity to react to cash flow shocks, and that are unconstrained in their issuance decision tend to be less stable.

The findings indicate that firm size has an inverted U-shaped relationship with risk-taking behaviour. Asset tangibility reduces the financial stability of firms, which shows the growing relevance of intangible value in enhancing corporate value and stability. The finding shows that financial leverage has a negative effect on financial stability while growth in cash flow, GDP growth, and inflation have a positive significant effect on financial stability. The results further show that revenue growth does not significantly drive financial stability. The findings provide clarity and further insights on the inconclusive findings and unexplored areas in the extant literature.

6. Implications for policy, practice, and future research

The results of this study provide some clarity on the relationships between investment efficiency, investment scale, financial flexibility, and the risk-taking behaviour of listed non-financial firms. The results have implications in a threefold perspective, firstly for policy, secondly for practice, and thirdly for future research.

Policy-wise, the results are essential for understanding the drivers of risk-taking behaviours of the firms. This is useful for policy makers such as the regulators of the non-financial sector, the Securities and Exchange Commissions, the investor community, and other institutions that invest in the stock market. It implies that much focus needs to be placed on the investment efficiency, investment scale, and financial flexibility when it comes to the stock market and risk-taking behaviour. Moreover, the study shows why policy makers need to also consider the financial flexibility of firms in making decisions on risk-taking, especially with the fact that unused debt capacity may increase during global criseis like the COVID-19 pandemic. The findings are broadly useful in understanding how macroeconomic factors and firm-specific factors are driving the risk-taking behaviour of the firms. The study can also be linked to the sustainable development goal, SDG 17: *Partnerships to Achieve the Goal*, which covers the relevant role of financial inclusion in driving investment and financial stability to drive economic growth.[2]

Practice-wise, the findings provide relevant pointers that managers, corporate boards, practitioners, and the entire C-suite executives must keep their eyes on when it comes to the risk-taking behaviour of firms. The findings show that the capital investment decisions of managers are paramount in driving the financial stability of firms. They also reveals the possible diseconomies of scale related to investment scale, as high investment scale is found to reduce financial stability. The concern about size is paramount as the study reveals that size moderates the relationship between investment efficiency (or investment scale) and financial stability. Moreover, the findings on financial flexibility draw the notion that considering the unused debt and other related issues is essential when it comes to the risk exposure of firms. This has been noted already as a previous survey on financial flexibility reveals that it is the key capital structure issue for CFOs to consider (Bancel & Mittoo, 2011; Graham & Harvey, 2001). Considering that in the African context, financial flexibility increases financial instability, this can be attributed to possible agency problems that are predominant in the African context. This suggests that there need to be controls in

the organizations to address any impending agency problem in cases where corporate organizations aim to pursue financial flexibility. Besides, there are clear insights on factors like size, leverage, revenue growth, and cash flow, which business executives must consider in maintaining acceptable levels of risk.

This study is unique in introducing risk-taking behaviour into the literature on investment efficiency, investment scale, and financial flexibility. Yet, there are further aspects of the inconsistencies in the literature that can be explored. Other areas to explore include understanding how recent events, like the COVID-19 pandemic, have impacted the risk-taking behaviour, investment efficiency, investment scale, and financial flexibility of firms. Moreover, others could consider applying the analysis to small and medium-sized enterprises and microfinance institutions. This will provide insights into the issues in the context of businesses that serve the pro-poor communities, and expand the discussions on financial inclusion further.

Notes

1. The VIF score used in the text is the result for the analysis with investment efficiency. A different test was conducted where investment scale replaced investment efficiency. The results for the alternative analysis (using investment scale) to obtain the VIF were similar to the one reported and below the rule of thumb of 10.

2. Besides, the study relates to other SDGs such as SDG 1: *No Poverty*; SDG 2: *Zero Hunger;* SDG 3: *Good Health and Well-being;* SDG 5: *Gender Equality;* SDG 8: *Decent Work and Economic Growth;* SDG 9: *Industry, Innovation, and Infrastructure;* as well as SDG 10: *Reducing Inequality,* albeit indirectly.

References

Ahn, S.C. and P. Schmidt. 1995. “Efficient estimation of models for dynamic panel data”. *Journal of econometrics,* 68(1): 5–27.

Aminadav, G. and E. Papaioannou. 2020. “Corporate control around the world”. *The Journal of finance,* 75(3): 1191–1246.

Antill, S. and S.R. Grenadier. 2019. “Optimal capital structure and bankruptcy choice: Dynamic bargaining versus liquidation”. *Journal of Financial Economics,* 133(1): 198–224.

Arellano, M. and O. Bover. 1995. “Another look at the instrumental variable estimation of error-components models”. *Journal of econometrics*, 68(1): 29–51.

Arslan-Ayaydin, Ö., C. Florackis and A. Ozkan. 2014. “Financial flexibility, corporate investment and performance: Evidence from financial crises”. *Review of Quantitative Finance and Accounting,* 42(2): 211–50.

Asare, E.T., K.C.T. Duho, C. Agyenim-Boateng, J.M. Onumah and S.N.Y. Simpson. 2021. “Anti-corruption disclosure as a necessary evil: Impact on profitability and stability of extractive firms in Africa”. *Journal of Financial Crime,* 28(2): 531–47.

Aven, T. and O. Renn. 2009. “On risk defined as an event where the outcome is uncertain”. *Journal of Risk Research,* 12(1): 1–11.

Baker, M. and J. Wurgler. 2013. “Behavioral corporate finance: An updated survey”. In *Handbook of the Economics of Finance,* Vol. 2, pp. 357–424). Amsterdam: Elsevier.

Bancel, F. and U.R. Mittoo. 2011. “Financial flexibility and the impact of the global financial crisis: Evidence from France”. *International Journal of Managerial Finance,* 7(2): 179–216.

Bargeron, L.L., K.M. Lehn and C.J. Zutter. 2010. “Sarbanes-Oxley and corporate risk-taking”. *Journal of Accounting and Economics*, 49(1-2): 34–52.

Baum, C.F., M. Caglayan, N. Ozkan and O. Talavera. 2006. “The impact of macroeconomic uncertainty on non-financial firms' demand for liquidity”. *Review of financial economics,* 15(4): 289–304.

Berger, P.G., E. Ofek and D.L. Yermack. 1997. “Managerial entrenchment and capital structure decisions”. *The Journal of finance*, 52(4): 1411–38.

Biddle, G.C., G. Hilary and R.S. Verdi. 2009. “How does financial reporting quality relate to investment efficiency?” *Journal of Accounting and Economics*, 48(2-3): 112–31.

Blundell, R. and S. Bond. 1998. “Initial conditions and moment restrictions in dynamic panel data models”. *Journal of econometrics*, 87(1): 115–43.

Boubakri, N., S.A. Mansi and W. Saffar. 2013. “Political institutions, connectedness, and corporate risk-taking”. *Journal of international business studies,* 44(3): 195–215.

Byoun, S. 2011. "Financial flexibility and capital structure decision". Available at *SSRN 1108850*, 1–50. doi:https://dx.doi.org/10.2139/ssrn.1108850

Cao, Y., Y. Dong, Y. Lu and D. Ma. 2020. "Does institutional ownership improve firm investment efficiency?" *Emerging Markets Finance and Trade*, 56(12): 2772–92.

Cao, Y., Y. Dong, D. Ma and L. Sun. 2021. "Customer concentration and corporate risk-taking". *Journal of Financial Stability*, 54: 100890. doi:https://doi.org/10.1016/j.jfs.2021.100890

Chen, F., O.-K. Hope, Q. Li and X. Wang. 2011a. "Financial reporting quality and investment efficiency of private firms in emerging markets". *The accounting review*, 86(4): 1255–88.

Chen, S., Z. Sun, S. Tang and D. Wu. 2011b. "Government intervention and investment efficiency: Evidence from China". *Journal of Corporate Finance,* 17(2): 259–71.

Chen, R., S. El Ghoul, O. Guedhami and H. Wang. 2017. "Do state and foreign ownership affect investment efficiency? Evidence from privatizations". *Journal of Corporate Finance*, 42: 408–21.

Chen, W., K. He and L. Wang. 2021. "Blockchain technology, macroeconomic uncertainty and investment efficiency". *International Journal of Emerging Markets*. doi:https://doi.org/10.1108/IJOEM-10-2020-1250

Cheng, M., D. Dhaliwal and Y. Zhang. 2013. "Does investment efficiency improve after the disclosure of material weaknesses in internal control over financial reporting?" *Journal of Accounting and Economics*, 56(1): 1–18.

Cook, K.A., A.M. Romi, D. Sánchez and J.M. Sánchez. 2019. "The influence of corporate social responsibility on investment efficiency and innovation". *Journal of Business Finance & Accounting,* 46(3-4): 494–537.

De Jong, A., M. Verbeek and P. Verwijmeren. 2012. "Does financial flexibility reduce investment distortions?" *Journal of Financial Research*, 35(2): 243–59.

DeAngelo, H. and L. DeAngelo. 2007. "Capital structure, payout policy, and financial flexibility". Marshall School of Business Working Paper No. FBE 02-06. Marshall School of Business, May. doi:https://dx.doi.org/10.2139/ssrn.916093

DeAngelo, H., L. DeAngelo and T.M. Whited. 2011. "Capital structure dynamics and transitory debt". *Journal of Financial Economics*, 99(2): 235–61.

Denis, D.J. and S.B. McKeon. 2012. "Debt financing and financial flexibility: Evidence from proactive leverage increases". *The Review of Financial Studies*, 25(6): 1897–29.

Dreyer, B. and K. Grønhaug. 2004. "Uncertainty, flexibility, and sustained competitive advantage". *Journal of Business Research*, 57(5): 484–94.

Duho, K.C.T. 2020a. Examining Anti-Corruption Disclosures, Profitability and Financial Stability Among Extractive Firms in Africa. Master of Philosophy Thesis, University of Ghana, Accra, Ghana.

Duho, K.C.T. 2020b. "Intellectual capital and technical efficiency of banks in an emerging market: A slack-based measure". *Journal of Economic Studies,* 47(7): 1711–32.

Duho, K.C.T., J.M. Onumah and R.A. Owodo. 2020a. "Bank diversification and performance in an emerging market". *International Journal of Managerial Finance*, 16(1): 120–38.

Duho, K.C.T., J.M. Onumah, R.A. Owodo, E.T. Asare and R.M. Onumah. 2020b. "Bank risk, profit efficiency and profitability in a frontier market". *Journal of Economic and Administrative Sciences,* 36(4): 381–402.

Duho, K.C.T. and P.E. Agomor. 2021. "Intellectual capital and performance among listed non-financial firms in West Africa". Dataking Working Paper Series No. WP2021-03-02. Dataking, March. doi:https://dx.doi.org/10.2139/ssrn.3803094

Duho, K.C.T., D.M. Duho and J.A. Forson. 2021a. "Impact of income diversification strategy on credit risk and market risk among microfinance institutions". *Journal of Economic and Administrative Sciences.* doi:https://doi.org/10.1108/JEAS-09-2020-0166

Duho, K.C.T., C. Agyenim-Boateng, E.T. Asare and J.M. Onumah. 2021b. "Convergence and determinants of anti-corruption disclosure among extractive firms in Africa". *Journal of Financial Crime*. doi:https://doi.org/10.1108/JFC-06-2020-0109

Eisenhardt, K.M. 1989. "Agency theory: An assessment and review". *Academy of management review*, 14(1): 57–74.

Erickson, T. and T.M. Whited. 2000. "Measurement error and the relationship between investment and q". *Journal of political economy*, 108(5): 1027–57.

Fama, E.F. 1980. "Agency problems and the theory of the firm". *Journal of political economy*, 88(2): 288–307.

Franzoni, F. 2009. "Underinvestment vs. overinvestment: Evidence from price reactions to pension contributions". *Journal of financial economics*, 92(3): 491–518.

Gamba, A. and A. Triantis. 2008. "The value of financial flexibility". *The Journal of finance,* 63(5): 2263–96.

Gao, R. and X. Yu. 2020. "How to measure capital investment efficiency: A literature synthesis". *Accounting & Finance*, 60(1): 299–334.

Gao, X., W. Xu, D. Li and L. Xing. 2021. "Media coverage and investment efficiency". *Journal of Empirical Finance,* 63: 270–93.

Garmaise, M.J. and G. Natividad. 2021. "Financial flexibility: At what cost?" *Journal of financial and quantitative analysis*, 56(1): 249–82.

Gomariz, M.F.C. and J.P.S. Ballesta. 2014. "Financial reporting quality, debt maturity and investment efficiency". *Journal of banking & finance*, 40: 494–506.

González, F. 2020. "Creditor rights, financial health, and corporate investment efficiency". *The North American Journal of Economics and Finance,* 51: 100873. doi:https://doi.org/10.1016/j.najef.2018.11.002

Goodman, T.H., M. Neamtiu, N. Shroff and H.D. White. 2014. "Management forecast quality and capital investment decisions". *The accounting review*, 89(1): 331–65.

Graham, J.R. and C.R. Harvey. 2001. "The theory and practice of corporate finance: Evidence from the field". *Journal of Financial Economics*, 60(2-3): 187–243.

Graham, J.R. and C.R. Harvey. 2002. "How do CFOs make capital budgeting and capital structure decisions?" *Journal of applied corporate finance,* 15(1): 8–23.

Gregory, R.P. 2020. "Political risk and financial flexibility in BRICS countries". *The Quarterly Review of Economics and Finance,* 78: 166–174.

Gulen, H. and M. Ion. 2016. "Policy uncertainty and corporate investment". *The Review of Financial Studies*, 29(3): 523–64.

Hadlock, C.J. and J.R. Pierce. 2010. "New evidence on measuring financial constraints: Moving beyond the KZ index". *The Review of Financial Studies*, 23(5): 1909–40.

Han, X., S. Hus and J. Li. 2019. "The impact of enterprises' shadow banking activities on business performance: A test based on mediator effect of investment scale and investment efficiency". *Emerging Markets Finance and Trade*, 55(14): 3258–3274.

Harris, M.N. and L. Mátyás. 2004. "A comparative analysis of different IV and GMM estimators of dynamic panel data models". *International Statistical Review*, 72(3): 397–408.

He, Y., C. Chen and Y. Hu. 2019. "Managerial overconfidence, internal financing, and investment efficiency: Evidence from China". *Research in International Business and Finance*, 47: 501–10.

Hodgson, T.M., S.J. Breban, C.L. Ford, M.P. Streatfield and R.C. Urwin. 2000. "The concept of investment efficiency and its application to investment management structures". *British Actuarial Journal,* 6(3): 451–45.

Jensen, M.C. 1986. "Agency costs of free cash flow, corporate finance, and takeovers". *The American Economic Review,* 76(2): 323–29.

Jensen, M.C. and W. Meckling. 1976a. "Theory of the firm: Managerial behaviour, agency costs and capital structure". *Journal of Financial Economics*, 3: 305–60.

Jensen, M.C. and W.H. Meckling. 1976b. "Theory of the firm: Managerial behavior, agency costs and ownership structure". *Journal of Financial Economics*, 3(4): 305–360.

John, K., S. De Masi and A. Paci. 2016. "Corporate governance in banks". *Corporate Governance: An International Review,* 24(3): 303–21.

Kanga, D., V. Murinde and I. Soumaré. 2020. "Capital, risk and profitability of WAEMU banks: Does bank ownership matter?" *Journal of Banking & Finance*, 114: 105814. doi:https://doi.org/10.1016/j.jbankfin.2020.105814

Kaplan, S. 1991. "Risk assessment and risk management–basic concepts and terminology". In *Risk management: Expanding horizons in nuclear power and other industries*, pp. 11–28. Boston, MA: Hemisphere Publ. Corp.

Kaplan, S. and B.J. Garrick. 1981. "On the quantitative definition of risk". *Risk analysis*, 1(1): 11–27.

Khémiri, W. and H. Noubbigh. 2018. "Determinants of capital structure: Evidence from sub-Saharan African firms". *The Quarterly Review of Economics and Finance*, 70: 150–59.

Lai, S.-M. and C.-L. Liu. 2018. "Management characteristics and corporate investment efficiency". *Asia-Pacific Journal of Accounting & Economics*, 25(3-4): 295–312.

Leahy, J.V. and T.M. Whited. 1996. "The effect of uncertainty on investment: Some stylized facts". *Journal of Money, Credit and Banking*, 28(1): 64–83.

Lensink, R. and V. Murinde. 2006. "The inverted-U hypothesis for the effect of uncertainty on investment: Evidence from UK firms". *The European Journal of Finance*, 12(2): 95–105.

Li, K., D. Griffin, H. Yue and L. Zhao. 2013. "How does culture influence corporate risk-taking?" *Journal of Corporate Finance*, 23(C): 1–22.

Ma, C.-A. and Y. Jin. 2016. "What drives the relationship between financial flexibility and firm performance: Investment scale or investment efficiency? Evidence from China". *Emerging Markets Finance and Trade,* 52(9): 2043–55.

Majeed, M.A., X. Zhang and M. Umar. 2018. "Impact of investment efficiency on cost of equity: Evidence from China". *Journal of Asia Business Studies*, 12(1): 44–59.

Malmendier, U. and G. Tate. 2005a. "CEO overconfidence and corporate investment". *The Journal of finance,* 60(6): 2661–2700.

Malmendier, U. and G. Tate. 2005b. "Does overconfidence affect corporate investment? CEO overconfidence measures revisited". European financial management, 11(5): 649–59.

Manos, R., V. Murinde and C.J. Green. 2012. "Dividend policy and business groups: Evidence from Indian firms". *International Review of Economics & Finance,* 21(1): 42–56.

Marchica, M.T. and R. Mura. 2010. "Financial flexibility, investment ability, and firm value: Evidence from firms with spare debt capacity". *Financial Management*, 39(4): 1339–65.

McLean, R.D., T. Zhang and M. Zhao. 2012. "Why does the law matter? Investor protection and its effects on investment, finance, and growth". *The Journal of finance*, 67(1): 313–50.

Menshawy, I.M., R. Basiruddin, N.A. Mohd-Zamil and K. Hussainey. 2021. "Strive towards investment efficiency among Egyptian companies: Do board characteristics and information asymmetry matter?" *International Journal of Finance & Economics*. doi:https://doi.org/10.1002/ijfe.2540

Modigliani, F. and M.H. Miller. 1958. "The cost of capital, corporation finance and the theory of investment". *The American Economic Review*, 48(3): 261–97.

Modigliani, F. and M.H. Miller. 1963. "Corporate income taxes and the cost of capital: A correction". *The American economic review*, 53(3): 433–43.

Myers, S.C. 1984a. "Capital structure puzzle". NBER Working Paper No.1393. National Bureau of Economic Research, July.

Myers, S.C. 1984b. "The capital structure puzzle". *The Journal of finance*, 39(3): 574–92.

Myers, S.C. and N.S. Majluf. 1984. "Corporate financing and investment decisions when firms have information that investors do not have". *Journal of Financial Economics*, 13(2): 187–221.

Naeem, K. and M.C. Li. 2019. "Corporate investment efficiency: The role of financial development in firms with financing constraints and agency issues in OECD non-financial firms". *International Review of Financial Analysis,* 62: 53–68.

Nickell, S. 1981. "Biases in dynamic models with fixed effects". *Econometrica*, 49(6): 1417–26.

Obaydin, I., R. Zurbruegg, P. Brockman and G. Richardson. 2021. "The relative number of anti-takeover provisions and the market for corporate control". *Journal of Financial Research*, 44(4): 279–98.

Palmer, T.B. and R.M. Wiseman. 1999. "Decoupling risk taking from income stream uncertainty: A holistic model of risk". *Strategic Management Journal,* 20(11): 1037–62.

Panousi, V. and D. Papanikolaou. 2012. "Investment, idiosyncratic risk, and ownership". *The Journal of finance*, 67(3): 1113–48.

Phan, D.H.B., B.N. Iyke, S.S. Sharma and Y. Affandi. 2021. "Economic policy uncertainty and financial stability–Is there a relation?" *Economic Modelling*, 94(C): 1018–29.

Rao, U. and T. Mishra. 2020. "Posterior analysis of mergers and acquisitions in the international financial market: A re-appraisal". *Research in International Business and Finance*, 51: 101062. doi:https://doi.org/10.1016/j.ribaf.2019.101062

Richardson, S. 2006. "Over-investment of free cash flow". *Review of accounting studies*, 11(2-3): 159–89.

Roodman, D. 2009a. "How to do xtabond2: An introduction to difference and system GMM in Stata". *The stata journal*, 9(1): 86–136.

Roodman, D. 2009b. "A note on the theme of too many instruments". *Oxford bulletin of Economics and Statistics,* 71(1): 135–58.

Rosa, E.A. 1998. "Metatheoretical foundations for post-normal risk". *Journal of Risk Research,* 1(1): 15–44.

Rosa, E.A. 2003. "The logical structure of the social amplification of risk framework (SARF): Metatheoretical foundations and policy implications". *The social amplification of risk*, 47: 47–49.

Samet, A., N. Boubakri and S. Boubaker. 2018. "Does public–private status affect bank risk taking? Worldwide evidence". *Journal of International Financial Markets, Institutions and Money,* 53(C): 287–306.

Samet, M. and A. Jarboui. 2017. "How does corporate social responsibility contribute to investment efficiency?" *Journal of multinational financial management*, 40: 33–46.

Shahzad, F., I.U. Rehman, F. Nawaz and N. Nawab. 2018. "Does family control explain why corporate social responsibility affects investment efficiency?" *Corporate Social Responsibility and Environmental Management,* 25(5): 880–88.

Shapiro, S.P. 2005. "Agency theory". *Annu. Rev. Sociol.,* 31: 263–84.

Soumaré, I., D. Kanga, J. Tyson and S. Raga. 2021. *Capital Market Development in Sub-Saharan Africa: Progress, Challenges and Innovations.* London: Overseas Development Institute (ODI).

Stein, J.C. 2003. "Agency, information and corporate investment". *Handbook of the Economics of Finance*, 1: 111–65.

Stiglitz, J.E. and A. Weiss. 1981. "Credit rationing in markets with imperfect information". *The American Economic Review,* 71(3): 393–10.

Tran, Q.T. 2019. "Economic policy uncertainty and corporate risk-taking: International evidence". *Journal of Multinational Financial Management*, 52-53: 100605. doi:https://doi.org/10.1016/j.mulfin.2019.100605

Tran, Q.T. 2020. "Foreign ownership and investment efficiency: New evidence from an emerging market". *International Journal of Emerging Markets,* 15(6): 1185–99.

Tsai, H.-J.S., Y. Wu and B. Xu. 2021. "Does capital market drive corporate investment efficiency? Evidence from equity lending supply". *Journal of Corporate Finance*, 69: 102042. doi:https://doi.org/10.1016/j.jcorpfin.2021.102042

Willis, H.H. 2007. "Guiding resource allocations based on terrorism risk". *Risk Analysis: An International Journal,* 27(3): 597–606.

Windmeijer, F. 2005. "A finite sample correction for the variance of linear efficient two-step GMM estimators". *Journal of econometrics,* 126(1): 25–51.

Wooldridge, J.M. 2016. *Introductory Econometrics: A Modern Approach*, 6th ed.. Boston: Cengage.

Xu, C. and Z. Zhou. 2016. "The study of internal control and over-investment on corporate credit risk". *Procedia computer science*, 91: 109–13.

Yartey, C.A. and C.K. Adjasi. 2007. "Stock market development in sub-Saharan Africa: Critical issues and challenges". IMF Working Paper No. WP/07/209. International Monetary Fund, August.

Yusuf, F., A. Yousaf and A. Saeed. 2018. "Rethinking agency theory in developing countries: A case study of Pakistan". *Accounting forum,* 42(4): 281–92.

Zhang, M., W. Zhang and S. Zhang. 2016. "National culture and firm investment efficiency: International evidence". *Asia-Pacific Journal of Accounting & Economics,* 23(1): 1–21.

Zwiebel, J. 1996. "Dynamic capital structure under managerial entrenchment". *American economic review*, 86(5): 1197–1215.

Appendixes

Appendix A: Estimation using leverage and investment models

The study provides a short description of some preliminary steps taken to measure financial flexibility and investment efficiency, which are estimated based on a multiple-step approach. The description of the methodology applied in line with extant literature is provided in the content of the article under the methodology section. In this case, we provide the results of the regression analysis from which the scores for the two variables used as a proxy for financial flexibility and investment efficiency were developed. The findings are presented in Table A1. It is worth noting that the results are not used directly in this study, but the predicted values of the leverage model and the residuals of the investment models were rather the scores used to develop the respective proxies used for the study.

Table A1: Results for the leverage model and investment model

VARIABLES	(1)	(2)
	LEV	INV
L.LEV	0.270***	
	(0.025)	
MLEV	-0.675	
	(0.544)	
MTB	-0.000*	
	(0.000)	
SIZE	-0.287***	
	(0.073)	
TANG	-0.246	
	(0.212)	
PROF	-4.270***	
	(0.160)	
FINF	-0.000	
	(0.004)	

continued next page

Table A1 Continued

VARIABLES	(1)	(2)
	LEV	INV
L.INV		0.000
		(0.001)
CF		0.413***
		(0.115)
Tobin's Q		0.001
		(0.001)
FF		0.012
		(0.030)
CF x FF		0.009
		(0.126)
_cons	4.409***	0.044*
	(0.889)	(0.024)
Obs.	1966	1282
Firms	235	172
Countries	17	17
R-squared	0.330	0.049
F-Stats	121.21***	11.29***
Hausman Test (χ2)	640.71***	286.43***

Notes: LEV represents leverage; INV represents investment; L.LEV represents lag of leverage; MLEV represents the median of industry-wide leverage; MTB represents market-to-book value; SIZE represents the size of firms; TANG represents asset tangibility; PBT represents profit before tax to total assets; FINF represents future inflation; L.INV represents lag of investment; CF represents cash flow; Tobin's Q represents the Tobin's Q of the firms; and FF represents financial flexibility. The standard errors are in parenthesis; while ***, **, and * represent significant levels of 1%, 5%, and 10%, respectively.
Source: Authors' Computations in STATA14.

The results in Table A1, are for the leverage model (1), which is for estimating financial flexibility and the investment model (2), which is for estimating investment efficiency. The steps followed in developing the proxies are discussed in detail in Section 3 under "financial flexibility (based on leverage model)" and "investment efficiency (based on investment model)", respectively.

The analysis for the financial leverage model reveals the following findings. There is a positive significant effect of the one-year lag of leverage and the median industry-wide leverage on the financial leverage of non-financial firms. However, profitability has a negative significant effect on the financial leverage of firms. Also, the findings reveal that the size of firms has a negative significant effect on the firms, revealing that larger firms tend to have relatively lower financial leverage. The findings also reveal that market-to-book ratio has a negative significant effect on financial leverage. Moreover, asset tangibility and expected inflation do not significantly affect financial leverage among the firms. The predicted values of the leverage, which is the dependent

value, have been used in line with the method discussed in Section 3 under "financial flexibility (based on leverage model)" to develop the financial flexibility metric.

Besides, results for the investment model reveal the following findings. There is a positive and insignificant effect of the one-year lag of investment on investment. However, cash flow, Tobin's Q, and financial flexibility have a positive effect on investment, but only the result of cash flow is significant. Also, the interactive impact of cash flow and financial flexibility has a positive and insignificant effect on investment. The residual values of the investment model are used in line with Section 3 under "investment efficiency (based on investment model)" to develop the investment efficiency metric.

Appendix B: Industry statistics of risk-taking behaviour (z-score)

To further explore the unique industry-based scores for the proxy for risk-taking behaviour (z-score), we provide the results in Table B1. The findings show that the variability evidence in the z-scores can be explained by the unique industries within which the firms are found. Generally, the real estate, consumer services, and health industries are those with high variability as evident in the standard deviations. Moreover, this is largely explained by the unique industrial contexts. Thus, we included all the data set in the analysis to reflect the unique contexts of the various industries within which the firms exist.

Table B1: Summary statistics of risk-taking behaviour (z-score), by industry

INDUSTRY	Obs	Mean	Std.Dev.	Min	Max
Basic Materials	251	14.077	12.544	-12.688	59.117
Consumer Goods	651	13.086	12.230	-8.682	69.042
Consumer Services	454	15.396	17.581	-101.897	89.142
Health	115	20.275	17.646	-7.447	58.317
Industrial	530	14.223	11.822	-18.533	53.899
Oil and Gas	127	16.225	13.494	-1.858	59.043
Real Estate	271	21.927	42.667	-2.383	357.682
Telecom/Technology	101	10.400	12.001	-5.498	46.953

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