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Firm characteristics and the use of investment decision techniques in the global south: Evidence from Ghana

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Abstract: This study uses a survey approach to investigate how managers associated with thirty (30) firm characteristics subgroups apply thirty-seven (37) investment decision techniques in practice in a frontier market covering: capital budgeting, cost of equity, cost of capital, and adjustments for other types of systemic risk. The results show that 27 out of 30 firm subgroups significantly apply a payback period, and 0 out of 30 firm subgroups significantly apply any of the cost of equity estimation techniques investigated, deviating from the current literature. Nineteen out of 30 firm subgroups significantly apply a single common firm-wide discount rate for all projects, which is in line with global trends but inappropriate. It seems that frontier market managers are leaning toward simplicity as payback period, no cost of equity estimation and using a single common firm-wide discount rate do not properly account for time and risk. This may lead to less optimal investment decisions: resulting in firm value degradation. Promoting policies that reduce uncertainties in frontier markets may encourage the dominant use of net present value, cost of equity estimation and opportunity risk-adjusted cost of capital techniques to support firm value maximisation.

Subjects: Economics; Finance; Corporate Finance; Business, Management and Accounting; Accounting; Corporate SocialResponsibility & Business Ethics;

Keywords: Firm characteristics; capital budgeting; cost of equity; cost of capital; survey; investment decision

1. Introduction

Developed, emerging, frontier, and stand-alone markets encapsulate the risk and hurdle associated with a market that investors must overcome to survive or otherwise die out. This paper investigates whether the existing market type alters managers' investment decisions associated with a particular firm characteristic. Frontier markets are close to the extreme end of the spectrum of acceptable investment horizons, where markets are considered unsuitable for investment. They are plagued by persistent risks and hurdles that shape investors in that environment, similar to walking through a minefield (Uludag & Ezzat, 2016). To generate future cash flows, managers must make investment decisions considering the firm and market characteristics to increase the likelihood of survival. A manager's approach to investment decisions is likely to differ based on the risk and hurdles in a market.

Many survey studies have engaged managers of firms with varying firm characteristics to understand how managers make their investment decisions in practice in developed and emerging markets. This approach combines firm characteristics, market type and the managers' thought processes, offering insights and improvement opportunities for managerial decision-making within a particular market classification. Similar survey studies include Arnold and Hatzopoulos (2000), Graham and Harvey (2001), Du Toit and Pienaar (2005), Correia and Cramer (2008), Maroyi and Van der Poll (2012), Maquieira et al. (2012), and Hartwig (2012), and Batra and Verma (2017), and Al-Mutairi et al. (2018), and Addico et al. (2022). The literature on firm characteristics and the use of investment techniques for the frontier market is scanty. Considering the increasing level of risk and hurdles as we move from developed to frontier markets, it is worth developing knowledge to help frontier market managers understand and improve upon their approach to investment decisions. This would support firm value maximisation, economic growth, and poverty alleviation in frontier markets.

On the interaction between the macro economy and firm characteristics, Issah and Antwi (2017), working with UK data, find that firm performance is a function of the prior year's return on asset (ROA) and macroeconomic variables. Also, macroeconomic variables and prior year ROA can impact future firm performance (ROA). Similarly, using emerging European countries, Anton (2019) empirically establishes a link between firm growth or performance, the macroeconomic environment, and the characteristics of domestic banking sectors. His quantitative results indicate that economic growth positively influences sales and total assets growth, which are firm characteristics. In addition, the effect of financial and economic development varied with the firm growth. This suggests that the difference in macroeconomic stability and banking structures of developed, emerging, and frontier markets may influence managers' investment decision processes to ensure survival.

The IMF (2022) sub-Saharan Africa (SSA) Regional Economic Outlook notes that SSA regional indebtedness is skewing toward Pre-Heavily Indebted Poor Countries Initiative (Pre-HIPC) levels. This time the debt portfolios are risker and likely to promote harsh economic conditions: as low-cost, long-term multilateral debt has been substituted with higher-cost private funds from the international bond market. This is encouraging rising debt-service costs and higher rollover risks. West Africa, which is within SSA, is largely made up of frontier markets. Ehigiamusoe et al. (2019), working with West African data, show that macroeconomic stability has significant effects on financial development, with the inflation rate, real exchange rate, and fiscal deficit having a negative effect on financial development. They further indicate that government debt and real interest rates positively affect financial development. They recommend that countries in the region should strive to achieve macroeconomic stability to drive financial development. Their financial development is proxied by credit to the private sector relative to Gross Domestic Product (GDP) and alternatively by liquid liabilities relative to GDP for robustness checks. This is interesting as access to funding for the private sector would influence the investment decision choices of managers within the region.

Within SSA and West Africa, Ghana is a typical frontier market that experiences persistent macroeconomic instability. An overview by the World Bank (2022) indicates macroeconomic headwinds, with the fiscal deficit reaching 5.6% of GDP in the first half of 2022—above the 3.9% target. By the end-June 2022, public debt inched towards 78% of GDP, and interest payments were about 54% of revenues over the first half of 2022. Inflation rose to 32% year-on-year (an 18-year high) in July 2022 from 12.6% at the end of 2021. The Bank of Ghana, reacting to inflationary pressure, raised the monetary policy rate (MPR) to 22%, and banks' primary reserve requirements moved from 12% to 15%. Responding to macroeconomic issues: the global credit rating agencies downgraded Ghana's Long-Term Local- and Foreign-Currency Issuer Default Ratings (IDRs) to junk with Fitch's downgrade moving from "CCC" to "CC" (Fitch, 2022). In July 2022, the Government of Ghana started engaging the IMF for a possible bailout program (World Bank, 2022). These significant macroeconomic fluctuations and risky business environments may influence managers of

a particular firm's characteristics to evolve differently from those in developed and emerging markets.

Using Ghana as a case study frontier market and the notion that managers may have uniquely adapted to the harsher macroeconomic environment differently than managers of the developed and emerging markets. This study attempts to provide a broad and deep perspective by coupling firm characteristics and Ghana's frontier market managers' investment decisions to provide insights using a cross-sectional analysis. The essence is that firm characteristics vary on many levels due to the firm's strategic positioning, cash flow situation, micro and macro factors, life cycle stage, etc. For example, the firm's life cycle theory posits that a firm goes through the start-up, expansion, high growth, maturity, and decline stages. Therefore, based on the life cycle stage, various fundamental analyses of the firm's behaviour pattern and performance can be performed (Mueller, 1972). This study believes that frontier market managers would make investment decisions uniquely per their market situation and firm characteristics differently from their counterparts in developed and emerging markets.

This study uses capital budgeting, cost of equity, cost of capital, and the need to adjust discount rates and cash flows to reflect other systemic market risk factors associated with a firm's opportunities as proxies for investment decisions similar to Graham and Harvey (2001). The study uses 15 firm characteristics grouped into 30 subgroups taking into consideration Ghana's frontier market context. Each technique is ranked to provide more clarity regarding the economic significance or high usage. Although surveys are rarely used in finance, their findings support bridging the gap between theory and practice. A review of the literature on Ghana and other frontier markets concerning survey papers in this area is extremely rare or non-existent. This paper seeks to capture the behavioural element of the investment decision process among firms in Ghana by engaging financial managers with a survey. Also, the applicability of the comparable literature from other parts of the world may not hold due to different cultures, governance systems, information availability, currency stability, capital market development, liquidity, transaction costs, and many more factors, hence the need for this work on Ghana. The paper adds to the literature by using a survey approach to probe how managers of varying firm characteristics apply investment decision techniques in a frontier market focusing on listed Ghanaian firms.

The research objectives are four (4) and include investigating how firm characteristics influence the use of capital budgeting tools among listed firms in Ghana. To determine how firm characteristics influence the use of the cost of equity estimation techniques. To determine how firm characteristics influence the application of the cost of capital techniques, and lastly, to investigate how firm characteristics influence appropriate risk adjustment to discount rates or cash flows for other systemic risk factors during project evaluation. The focus is on determining whether managers associated with a certain firm characteristic in a frontier market behave differently from their counterparts in a developed and emerging market as the world is becoming a global village.

This study is likely to help increase understanding of how the higher risk and hurdles in frontier markets influence managers' investment decisions per a particular firm characteristic. The results generally indicate that frontier market managers prefer simple investment decision techniques like payback period, no cost of equity estimation and using a single common firm-wide discount rate. These techniques do not properly process the time and risk factors associated with an opportunity: but are very valuable to frontier market managers than developed and emerging managers of all firm characteristics investigated. The study provides empirical evidence reinforcing the idea that the managerial decision approach must change per firm characteristics (in line with the life cycle theory) and the market. This study provides a reference to help practitioners identify improvement opportunities to support the firm's value maximisation and a platform for academic discussion. The knowledge developed here will support sustainable management for firms across Africa, which

has many frontier markets, supporting the African Union Agenda 2063, which seeks to transform Africa into the global powerhouse of the future (African Union, 2021).

The rest of the article is structured as follows; Section Two covers the methodology, the survey design, and the sampling process. Section Three documents and discusses the researcher's empirical results, and Section Four provides conclusions to the study.

2. Methodology

This study's targeted audiences were Chief Financial Officers (CFOs) of listed firms on the Ghana Stock Exchange (GSE) because they are senior managers with the primary role of overseeing the company's finances and financial activities. Listed firms were of interest because they were: accessible, heavily regulated by the GSE and the Security and Exchange Commission (SEC), cut across multiple industries, and have much public information.

The sample size was based on the GSE records at the end of February 2019. The GSE Market Information Session Daily Report showed that there were: 41 listed equities consisting of 33 main market equities, one (1) depository share, one (1) preference share, one (1) exchange tradeable funds (ETFs), and five (5) Alternative Market (GAX) equities. The research attempted to target all 33 main market equities of the GSE and five (5) GAX equities, resulting in a total target sample of 38 firms. The depository shares and preference shares were for listed firms already in the sample, while the Exchange Tradeable Funds (ETFs) were not accessible.

The research questionnaire inspired by Graham and Harvey (2001) consisted of three (3) sections. The first (1st) section focused on documenting a set of firm characteristics used to probe into various investment decision patterns investigated by this study. The second (2nd) section probed into the use of capital budgeting tools among CFOs in practice. The third (3rd) section investigated the cost of capital techniques with three (3) subsections that probed into the use of the cost of equity estimation techniques, the cost of capital techniques, and risk adjustment for other types of systemic risk factors. The final survey contained five (5) main questions and 37 individual investment decision techniques.

The survey was targeted and administered to all 38 listed firms using two (2) methods. These methods included visits to the targeted firm's premises to engage relevant stakeholders and emails to the firms. In all, 32 firms were visited, and six (6) emails were sent. After administering the survey, the interaction with the firms involved mainly applying a series of follow-up visits, calls, and emails because most CFOs from observation had tight schedules.

A total of 31 firms responded, resulting in a response rate of 81%. Graham and Harvey (2001) sampled 4,440 firms, out of which 392 CFOs responded to the survey resulting in a response rate of 9%. Maquieira et al. (2012) targeted 1,248 Alumni and 775 executives (a total of 2,023 firms) and obtained 290 answers resulting in a response rate of about 14% from seven main countries. Hermes et al. (2007) survey involved targeting 250 Dutch and 300 Chinese listed and non-listed companies. They receive 87 responses, 42 from Dutch and 45 from Chinese companies, resulting in a response rate of 17% for the Dutch and 15% for the Chinese sample. This study's high response rate may be due to the comparatively small sample size and the delivery of hard copies to the firms with a series of kind reminder calls and emails.

The completed questionnaires were reviewed, and the data collected from the survey was entered into SPSS software. All the firms' characteristics aligned with Graham and Harvey (2001), except for CEO nationality, business structure, and operating years. All data entered into the SPSS software were primary data except for the Price-Earnings ratio (PE ratio), leverage, and CEO nationality. PE ratio was available in the GSE Market Information Session Daily Report, CEO nationality was available via the responding firm's website, and leverage data was obtained from a review of the firms' 2017 audited financial statements provided to the GSE. The year

Table 1. Selected firm characteristics groups

Criteria	Selected firm characteristics	Grouping	
		Sub Group 1	Sub Group 2
Criteria 1	Size by sales	Medium	Large
Criteria 2	P/E	Non-Growth (≤15.97)	Growth(>15.97)
Criteria 3	Leverage	Low (≤13.19%)	High (>13.19%)
Criteria 4	Dividend	No	Yes
Criteria 5	Industry	Manufacturing	Others
Criteria 6	Mgt Ownership	Low(≤5%)	High(>5%)
Criteria 7	Institutional investors	Low(≤5%)	High(>5%)
Criteria 8	CEO age	Younger (≤40)	Older (>40)
Criteria 9	CEO tenure	Short (≤ 4 years)	Long (> 4 years)
Criteria 10	CEO MBA	MBA	Non-MBA
Criteria 11	CEO Nationality	Non-Ghanaian	Ghanaian
Criteria 12	Target debt ratio	No	Yes
Criteria 13	Foreign sales	No	Yes
Criteria 14	Business structure	Single operation	Group
Criteria 15	Operating years	≤10 years	>10 years

2017 audited financial statements were used because the leverage information was available for all responding firms. The fifteen (15) firm characteristics were grouped into two (2) subgroups to support data analysis resulting in thirty (30) subgroups, as detailed in Table 1. Also, see Appendix A for Summary Statistics and Appendix B for Firm Characteristics Correlation Matrix.

In defining the firm characteristics subgroups, the study adopted the Ghana Revenue Authority (GRA) classification, which describes large firms as firms with an annual turnover of more than GHC 5,000,000 ($1,009,570.73) and medium firms as firms with an annual turnover of more than GHC 90,000 ($18,172.27) but less than GHC5,000,000 ($1,009,570.73; GRA, 2018). To define non-growth and growth firms, this study used the PE ratio for all listed stocks in the GSE Market Information Session Daily Report at the end of February 2019. The average PE ratio on that day for all responding firms was 15.97. Firms with a PE ratio less or equal to 15.97 (≤15.97) were considered non-growth firms, and those above (>15.97) were considered growth firms.

On the subgrouping based on leverage, this study used the long-term debt-to-total assets ratio as a proxy, as it provides the percentage of a firm's assets financed with long-term debt. The average long-term debt-to-total assets ratio for all responding firms was 13.19%. Therefore, firms with a long-term debt-to-total assets ratio less or equal to 13.19% (≤13.19%) were considered low-leverage firms, and those above were considered high-leverage firms (>13.19). In classifying based on dividends, this study created subgroups based on dividend-paying and non-dividends-paying firms. On the industry level, the firm characteristics subgroupings were manufacturing and other (non-manufacturing) firms. For management ownership of the firm, this study considered management ownership of less than or equal to five per cent (≤5%) as low and above five per cent (>5%) as high.

This study considered institutional investors of less than or equal to five per cent (≤5%) as low and above five per cent (>5%) to be high. On the CEO characteristics, this study groups CEO age

into young CEOs (≤40 years) and older CEOs (>40 years), as 40 years is required for any person to be President in Ghana according to Chapter 8, Article 62 of the 1992 Constitution of Ghana. The CEO tenure subgroups consisted of short CEO tenure (<4 years) and long CEO tenure (>4 years), whiles the CEO-education level subgrouping was MBA CEOs and non-MBA CEOs. CEO Nationality was of interest because there was a need to determine whether CFOs of a firm with Ghanaian or non-Ghanaian CEOs were behaving differently.

This study investigated the target debt ratio by creating subgroups of firms with no targeted debt ratio and firms with some form of targeted debt ratio. The characteristics of foreign sales were divided into firms with zero per cent (0%) foreign sales and firms with some foreign sales percentage (1–100%). Also, an initial review of the list of firms showed that there were two main firms listed: single stand-alone firms and firms that are part of a group. Therefore, the research also considered whether CFOs were making investment decisions differently due to their business structure. In line with the life cycle theory of the firm, this study investigated how the number of operating years influences the managerial decision by creating short operating years (≤10 years) and long operating years (>10 years) subgrouping.

The analysis process involves coupling firm characteristics in Table 1 to each investment decision technique and tool investigated. The methodology applied involved manipulating the SPSS software through the following steps. The investigation into capital budgeting, cost of equity, and cost of capital were analysed according to a Richter scale of 0 to 4 with the following meanings: 0 (never), 1 (Rarely), 2 (Sometimes), 3 (almost always), and 4 (always). The results include total usage per technique and tool, which is the percentage sum of respondents for always or almost always (responses of 4 and 3), and the total mean per technique and tool, which is the average of respondents on a scale of 1 to 4.

The inquiry to risk adjustment to discount rate and/or cash flow for other types of systemic risk applied a scale of 1 to 4 with the following meanings: 1 (risk adjustment to discount rate only), 2 (risk adjustment to cash flow only), 3 (risk adjustment to both—cash flow and discount rate) and 4 (risk adjustment to neither—cash flow and discount rate). The results include total usage per technique and tool, which is the percentage sum of respondents for risk adjustment for both discount rate and cash flow (responses of 1 and 2) and the total mean per technique and tool, which is the average of respondents on a scale of 1 to 4.

Firm characteristic subgroup analysis included a firm characteristic subgroup mean value per technique and tool. This is the associated average of respondents on a scale of 1 to 4 for capital budgeting, cost of equity, and cost of capital and 0% to 100% for risk adjustment to discount rate and/or cash flow for other types of systemic risk. Firm characteristic subgroup mean values with statistically significant differences were analysed with SPSS using a two-sample t-test for equal means. For clarity, all statistical differences documented were underlined. This study assumed firm characteristic subgroups' mean values of economic significance or high usage to have a rating of 2.4 or more and 60% or more (2.4/4). This was to help standardise the definition of high usage—shaded grey.

The frequency was determined by manual counting and tallying from the SPSS output; all firm characteristic subgroup mean values of 2.4 or more or 60% or more for each technique or tool shaded grey. The ranking was done by frequencies first and then by total mean. Each investment decision technique and tool are associated with a frequency and a ranking to ensure a clear conclusion and interpretation of the results, expanding the work of Graham and Harvey (2001).

3. Results and discussions

For easy communication, the following acronyms are used throughout the remainder of the study: Net Present Value (NPV), Internal Rate of Return (IRR), Hurdle Rate, Earning Multiple Approach, Adjusted Present Value (APV), Payback Period (PBK), Discounted Payback Period (DPBK), Profitable

Index (PI), and Accounting Rate of Return (ARR). Also, note that a significant difference is a difference in the mean of two (2) associated subgroups. Lastly, a high or significant usage means a usage rating of 2.4 or more or 60% or more. The approach to discussion involves documenting all statistically significant differences and economically significant applications of a particular technique. This is followed by a summary of economically significant applications and synthesis with literature.

3.1. The influence of firm characteristics on Capital Budgeting Tools (CBTs)

3.1.1. Basic Firm Characteristics and the application of CBTs

Size by sales results from Table 2 indicates that large firms in Ghana's frontier market significantly use IRR differently than small firms (rating of 2.57 versus 1.25). Additionally, there is a comparatively high usage for CFOs of large firms applying NPV, IRR, and PBK. Large firms with a turnover of more than GHS 5,000,000 (≤ $1,009,570.73) per year are likely to have top-notch CFOs and finance teams who are well vest in discount cash flow techniques. Investment decisions that apply discounted cash flow techniques requires a bit more complexity as they replace accounting income with cash flows and explicitly factor in the time value of money (Damodaran, 2014). Therefore, CFOs of large firms seem to be taking the riskiness associated with their cash flow and cost of capital by leaning more towards discounted cash flow techniques such as IRR and NPV while using PBK as a supplementary tool. This is because CFOs using NPV are likely to use IRR. After all, IRR is the discount rate that makes the NPV of a project equal to zero (NPV = 0; Damodaran, 2014). These results are close to Graham and Harvey (2001), who find that United States (US) large firms are significantly more likely to use NPV than small firms (rating of 3.42 versus 2.83).

On the other side, medium firms in Ghana's frontier market with a turnover of less than GHS 5,000,000 (< $1,009,570.73) per year significantly use PI differently than large firms (rating of 3.25 versus 2.00). Additionally, there is a comparatively high usage for the CFOs of medium firms using PBK, PI, and ARR. This is plausible as firms with fewer resources would prefer to stick to simple techniques such as PBK, PI, and ARR that rely on accounting information. There is no need to consider risk and time; just accounting numbers are applicable (i.e., the cost of generating information is low).

P/E Ratio results show comparatively high usage of NPV and PBK by CFOs of non-growth firms in Ghana. Also, CFOs of growth firms significantly apply NPV, IRR, and PBK. The usage pattern for non-growth and growth firms are very similar, as NPV and IRR have a strong link, and CFOs are likely to use them concurrently. Also, there is a possibility that CFOs are using PBK as a supplementary tool to support their decision-making process due to its simplicity and intuitiveness. Damodaran (2014) supports this idea and suggests that firms are much more likely to apply PBK as a secondary investment decision rule and use it as a constraint in decision-making. For example, they can accept projects with PBK of less than ten years or choose between projects when the primary decision rule produces similar results.

Leverage (as long-term debt to total asset) results indicate that high-leverage firms in Ghana's frontier market significantly apply PI and ARR differently from low-leverage firms (rating of 3.18 versus 1.85 and rating of 2.64 versus 1.55, respectively). From the results, a high-leverage firm might use PI and ARR as basic metrics to provide additional perspectives on their debt situation, as they can easily generate them with existing accounting data. In contrast, firms with low leverage have no real need to use PI and ARR to provide alternative perspectives to their debt situation leading to their low application. Various managerial and business environment factors power the use of leverage. Asquith and Weiss (2019) note that a firm's capital structure decision lies in appreciating the industry and firm's traits and whether the firm is expected to have low or high costs of financial distress. They also indicate a clear industry effect when setting firm capital structure or use of leverage. Firms in industries with stable cash flows (e.g., utilities and real estate)

Table 2. Results on the use of Capital Budgeting Tools among CFOs in practice in Ghana

How frequently does your firm use the following techniques when deciding which projects or acquisitions to pursue?	% always or almost always	Total Mean	Criteria 1		Criteria 2		Criteria 3		Criteria 4		Criteria 5		Criteria 6		Criteria 7		Criteria 8	
			Size by sales		Price earnings ratio		Leverage		Dividend		Industry		Mgt Ownership		Institutional investors		CEO age	
			medium	Large	Non-Growth	Growth	Low	High	No	Yes	Manu	Others	Low	high	Low	high	Young	Older
			< GHC 5 million	> GHC 5 million	<= 15.97	>15.97	<= 13.19%	>13.19%	No	Yes	Manu	Others	<= 5%	>5%	<= 5	> 5	<= 40	>40
a) Net Present Value (NPV)	61.29%	2.65	2.38a	2.74a	2.48a	3.13a	2.55a	2.82a	2.75a	2.63a	2.82a	2.55a	2.50a	3.14a	2.40a	2.76a	1.00a	2.76b
b) Internal Rate of Return (IRR)	54.84%	2.23	1.25a	2.57b	2.09a	2.63a	2.10a	2.45a	2.25a	2.22a	1.73a	2.50a	2.33a	1.86a	1.30a	2.67b	1.50a	2.28a
c) Hurdle Rate	12.90%	1.03	.88a	1.09a	1.13a	.75a	1.15a	.82a	1.50a	.96a	1.18a	.95a	1.17a	.57a	.40a	1.33b	1.00a	1.03a
d) Earnings multiple approach	19.35%	1.16	1.25a	1.13a	1.26a	.88a	.90a	1.64a	1.50a	1.11a	.91a	1.30a	1.00a	1.71a	.70a	1.38a	1.00a	1.17a
e) Adjusted Present Value (APV)	32.26%	1.58	1.63a	1.57a	1.61a	1.50a	1.30a	2.09a	1.75a	1.56a	1.45a	1.65a	1.33a	2.43b	1.50a	1.62a	1.00a	1.62a
f) Payback period	67.74%	2.81	2.50a	2.91a	2.65a	3.25a	2.85a	2.73a	2.50a	2.85a	2.82a	2.80a	3.00a	2.14a	2.40a	3.00a	2.00a	2.86a
g) Discounted payback period	51.61%	2.29	2.38a	2.26a	2.26a	2.38a	2.10a	2.64a	2.50a	2.26a	2.45a	2.20a	2.46a	1.71a	2.00a	2.43a	2.00a	2.31a
h) Profitability index	54.84%	2.32	3.25a	2.00b	2.30a	2.38a	1.85a	3.18b	2.75a	2.26a	2.36a	2.30a	2.08a	3.14a	2.90a	2.05a	3.50a	2.24a
i) Accounting Rate of Return (or Book Rate of Return on Assets)	38.71%	1.94	2.75a	1.65a	2.04a	1.63a	1.55a	2.64b	2.00a	1.93a	1.91a	1.95a	1.92a	2.00a	2.40a	1.71a	3.50a	1.83a
j) Sensitivity analysis (e.g., "good" vs. "fair" vs. "bad")	45.16%	2.13	1.75a	2.26a	2.04a	2.38a	1.90a	2.55a	2.25a	2.11a	1.91a	2.25a	1.96a	2.71a	1.80a	2.29a	1.00a	2.21a
k) Value-at-Risk or other simulation analysis	29.03%	1.68	1.75a	1.65a	1.61a	1.87a	1.30a	2.36a	1.50a	1.70a	1.82a	1.60a	1.50a	2.29a	2.10a	1.48a	1.00a	1.72a
l) We incorporate the "real options" of a project when evaluating it	29.03%	1.35	2.00a	1.13a	1.43a	1.13a	1.25a	1.55a	1.50a	1.33a	1.55a	1.25a	1.17a	2.00a	1.70a	1.19a	2.00a	1.31a

(*Continued*)

Table 2. (*Continued*)

How frequently does your firm use the following techniques when deciding which projects or acquisitions to pursue?	% always or almost always	Total Mean	Criteria 9		Criteria 10		Criteria 11		Criteria 12		Criteria 13		Criteria 14		Criteria 15		- Frequency is a count of comparatively high usage with rating above 2.4- Raking is base on frequency and total mean	
			CEO tenure		CEO MBA		CEO Nationality		Target debt ratio		Foreign sales		Business structure		Operating years			
			Short	Long	Yes	No			Yes	No	No	Yes	Main	Group	Short	Long		
			<= 4 years	> 4	MBA	non-MBA	Non-Ghanaian	Ghanaian	no target range	Some form of target range	0%	1 - 100%	Single operation	Group operation	<=10years	>10years		
a) Net Present Value (NPV)	61.29%	2.65	2.33a	2.94a	2.71a	2.57a	2.73a	2.60a	2.71a	2.59a	2.45a	2.75a	2.75a	2.61a	1.50a	2.72a	26	2nd rank
b) Internal Rate of Return (IRR)	54.84%	2.23	2.00a	2.44a	2.12a	2.36a	2.64a	2.00a	2.21a	2.24a	1.55a	2.60a	1.88a	2.35a	1.50a	2.28a	8	5th rank
c) Hurdle Rate	12.90%	1.03	.73a	1.31a	.88a	1.21a	1.18a	.95a	1.21a	.88a	.64a	1.25a	1.25a	.96a	.00a	1.10a	0	Low or no usage
d) Earnings multiple approach	19.35%	1.16	.67a	1.62b	1.18a	1.14a	.82a	1.35a	.93a	1.35a	.55a	1.50b	2.00a	.87b	1.50a	1.14a	0	Low or no usage
e) Adjusted Present Value (APV)	32.26%	1.58	1.13a	2.00a	1.65a	1.50a	1.45a	1.65a	1.14a	1.94a	.91a	1.95b	2.50a	1.26b	1.50a	1.59a	2	8th rank
f) Payback period	67.74%	2.81	2.93a	2.69a	2.71a	2.93a	2.91a	2.75a	2.50a	3.06a	2.36a	3.05a	2.63a	2.87a	1.00a	2.93b	27	1st rank
g) Discounted payback period	51.61%	2.29	2.20a	2.38a	2.06a	2.57a	2.00a	2.45a	2.43a	2.18a	2.27a	2.30a	2.63a	2.17a	2.00a	2.31a	9	4th rank
h) Profitability index	54.84%	2.32	2.33a	2.31a	2.59a	2.00a	1.82a	2.60a	2.14a	2.47a	2.45a	2.25a	2.88a	2.13a	3.50a	2.24a	12	3rd rank
i) Accounting Rate of Return (or Book Rate of Return on Assets)	38.71%	1.94	1.93a	1.94a	2.06a	1.79a	1.55a	2.15a	1.71a	2.12a	1.73a	2.05a	2.50a	1.74a	3.50a	1.83a	6	6th rank
j) Sensitivity analysis (e.g., "good" vs. "fair" vs. "bad")	45.16%	2.13	1.93a	2.31a	2.18a	2.07a	2.00a	2.20a	2.14a	2.12a	1.55a	2.45a	2.38a	2.04a	1.50a	2.17a	3	7th rank

(*Continued*)

Table 2. (*Continued*)

k) Value-at-Risk or other simulation analysis	29.03%	1.68	1.60a	1.75a	1.76a	1.57a	1.64a	1.70a	1.64a	1.71a	1.27a	1.90a	2.38a	1.43a	1.50a	1.69a	0	Low or no usage
l) We incorporate the "real options" of a project when evaluating it	29.03%	1.35	1.27a	1.44a	1.12a	1.64a	.91a	1.60a	1.50a	1.24a	1.09a	1.50a	2.38a	1.00b	2.00a	1.31a	0	Low or no usage

Notes: CFOs of listed firms in Ghana rated their use of corporate finance knowledge, techniques, and tools on the scale of 0 (never), 1 (Rarely), 2 (Sometimes), 3 (almost always) and 4 (always). The report shows the total mean as well as the sum of Percentage(%) responses 3(almost always) and 4(always). Output results in the same row and subtable not having the same subscript are significantly different at $p < .05$ in the two-sided test of equality for column means. Output results with no subscript are not included in the test (which assume equal variances) and also they are not used in comparisons because there are no other valid categories to compare. In addition, this statistical tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction. The techniques that are highly used by respondents are in grey shades. All rows and columns are as defined and the ranking of each corporate finance knowledge, techniques, and tools are also documented in the last column of the full table

have high debt ratios. In contrast, firms in industries with volatile cash flows or a lot of technological change and R&D (e.g., high-tech and pharmaceuticals) have very low debt ratios.

Additionally, there is a comparatively high usage for CFOs of low-leverage firms in Ghana's frontier market using NPV and PBK. However, CFOs of high-leverage firms significantly apply NPV, IRR, PBK, DPBK, PI, ARR, and Sensitivity analysis. One of the costs of using debt or leverage is the cost of bankruptcy, which is both direct and indirect. The state of bankruptcy, where the firm cannot meet its obligations, is a nightmare for most managers. This could be why Ghana's high-leverage firms are using an increasing number of tools to provide varying perspectives and understanding of their investment decisions. Graham and Harvey (2001) find that highly levered firms are significantly more likely to use NPV and IRR than firms with small debt.

Dividend results show comparatively high usage of NPV, PBK, DPBK, and PI for CFOs of non-dividend paying firms in Ghana, while dividend-paying firms are significantly applying NPV and PBK. The CBTs application patterns are similar. This could be because dividend policy is driven by varying factors influencing the board's decision to pay and not like the availability of excess free cash flow. For example, Baker and Wurgler (2004) posit a catering theory of dividends that suggests managers cater to investors by paying dividends when investors put a stock price premium on payers and, ideally, not paying when investors prefer nonpayers. In short, managers give investors what they currently want, introducing a behavioural element of the dividend payment.

Also, Damodaran (2014) suggests that there are cases where high-growth firms with great investment opportunities do not usually pay dividends. In contrast, stable firms with larger cash flows and fewer projects tend to pay more earnings out as dividends. This implies that the decision to pay is relatively subjective and may account for the lack of significant difference in applying investment tools among the dividend-paying and non-paying subgroups. Notably, Graham and Harvey (2001) find that firms that pay dividends are significantly more likely to use NPV and IRR than firms that do not pay dividends.

Also, the high usage of CBTs tools by non-dividend-paying firms in Ghana's frontier market could be that they are growth firms with many positive NPV projects which require cash resources (both internal and external). It makes sense for CFOs of such firms to apply varying tools as they are engaging equity and debt sources of funds, which is generally expensive in a frontier market like Ghana. Also, dividend payments represent real cash moving out of the firm; therefore, CFOs with less flexibility are likely to apply various techniques to provide them with varying scenarios before deciding to pay or not. Interest rates are generally high in Ghana; as of December 2022, the 91-day Treasury bill interest rate (risk-free rate) is approximately 35.6% (Bank of Ghana, 2022). The prevailing high-interest rates may be forcing CFOs to align with the pecking order theory that suggests managers would focus on internal funds by ensuring funds required for plough back are secured. This implies that managers would put in extra effort (using more tools to help make a better decision) to realise expected future cash flows from the firm's investments.

Industry results indicate a comparatively high usage for CFOs of manufacturing firms in Ghana using NPV, PBK, and DPBK, while CFOs of non-manufacturing firms significantly apply NPV, IRR, and PBK. The application of CBTs by both subgroups is similar, as NPV and IRR are strongly linked. The indifference in the application pattern could be due to the influence of the persistent macroeconomic instability environment experienced by all industries in Ghana, which may be forcing all industries to behave similarly. Currently, in 2022, Ghana is in bailout talks with the IMF. The country's fiscal deficit is hovering around 5.6% of GDP, public debt reached 78% of GDP, interest payments are approximately 54% of revenues, inflation rose to 32% year-on-year (an 18-year high), monetary policy rate (MPR) is at 22%. Banks' primary reserve requirements moved from 12% to 15% (World Bank, 2022). Fitch (2022) downgraded Ghana's Long-Term Local- and Foreign-Currency Issuer Default Ratings (IDRs) from "CCC" to "CC". This study believes that Ghana's

persistent macroeconomic instability and high cost of debt may be why both industry subgroups are applying CBTs similarly.

3.1.2. Ownership Characteristics and the application of CBTs

Management Ownership results from Table 2 show that firms in Ghana with high (>5%) managerial ownership orientation are significantly likely to use APV differently than firms with low (≤5%) managerial ownership (rating of 2.43 versus 1.33). The literature in this area is dichotomous; a review of agency literature (e.g., Jensen and Meckling, 1976; Morck, Shleifer, and Vishny, 1988; Stulz, 1988) show that increasing managerial ownership benefits shareholders due to an increase in managers' incentives to increase firm value. However, managers can progressively entrench themselves as managerial ownership exceeds a certain point, resulting in firm value degradation. This means there is likely to be an optimal ownership level (Fahlenbrach & Stulz, 2009). The APV technique requires dedication, as its more rigorous than most CBTs. It may signify that CFOs of high managerial ownership firms are putting in extra effort to apply it, implying that managers and shareholders have their interests aligned. Damodaran (2014) states that the APV approach involves valuing the firm without debt and then adding the effect of the firm's debt by considering the net effect of both the benefits and the costs of borrowing. This approach allows a levered firm to be estimated at different debt levels, which enables managers to determine the optimal debt ratio that maximises the firm value, which is relatively demanding.

However, there is a comparatively high usage for CFOs of low-management ownership firms in Ghana's frontier market using NPV, PBK, and DPBK. In contrast, CFOs of high-management ownership firms significantly apply NPV, APV, PI, and Sensitivity analysis. The high-managerial ownership firm's usage pattern of more CBTs could be interpreted as a signal of high commitment toward ensuring that investment decisions result in realising the future cash flow needed to increase the firm's value.

Institutional Investors results indicate firms with a high number (>5%) of institutional investors in Ghana significantly apply IRR and hurdle rates differently from firms with a low number (≤5%) of institutional investors (rating of 2.67 versus 1.30 and rating of 1.33 versus 0.40, respectively). Bodie et al. (2018) note that institutional investors such as mutual funds, pension funds, hedge funds, endowment funds, and insurance companies facilitate the monitoring of managers and make the lives of poor performers at the least uncomfortable, helping to reduce agency problems. Most institutional investors would often have useful insights about the firm's market demand, prospects, and competitors, enabling them to bring varying perspectives to managers. This use of hurdle rate by CFOs of firms with a high institutional investor in Ghana may ensure that all investment opportunities are more than the cost of capital, leading to value creation.

Additionally, there is a comparatively high usage for CFOs of low institutional investor firms in Ghana using NPV, PBK, PI, and ARR. Also, CFOs of high institutional investor firms significantly apply NPV, IRR, PBK, and DPBK. The application of CBTs by both subgroups is similar, and the indifference in the application pattern may be due to the harsh macroeconomic conditions and high-interest rates described previously, which may be forcing managers to behave similarly.

3.1.3. CEO characteristics and the application of CBTs

CEO Age results show that CFOs of Older (>40 years) CEOs in Ghana's frontier market are significantly likely to use NPV differently than CFOs of younger (≤40 years) CEOs (rating of 2.76 versus 1.00). However, there is a comparatively high usage for CFOs of young CEO firms using PI, and ARR, while CFOs of older CEO firms significantly apply NPV and PBK. This could result from CFOs of Older CEOs being associated with matured and well-established listed firms with human resources and capabilities for using discount cash flow techniques. Whiles CFOs of younger CEOs may be associated with start-ups that find PI and ARR easy to use by harnessing existing accounting data. Also, Graham and Harvey (2001) find that mature US CEOs use payback significantly more often than younger CEOs.

CEO Tenure results indicate a comparatively high usage for CFOs of short-tenure CEO firms in Ghana using PBK, while CFOs of long-tenure CEO firms significantly apply NPV, IRR, and PBK. CFOs of short-tenure CEO firms may focus on PBK, possibly due to short-termism. Palley (1997) notes that firms experiencing managerial short-termism are concerned about the time pattern of returns and prefer projects where the pay-offs come sooner rather than later. This is in line with this study's results that CFOs of short-tenure CEOs have a high PBK usage. He further suggests that there are two broad strands in the literature on short-termism. One strand focuses on imperfections in financial markets, and the other focuses on managers' career concerns, which support the idea that short-term CEOs would intuitively value PBK over other CBTs. Noteworthy, Graham and Harvey (2001) provide different perspectives to the argument above; they find that payback is used by older, longer-tenured CEOs without MBAs and suggest that lack of sophistication is a driving factor behind the popularity of the payback criterion. The difference in results could be due to the difference between the developed and frontier market structures.

CEO MBA (education) results show a comparatively high usage for CFOs of MBA CEO firms in Ghana using NPV, PBK, and PI. In parallel, CFOs of non-MBA CEO firms significantly apply NPV, PBK, and DPBK. The usage patterns above are similar and could be because listed firms are likely to have a well-organised and resourced management setup that might ensure the appropriate use of CBTs irrespective of the CEOs' education. Graham and Harvey (2001) note that CEOs without MBAs are more likely to use the payback criterion, and also CEOs with MBAs are more likely than non-MBA CEOs to use NPV.

CEO Nationality results indicate a comparatively high usage for CFOs of non-Ghanaian CEO firms using NPV, IRR, and PBK. Similarly, CFOs of Ghanaian CEO firms significantly apply NPV, PBK, DPBK, and PI. The usage pattern documented in this section is similar for both Ghanaian and non-Ghanaian CEOs subgroups. It may be signalling that the training from Business Schools in Ghana is progressively approaching global standards.

3.1.4. Other firm-related characteristics and the application of CBTs

Target Debt Ratio results show a comparatively high usage for CFOs of no targeted debt range firms in Ghana using NPV, PBK, and DPBK. Likewise, CFOs of firms with some form of target debt range significantly apply NPV, PBK and PI. The results in this section are similar for both subgroups. This could be due to the disciplinary effect of debt. Quiry et al. (2018) note that the firm's use of debt is one way of resolving conflicts of interest between shareholders and managers. Debt, by its transaction arrangement, has a constraining effect on managers, which forces them to maximise cash flows to enable the firm to support its interest and principal payments. Firms that cannot meet their financial obligations risk bankruptcy, with a high tendency of managers to lose their jobs. The disciplining powers of debt make managers more efficient, maybe forcing Ghana's frontier market CFOs to apply NPV, PBK, and PI to provide varying perspectives during the investment decision process.

Foreign Sales results from Table 2 indicate that firms in Ghana with some foreign sales significantly use earnings multiple approaches differently than firms with zero foreign sales (rating 1.50 versus 0.55). Also, firms with some foreign sales significantly apply APV differently than those with zero foreign sales (rating of 1.95 versus 0.91). Additionally, there is a comparatively high usage for CFOs of zero foreign sale firms using NPV, PBK, and PI. Also, CFOs of firms with some foreign sales significantly apply NPV, IRR, PBK, and sensitivity analysis. The results above show that firms with some foreign sales in Ghana use more diverse CBTs than most firm characteristic subgroups in this study: as most subgroups do not often apply methods such as earnings multiple approach, APV, and/or sensitive analysis. This extra effort may be due to foreign exchange risk exposures. Abor (2005) suggests that foreign exchange risk is managed mainly among Ghanaian firms by adjusting prices to reflect changes resulting from currency fluctuation and buying and saving foreign currency in advance. He further states that a significant problem is the frequent appreciation of foreign currencies against the local currency and the low-level use of hedging

techniques by Ghanaian frontier market firms involved in international trade. This means that foreign risk exposure is real, and its impact can be devastating.

Business Structure results show that firms in Ghana with a single operation significantly use the earnings multiple approach and APV differently than firms with a group structure (rating of 2.00 versus 0.87 and rating of 2.50 versus 1.26, respectively). However, there is a comparatively high usage for CFOs of single operation firms using NPV, APV, PBK, DPBK, PI, and ARR. In contrast, CFOs of group structure firms significantly apply NPV and PBK. This section's results are appreciable as single stand-alone firms are less diversified and more vulnerable to macro and micro environmental shocks. Therefore, their CFOs are likely to seek more perspectives during the investment decision process than CFOs of firms with a group structure with multiple revenue streams. Khanna and Yafeh (2005) support this argument. They note that one function often attributed to business groups is that they enable member firms to share risks by smoothing income flows and locating money from one affiliate to another. In line Mori et al. (2021), investigating business groups (keiretsu) risk-sharing in the Japanese Real Estate Investment Trust (REIT) market find that keiretsu REITs have significantly lower volatility of profitability than non-keiretsu REITs. Furthermore, keiretsu affiliation reduces the systematic volatility of keiretsu REITs compared to non-keiretsu REITs suggesting that the risk-sharing effect may be beneficial for the value of keiretsu REITs. In summary, business groups may induce stability.

Operating years results indicate that firms with long years (>10 years) of operation in Ghana significantly use PBK differently than firms with short years (≤10 years) of operation (rating of 2.93 versus 1.00). Additionally, there is a comparatively high usage for CFOs of firms with short years of operation using PI and ARR. In contrast, CFOs of firms with long years of operations significantly apply NPV and PBK. Damodaran (2014) notes that a firm that survives with time is likely to go through a life cycle, which spans from start-up to expansion to high growth to maturity and to the declining stage. Young firms usually have high equity composition because they do not have the cash flows (or earnings) to sustain debt. As the firm age, they become larger, increasing profits and cash flow, which allows them to take on and manage more debt. The results in this section may be in line as firms with more than ten years (>10 years) are likely to be matured with a significant debt portfolio: therefore, applying NPV and PBK to provide the complex perspectives required to support a new investment decision coupled with an existing debt portfolio.

3.1.5. Summary of interaction between firm characteristics and the application of CBTs

The results in the CBTs section above and Table 2 significantly show that: 27 out of 30 subgroups apply PBK, 26 out of 30 subgroups apply NPV, 12 out of 30 subgroups apply PI, 9 out of 30 subgroups apply DPBK, 8 out of 30 subgroups apply IRR, 6 out of 30 subgroups apply ARR, 3 out of 30 subgroups apply Sensitivity Analysis, 2 out of 30 subgroups apply APV, and 0 out of 30 subgroups apply hurdle rate, earnings multiple approach, value-at-risk or other simulation analysis, and real options. This implies that CFOs in Ghana's frontier market with various firm characteristics prefer PBK, NPV, and PI in descending order when making their investment decisions.

We use our definition of high or significant usage of a rating of 2.4 or more or 60% or more to interpret the results from comparative literature. In emerging market studies, Hermes et al. (2007), interacting with Chinese managers, find using 5 firm characteristics grouped into 10 subgroups (in their Table 3) that 10 out of 10 subgroups significantly use IRR and PBK and 6 out of 10 subgroups significantly use NPV. Implying emerging market Chinese CFOs prefer IRR, PBK and NPV in descending order when making their investment decisions. They find that Chinese CFOs use IRR and the PBK methods 89% and 84% of the time (almost) always, respectively. Chinese CFOs used NPV much less—only 49%(almost) always.

From Latin America (LATAM) emerging markets, Maquieira et al. (2012), working with 10 firm characteristics grouped into 20 subgroups, find (in their Table 3, Pane; A) that 20 out of 20 subgroups significantly use NPV and IRR, and 19 out of 20 subgroups significantly use PBK. This

Table 3. Results on the use of the Cost of Equity Estimation Techniques among CFOs in practice in Ghana

Does your firm estimate the cost of equity capital? Yes No (if "no", please skip to #5) If "yes", how do you determine your firm's cost of equity capital?	% always or almost always	Total Mean	Criteria 1 Size by sales		Criteria 2 Price earnings ratio		Criteria 3 Leverage		Criteria 4 Dividend		Criteria 5 Industry		Criteria 6 Mgt Ownership		Criteria 7 Institutional investors		Criteria 8 CEO age	
			medium	Large	Non-Growth	Growth	Low	High	No	Yes	Manu	Others	Low	high	Low	high	Young	Older
			< GHC 5 million	> GHC 5 million	<= 15.97	>15.97	<= 13.19%	>13.19%	No	Yes	Manu	Others	<= 5%	>5%	<= 5	> 5	<= 40	>40
a) with average historical returns on common stock	12.90%	0.81	1.50a	.57a	.96a	.38a	.80a	.82a	.75a	.81a	1.36a	.50a	.79a	.86a	1.40a	.52a	1.50a	.76a
b) using the Capital Asset Pricing Model (CAPM, the "beta approach)	32.26%	1.29	1.13a	1.35a	1.09a	1.88a	1.20a	1.45a	.75a	1.37a	1.55a	1.15a	1.21a	1.57a	1.50a	1.19a	1.00a	1.31a
c) using the CAPM but including some extra "risk factors"	32.26%	1.42	1.50a	1.39a	1.26a	1.88a	1.30a	1.64a	1.00a	1.48a	1.73a	1.25a	1.42a	1.43a	1.40a	1.43a	1.00a	1.45a
d) whatever our investors tell us they require	16.13%	0.77	1.75a	.43b	.91a	.38a	.95a	.45a	1.00a	.74a	1.00a	.65a	.63a	1.29a	1.10a	.62a	1.50a	.72a
e) by regulatory decisions	16.13%	0.71	1.75a	.35b	.74a	.63a	.65a	.82a	1.00a	.67a	1.27a	.40a	.42a	1.71b	1.60a	.29b	1.50a	.66a
f) back out from discounted dividend/ earnings model, e.g., Price=Div./(cost of cap.– growth)	6.45%	0.71	1.00a	.61a	.65a	.88a	.55a	1.00a	.50a	.74a	.82a	.65a	.58a	1.14a	1.00a	.57a	.50a	.72a

(*Continued*)

Table 3. (*Continued*)

Does your firm estimate the cost of equity capital? Yes No (if "no", please skip to #5) If "yes", how do you determine your firm's cost of equity capital?	% always or almost always	Total Mean	Criteria 9		Criteria 10		Criteria 11		Criteria 12		Criteria 13		Criteria 14		Criteria 15		- Frequency is a count of comparatively high usage with rating above 2.4- Raking is based on frequency and total mean	
			CEO tenure		CEO MBA		CEO Nationality		Target debt ratio		Foreign sales		Business structure		Operating years			
			Short	Long	Yes	No			Yes	No	No	Yes	Main	Group	Short	Long		
			<= 4 years	> 4	MBA	non-MBA	Non-Ghanaian	Ghanaian	no target range	Some form of target range	0%	1 - 100%	Single operation	Group operation	<=10years	>10years		
a) with average historical returns on common stock	12.90%	0.81	.87a	.75a	.88a	.71a	.36a	1.05a	.64a	.94a	.82a	.80a	2.13a	.35b	.00a	.86a	0	Low or no usage
b) using the Capital Asset Pricing Model (CAPM, the "beta approach)	32.26%	1.29	1.27a	1.31a	1.47a	1.07a	1.27a	1.30a	1.14a	1.41a	1.18a	1.35a	1.75a	1.13a	.00a	1.38a	0	Low or no usage
c) using the CAPM but including some extra "risk factors"	32.26%	1.42	1.20a	1.62a	1.41a	1.43a	1.45a	1.40a	1.43a	1.41a	1.27a	1.50a	2.00a	1.22a	.00a	1.52a	0	Low or no usage
d) whatever our investors tell us they require	16.13%	0.77	1.00a	.56a	.35a	1.29b	.55a	.90a	.57a	.94a	.64a	.85a	2.13a	.30b	1.50a	.72a	0	Low or no usage
e) by regulatory decisions	16.13%	0.71	.80a	.63a	.47a	1.00a	.27a	.95a	.64a	.76a	.55a	.80a	1.63a	.39b	.00a	.76a	0	Low or no usage
f) back out from discounted dividend/ earnings model, e.g., Price=Div./(cost of cap.– growth)	6.45%	0.71	.67a	.75a	.82a	.57a	.27a	.95a	.79a	.65a	.64a	.75a	1.00a	.61a	.00a	.76a	0	Low or no usage

Notes: CFOs of listed firms in Ghana rated their use of corporate finance knowledge, techniques, and tools on the scale of 0 (never), 1 (Rarely), 2 (Sometimes), 3 (almost always) and 4 (always). The report shows the total mean as well as the sum of Percentage(%) responses 3(almost always) and 4(always). Output results in the same row and subtable not having the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Output results with no subscript are not included in the test (which assume equal variances) and also they are not used in comparisons because there are no other valid categories to compare. In addition, this statistical tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction. The techniques that are highly used by respondents are in grey shades. All rows and columns are as defined and the ranking of each corporate finance knowledge, techniques, and tools are also documented in the last column of the full table.

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implies that LATAM managers of various firm characteristics prefer NPV, IRR and PBK in descending order of 72%, 70% and 62%, respectively, when making their investment decisions. Interestingly, they document that small and medium (SMEs) firms in LATAM frequently apply both the PBK and PI, which is expected as emerging markets experience higher volatility and instability in general. This usually leads to capital rationing problems for which the PBK and the PI have often been advised. This insight may be why PBK and PI are the 1st and 3rd most applied CBTs among CFOs in Ghana's frontier market—a persistent harsher environment than emerging markets.

In the developed market, Graham and Harvey (2001), using US data associated with 15 firm characteristics and 30 subgroups, show (in their Table 2) that 30 out of 30 subgroups significantly use IRR and NPV and 20 out of 30 subgroups significantly use hurdle rate. This implies that US CFOs use IRR, NPV and hurdle rates in descending order of 76%, 75% and 57% always or almost always, respectively. Similarly, Hermes et al. (2007), working with CFOs in the Netherlands using 5 firm characteristics with 10 subgroups (in their Table 3) shows 10 out of 10 subgroups significantly use NPV, PBK and IRR descending order 89%, 79% and 74% (almost) always respectively. Similarly, Hartwig (2012), working with Swedish-Listed Companies using 11 firm characteristics with 22 subgroups (in his Table 4 and 5) shows 20 out of 22 subgroups significantly use NPV, 5 out of 22 subgroups significantly use PBK and 1 out of 22 subgroups significantly use Sensitivity Analysis. This implies that Swedish CFOs use NPV, PBK and Sensitivity Analysis in descending order of 64%, 51% and 48% always or almost always, respectively.

The discussion in the section generally shows NPV being documented in the top three most used CBTs per various firm characteristics in developed, emerging and frontier markets. This may be because NPV offers CFOs versatile capabilities like the aggregation of NPVs for individual projects of a firm or a division (no other investment technique has this property). Also, firm value can be calculated as the present values, cash flows of the projects it has already taken on, and the expected NPVs of prospective future projects (Damodaran, 2014). However, for emerging and frontier markets, PBK would be relevant as it emphasises the liquidity criteria, which is crucial for survival in their relatively higher-risk business environment compared to developed markets.

3.2. The influence of firm characteristics on the application of Cost of Equity (CoE) Estimation techniques

3.2.1. All firm characteristics and the application of CoE techniques

This section's results are not all economically significant, so we ignore any statistically significant different result discussions.

3.2.2. Summary of interaction between firm characteristics and the application of CoE techniques

The implications of the discussion above and results in Table 3 are that Ghana's frontier Market CFOs of all firm characteristic subgroups investigated are not putting in the effort to estimate and apply CoE estimation techniques. The results indicate that 0 out of 30 subgroups significantly apply any of the following CoE techniques: average historical returns-on-common stock, CAPM (the "beta approach"), CAPM but including some extra "risk factors", investors' requirements, regulatory needs and estimation via discounted dividend/earnings model.

These results suggest that CFOs of listed firms in Ghana may be ignoring the CoE component of the Cost of Capital (CoC) calculation in the literature. Ghana's frontier market CFOs may be considering the Cost of Debt (CoD) only as CoC. Literature provides evidence where CoD is applied as CoC. Arnold and Hatzopoulos (2000) noted that Westwick and Shohet (1976) found in the UK that the most popular method for selecting the minimum rate of return (cost of capital) for use in investment appraisal decisions was to use the firm's bank overdraft rate (borrowing rate). It is also safe to assume that Westwick and Shohet (1976) findings were in a less developed UK market

compared to the UK market in 2019—the year of data collection. Ghana's financial sector could be at the less developed UK market level that Westwick and Shohet (1976) studied.

This notion of Ghana's frontier market CFOs using CoD as CoC is very plausible. The evidence of persistent high-interest rates in Ghana may have forced CFOs to ignore CoE estimations in determining the firm's CoC. Since the liberalisation of the domestic economy after the Economic Recovery Program (ERP) and Structural Adjustment Program (SAP) by World Bank. The average charged commercial banks lending rates surged from 10% to 47% in 2001. However, it declined slightly to an average of 27% in 2013—one of the highest in the sub-region compared to 9% in South Africa and 11% in Nigeria (Asamoah & Adu, 2016). As of the time of this study, the PWC Ghana (2020) in the Ghana Banking Survey indicates that the average commercial bank lending rate is 23.7%. December 2022 data from the Bank of Ghana indicate that the 91-day Treasury bill interest rate (risk-free rate) is approximately 35.6% (Bank of Ghana, 2022). Therefore 35.6% risk-free rate plus a premium of 5% could put the borrowing rate above 40%. These high-interest rate exposure in Ghana over the years could be why CFOs in Ghana are less interested in CoE estimations.

As in the previous section, we use our definition of high or significant usage of a rating of 2.4 or more or 60% or more to interpret the results from comparative literature. In emerging market-related literature, Hermes et al. (2007), interacting with Chinese managers, find using 5 firm characteristics grouped into 10 subgroups (in their Table 5) that 9 out of 10 subgroups significantly use Capital Asset Pricing Model (CAPM), 6 out of 10 subgroups significantly use no estimation of CoE, and 0 out of 10 subgroups significantly use average historical returns on common stock and Other methods. Maquieira et al. (2012), using emerging market data from 7 Latin American countries and working with 10 firm characteristics grouped into 20 subgroups, find (in their Table 5) that 0 out of 20 subgroups significantly use capital asset pricing model (β approach), CAPM but including additional "risk factors", historical return on common stock, bank rate, investors requirement, and regulatory need.

Interestingly Maquieira et al. (2012) document that the most popular choice for cost of equity estimation is to follow whatever investors require (about 49%). They observe that 39% of managers estimate their CoE based on the bank rate always or almost always. This result may be the case in Ghana, where CFOs are applying CoD as CoC. From their work, about 38% of managers compute CoE using the CAPM approach. This means that the domination of CAPM usage in developed markets is not the same in the context of Latin American emerging economies and is certainly not applicable to Ghana's frontier market. On the issue of the low or no use of CAPM by Ghana's frontier market CFOs: Acheampong and Swanzy (2016) find that on the GSE, excess portfolio returns cannot be explained by a uni-factor model like the (CAPM), but multi-factor asset pricing model, that is, the Fama-French Three-Factor Model are more applicable. However, the multi-factor model requires more rigour than CAPM and may not be worth it for CFOs.

In the developed market, Graham and Harvey (2001), using US data associated with 15 firm characteristics and 30 subgroups, show (in their Table 3) that 29 out of 30 subgroups significantly use the capital asset pricing model (CAPM, the beta approach), 1 out of 30 subgroups significantly use average historical returns on common stock, 0 out of 30 subgroups significantly use CAPM but including some extra risk factors, discounted dividend/earnings model, investors requirement and by regulatory needs. Notably, Graham and Harvey (2001) indicate that the CAPM is by far the most popular method of estimating the CoE, with 74% of CFOs always or almost always applying CAPM (rating of 2.92). The second and third most popular methods are average stock returns and a multi-beta CAPM, respectively. Hermes et al. (2007), using data from CFOs in the Netherlands, find using 5 firm characteristics grouped into 10 subgroups (in their Table 5) that 0 out of 10 subgroups significantly use no estimation of CoE and average historical returns on common stock, 2 out of 10 subgroups significantly use Capital Asset Pricing Model (CAPM) and 2 out of 10 subgroups significantly use Other methods. Similarly, Hartwig (2012), working with Swedish-

Table 4. Results on the use of the Cost of Capital Techniques among CFOs in practice in Ghana

How frequently would your company use the following discount rates when evaluating a new project? To evaluate this project, we would use ...	% always or almost always	Total Mean	Criteria 1		Criteria 2		Criteria 3		Criteria 4		Criteria 5		Criteria 6		Criteria 7		Criteria 8	
			Size by sales		Price earnings ratio		Leverage		Dividend		Industry		Mgt Ownership		Institutional investors		CEO age	
			medium	Large	Non-Growth	Growth	Low	High	No	Yes	Manu	Others	Low	high	Low	high	Young	Older
			< GHC 5 million	> GHC 5 million	<= 15.97	>15.97	<= 13.19%	>13.19%	No	Yes	Manu	Others	<= 5%	>5%	<= 5	> 5	<= 40	>40
a) the discount rate for our entire company	54.84%	2.48	2.50a	2.48a	2.26a	3.13a	2.25a	2.91a	2.75a	2.44a	3.00a	2.20a	2.38a	2.86a	2.80a	2.33a	2.00a	2.52a
b) a different discount rate for each component of cashflow that has a different risk characteristic (e.g. Depreciation vs. operating cash flows)	48.39%	2.19	2.13a	2.22a	2.17a	2.25a	2.15a	2.27a	1.25a	2.33a	2.09a	2.25a	2.08a	2.57a	2.10a	2.24a	2.50a	2.17a
c) a risk-matched discount rate for this particular project (considering both country and industry)	41.94%	1.94	3.00a	1.57b	2.22a	1.13b	1.85a	2.09a	2.50a	1.85a	1.82a	2.00a	1.83a	2.29a	1.90a	1.95a	2.00a	1.93a
d) a divisional discount rate (if the project line of business matches a domestic division)	16.13%	1.19	2.00a	.91b	1.39a	.63a	1.00a	1.55a	1.25a	1.19a	1.09a	1.25a	1.04a	1.71a	1.10a	1.24a	1.50a	1.17a

(*Continued*)

Table 4. (*Continued*)

How frequently would your company use the following discount rates when evaluating a new project? To evaluate this project, we would use ...	% always or almost always	Total Mean	Criteria 9		Criteria 10		Criteria 11		Criteria 12		Criteria 13		Criteria 14		Criteria 15		- Frequency is a count of comparatively high usage with rating above 2.4- Raking is base on frequency and total mean	
			CEO tenure		CEO MBA		CEO Nationality		Target debt ratio		Foreign sales		Business structure		Operating years			
			Short	Long	Yes	No			Yes	No	No	Yes	Main	Group	Short	Long		
			<= 4 years	> 4 years	MBA	non-MBA	Non-Ghanaian	Ghanaian	no target range	Some form of target range	0%	1 - 100%	Single operation	Group operation	<=10years	>10years		
a) the discount rate for our entire company	54.84%	2.48	2.40a	2.56a	2.12a	2.93b	2.36a	2.55a	2.64a	2.35a	2.73a	2.35a	2.50a	2.48a	2.00a	2.52a	19	1st rank
b) a different discount rate for each component of cashflow that has a different risk characteristic (e.g. Depreciation vs. operating cash flows)	48.39%	2.19	2.13a	2.25a	2.00a	2.43a	2.45a	2.05a	1.71a	2.59b	1.45a	2.60b	2.50a	2.09a	2.50a	2.17a	8	2nd rank
c) a risk-matched discount rate for this particular project (considering both country and industry)	41.94%	1.94	1.73a	2.13a	1.76a	2.14a	1.64a	2.10a	2.00a	1.88a	1.55a	2.15a	2.50a	1.74a	2.00a	1.93a	3	3rd rank
d) a divisional discount rate (if the project line of business matches a domestic division)	16.13%	1.19	.87a	1.50a	1.18a	1.21a	.73a	1.45a	1.14a	1.24a	.55a	1.55b	2.13a	.87b	2.00a	1.14a	0	Low or no usage

Notes: CFOs of listed firms in Ghana rated their use of corporate finance knowledge, techniques, and tools on the scale of 0 (never), 1 (Rarely), 2 (Sometimes), 3 (almost always) and 4 (always). The report shows the total mean as well as the sum of Percentage(%) responses 3(almost always) and 4(always). Output results in the same row and subtable not having the same subscript are significantly different at p< .05 in the two-sided test of equality for column means. Output results with no subscript are not included in the test (which assume equal variances) and also they are not used in comparisons because there are no other valid categories to compare. In addition, this statistical tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction. The techniques that are highly used by respondents are in grey shades. All rows and columns are as defined and the ranking of each corporate finance knowledge, techniques, and tools are also documented in the last column of the full table.

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Table 5. Results on the use of Discount Rate and Cash Flow Risk Adjustment Techniques among CFOs in practice in Ghana

When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?							Criteria 1										Criteria 2	
									Size								P/E	
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Medium	Large	Medium	Large	Medium	Large	Medium	Large	Non-Growth	Growth	Non-Growth	Growth	Non-Growth	Growth	Non-Growth	Growth
a) risk of unexpected inflation	48.39%	2.90	0.0%1	4.3%a	12.5%a	30.4%a	50.0%a	47.8%a	37.5%a	17.4%a	4.3%a	0.0%1	26.1%a	25.0%a	47.8%a	50.0%a	21.7%a	25.0%a
b) interest rate risk (change in general level of interest rates)	51.61%	3.00	12.5%a	8.7%a	0.0%1	13.0%a	62.5%a	47.8%a	25.0%a	30.4%a	8.7%a	12.5%a	8.7%a	12.5%a	60.9%a	25.0%a	21.7%a	50.0%a
c) term structure risk (change in the long-term vs. short term interest rate)	25.81%	3.00	12.5%a	8.7%a	12.5%a	26.1%a	50.0%a	17.4%a	25.0%a	47.8%a	8.7%a	12.5%a	21.7%a	25.0%a	30.4%a	12.5%a	39.1%a	50.0%a
d) GDP or business cycle risk	32.26%	3.10	0.0%1	0.0%1	37.5%a	26.1%a	37.5%a	30.4%a	25.0%a	43.5%a	0.0%1	0.0%1	39.1%a	0.0%1	21.7%a	62.5%b	39.1%a	37.5%a
e) commodity price risk	25.81%	3.23	0.0%1	0.0%1	37.5%a	21.7%a	37.5%a	21.7%a	25.0%a	56.5%a	0.0%1	0.0%1	26.1%a	25.0%a	26.1%a	25.0%a	47.8%a	50.0%a
f) foreign exchange risk	32.26%	2.77	12.5%a	4.3%a	25.0%a	39.1%a	37.5%a	30.4%a	25.0%a	26.1%a	4.3%a	12.5%a	39.1%a	25.0%a	39.1%a	12.5%a	17.4%a	50.0%a
g) distress risk (probability of bankruptcy)	25.81%	3.42	0.0%1	0.0%1	12.5%a	17.4%a	25.0%a	26.1%a	62.5%a	56.5%a	0.0%1	0.0%1	17.4%a	12.5%a	30.4%a	12.5%a	52.2%a	75.0%a

(*Continued*)

Table 5. (*Continued*)

h) "market-to-book" ratio (ratio of market value of firm to book value of assets)	25.81%	3.42	0.0%1	8.7%a	12.5%a	4.3%a	50.0%a	17.4%a	37.5%a	69.6%a	4.3%a	12.5%a	4.3%a	12.5%a	34.8%a	0.0%1	56.5%a	75.0%a
i) size (small firms being riskier)	32.26%	3.42	0.0%1	8.7%a	0.0%1	4.3%a	62.5%a	21.7%b	37.5%a	65.2%a	4.3%a	12.5%a	0.0%1	12.5%a	43.5%a	0.0%1	52.2%a	75.0%a
J) momentum (recent stock price performance)	25.81%	3.23	12.5%a	4.3%a	25.0%a	13.0%a	12.5%a	30.4%a	50.0%a	52.2%a	4.3%a	12.5%a	21.7%a	0.0%1	26.1%a	25.0%a	47.8%a	62.5%a
When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?			Criteria 3								Criteria 4							
			Leverage								Dividend							
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Low	High	Low	High	Low	High	Low	High	No	Yes	No	Yes	No	Yes	No	Yes
a) risk of unexpected inflation	48.39%	2.90	0.0%1	9.1%a	35.0%a	9.1%a	35.0%a	72.7%b	30.0%a	9.1%a	25.0%a	0.0%1	25.0%a	25.9%a	50.0%a	48.1%a	0.0%1	25.9%a
b) interest rate risk (change in general level of interest rates)	51.61%	3.00	10.0%a	9.1%a	15.0%a	0.0%1	50.0%a	54.5%a	25.0%a	36.4%a	50.0%a	3.7%b	0.0%1	11.1%a	50.0%a	51.9%a	0.0%1	33.3%a
c) term structure risk (change in the long-term vs. short term interest rate)	25.81%	3.00	10.0%a	9.1%a	20.0%a	27.3%a	20.0%a	36.4%a	50.0%a	27.3%a	25.0%a	7.4%a	25.0%a	22.2%a	50.0%a	22.2%a	0.0%1	48.1%a

(*Continued*)

Table 5. (*Continued*)

d) GDP or business cycle risk	32.26%	3.10	0.0%1	0.0%1	35.0%a	18.2%a	25.0%a	45.5%a	40.0%a	36.4%a	0.0%1	0.0%1	75.0%a	22.2% b	25.0%a	33.3% a	0.0%1	44.4%a
e) commodity price risk	25.81%	3.23	0.0%1	0.0%1	20.0%a	36.4%a	20.0%a	36.4%a	60.0%a	27.3%a	0.0%1	0.0%1	50.0%a	22.2% a	50.0%a	22.2% a	0.0%1	55.6%a
f) foreign exchange risk	32.26%	2.77	5.0%a	9.1%a	45.0%a	18.2%a	25.0%a	45.5%a	25.0%a	27.3%a	0.0%1	7.4%a	50.0%a	33.3% a	25.0%a	33.3% a	25.0%a	25.9%a
g) distress risk (probability of bankruptcy)	25.81%	3.42	0.0%1	0.0%1	15.0%a	18.2%a	30.0%a	18.2%a	55.0%a	63.6%a	0.0%1	0.0%1	25.0%a	14.8% a	50.0%a	22.2% a	25.0%a	63.0%a
h) "market-to-book" ratio (ratio of market value of firm to book value of assets)	25.81%	3.42	5.0%a	9.1%a	10.0%a	0.0%1	20.0%a	36.4%a	65.0%a	54.5%a	25.0%a	3.7%a	0.0%1	7.4%a	50.0%a	22.2% a	25.0%a	66.7%a
i) size (small firms being riskier)	32.26%	3.42	5.0%a	9.1%a	5.0%a	0.0%1	30.0%a	36.4%a	60.0%a	54.5%a	25.0%a	3.7%a	0.0%1	3.7%a	50.0%a	29.6% a	25.0%a	63.0%a
J) momentum (recent stock price performance)	25.81%	3.23	5.0%a	9.1%a	20.0%a	9.1%a	25.0%a	27.3%a	50.0%a	54.5%a	0.0%1	7.4%a	50.0%a	11.1% b	25.0%a	25.9% a	25.0%a	55.6%a
When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?							Criteria 5										Criteria 6	
							Industry								Mgt Ownership			
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Manu	Others	Manu	Others	Manu	Others	Manu	Others	Low	High	Low	High	Low	High	Low	High

(*Continued*)

Table 5. (Continued)

When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?			Criteria 7								Criteria 8							
			Institutional investors								CEO age							
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Low	High	Low	High	Low	High	Low	High	Younger (<= 40)	Older (>40)	Younger (<= 40)	Older (>40)	Younger (<= 40)	Older (>40)	Younger (<= 40)	Older (>40)
a) risk of unexpected inflation	48.39%	2.90	10.0%a	0.0%1	20.0%a	28.6%a	40.0%a	52.4%a	30.0%a	19.0%a	0.0%1	3.4%a	0.0%1	27.6%a	0.0%1	51.7%a	100.0%1	17.2%a
b) interest rate risk (change in general level of interest rates)	51.61%	3.00	10.0%a	9.5%a	10.0%a	9.5%a	40.0%a	57.1%a	40.0%a	23.8%a	0.0%1	10.3%a	0.0%1	10.3%a	50.0%a	51.7%a	50.0%a	27.6%a
c) term structure risk (change in the long-term vs. short term interest rate)	25.81%	3.00	0.0%1	14.3%a	40.0%a	14.3%a	20.0%a	28.6%a	40.0%a	42.9%a	0.0%1	10.3%a	0.0%1	24.1%a	50.0%a	24.1%a	50.0%a	41.4%a
d) GDP or business cycle risk	32.26%	3.10	0.0%1	0.0%1	20.0%a	33.3%a	40.0%a	28.6%a	40.0%a	38.1%a	0.0%1	0.0%1	50.0%a	27.6%a	0.0%1	34.5%a	50.0%a	37.9%a
e) commodity price risk	25.81%	3.23	0.0%1	0.0%1	50.0%a	14.3%b	20.0%a	28.6%a	30.0%a	57.1%a	0.0%1	0.0%1	50.0%a	24.1%a	0.0%1	27.6%a	50.0%a	48.3%a
f) foreign exchange risk	32.26%	2.77	10.0%a	4.8%a	30.0%a	38.1%a	30.0%a	33.3%a	30.0%a	23.8%a	0.0%1	6.9%a	50.0%a	34.5%a	0.0%1	34.5%a	50.0%a	24.1%a
g) distress risk (probability of bankruptcy)	25.81%	3.42	0.0%1	20.0%a		14.3%a	20.0%a	28.6%a	60.0%a	57.1%a	0.0%1	0.0%1	50.0%a	13.8%a	0.0%1	27.6%a	50.0%a	58.6%a
h) "market-to-book" ratio (ratio of market value of firm to book value of assets)	25.81%	3.42	10.0%a	4.8%a	20.0%a	0.0%1	20.0%a	28.6%a	50.0%a	66.7%a	0.0%1	6.9%a	50.0%a	3.4%b	0.0%1	27.6%a	50.0%a	62.1%a
i) size (small firms being riskier)	32.26%	3.42	10.0%a	4.8%a	10.0%a	0.0%1	30.0%a	33.3%a	50.0%a	61.9%a	0.0%1	6.9%a	0.0%1	3.4%a	50.0%a	31.0%a	50.0%a	58.6%a

(*Continued*)

Table 5. (*Continued*)

J) momentum (recent stock price performance)	25.81%	3.23	10.0%a	4.8%a	20.0%a	14.3%a	20.0%a	28.6%a	50.0%a	52.4%a	0.0%1	6.9%a	50.0%a	13.8%a	0.0%1	27.6%a	50.0%a	51.7%a
When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?			Criteria 9										Criteria 10					
			CEO tenure										CEO MBA					
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Short (<=4years)	Long (>4years)	Short (<=4years)	Long (>4years)	Short (<=4years)	Long (>4years)	Short (<=4years)	Long (>4years)	MBA	Non MBA	MBA	Non MBA	MBA	Non MBA	MBA	Non MBA
a) risk of unexpected inflation	48.39%	2.90	0.0%1	6.2%a	26.7%a	25.0%a	40.0%a	56.2%a	33.3%a	12.5%a	5.9%a	0.0%1	29.4%a	21.4%a	47.1%a	50.0%a	17.6%a	28.6%a
b) interest rate risk (change in general level of interest rates)	51.61%	3.00	0.0%1	18.8%a	20.0%a	0.0%1	33.3%a	68.8%b	46.7%a	12.5%b	11.8%a	7.1%a	11.8%a	7.1%a	41.2%a	64.3%a	35.3%a	21.4%a
c) term structure risk (change in the long-term vs. short term interest rate)	25.81%	3.00	0.0%1	18.8%a	20.0%a	25.0%a	26.7%a	25.0%a	53.3%a	31.2%a	5.9%a	14.3%a	23.5%a	21.4%a	23.5%a	28.6%a	47.1%a	35.7%a
d) GDP or business cycle risk	32.26%	3.10	0.0%1	0.0%1	20.0%a	37.5%a	33.3%a	31.2%a	46.7%a	31.2%a	0.0%1	0.0%1	17.6%a	42.9%a	41.2%a	21.4%a	41.2%a	35.7%a
e) commodity price risk	25.81%	3.23	0.0%1	0.0%1	33.3%a	18.8%a	13.3%a	37.5%a	53.3%a	43.8%a	0.0%1	0.0%1	23.5%a	28.6%a	29.4%a	21.4%a	47.1%a	50.0%a
f) foreign exchange risk	32.26%	2.77	13.3%a	0.0%1	26.7%a	43.8%a	33.3%a	31.2%a	26.7%a	25.0%a	0.0%1	14.3%a	35.3%a	35.7%a	35.3%a	28.6%a	29.4%a	21.4%a
g) distress risk (probability of bankruptcy)	25.81%	3.42	0.0%1	0.0%1	13.3%a	18.8%a	20.0%a	31.2%a	66.7%a	50.0%a	0.0%1	0.0%1	17.6%a	14.3%a	41.2%a	7.1%b	41.2%a	78.6%b
h) "market-to-book" ratio (ratio of market value of firm to book value of assets)	25.81%	3.42	0.0%1	12.5%a	13.3%a	0.0%1	13.3%a	37.5%a	73.3%a	50.0%a	11.8%a	0.0%1	5.9%a	7.1%a	29.4%a	21.4%a	52.9%a	71.4%a

(*Continued*)

Table 5. (*Continued*)

i) size (small firms being riskier)	32.26%	3.42	0.0%1	12.5%a	6.7%a	0.0%1	20.0%a	43.8%a	73.3%a	43.8%a	11.8%a	0.0%1	5.9%a	0.0%1	41.2%a	21.4%a	41.2%a	78.6%b
J) momentum (recent stock price performance)	25.81%	3.23	0.0%1	12.5%a	6.7%a	25.0%a	26.7%a	25.0%a	66.7%a	37.5%a	11.8%a	0.0%1	11.8%a	21.4%a	41.2%a	7.1%b	35.3%a	71.4%b
When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?	Criteria 11												Criteria 12					
			CEO Nationality								Target debt ratio							
	Disc rate and cash flow	Total Mean	Disc rate		Cash flow		Both		Neither		Disc rate		Cash flow		Both		Neither	
			Non-Ghanaian	Ghanaian	Non-Ghanaian	Ghanaian	Non-Ghanaian	Ghanaian	Non-Ghanaian	Ghanaian	No	Yes	No	Yes	No	Yes	No	Yes
a) risk of unexpected inflation	48.39%	2.90	9.1%a	0.0%1	36.4%a	20.0%a	27.3%a	60.0%a	27.3%a	20.0%a	7.1%a	0.0%1	21.4%a	29.4%a	50.0%a	47.1%a	21.4%a	23.5%a
b) interest rate risk (change in general level of interest rates)	51.61%	3.00	9.1%a	10.0%a	27.3%a	0.0%1	45.5%a	55.0%a	18.2%a	35.0%a	14.3%a	5.9%a	7.1%a	11.8%a	57.1%a	47.1%a	21.4%a	35.3%a
c) term structure risk (change in the long-term vs. short term interest rate)	25.81%	3.00	9.1%a	10.0%a	27.3%a	20.0%a	18.2%a	30.0%a	45.5%a	40.0%a	7.1%a	11.8%a	21.4%a	23.5%a	21.4%a	29.4%a	50.0%a	35.3%a
d) GDP or business cycle risk	32.26%	3.10	0.0%1	0.0%1	36.4%a	25.0%a	18.2%a	40.0%a	45.5%a	35.0%a	0.0%1	0.0%1	21.4%a	35.3%a	35.7%a	29.4%a	42.9%a	35.3%a
e) commodity price risk	25.81%	3.23	0.0%1	0.0%1	36.4%a	20.0%a	18.2%a	30.0%a	45.5%a	50.0%a	0.0%1	0.0%1	21.4%a	29.4%a	28.6%a	23.5%a	50.0%a	47.1%a
f) foreign exchange risk	32.26%	2.77	9.1%a	5.0%a	45.5%a	30.0%a	18.2%a	40.0%a	27.3%a	25.0%a	7.1%a	5.9%a	35.7%a	35.3%a	42.9%a	23.5%a	14.3%a	35.3%a
g) distress risk (probability of bankruptcy)	25.81%	3.42	0.0%1	0.0%1	27.3%a	10.0%a	18.2%a	30.0%a	54.5%a	60.0%a	0.0%1	0.0%1	14.3%a	17.6%a	21.4%a	29.4%a	64.3%a	52.9%a

(*Continued*)

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Table 5. (*Continued*)

h) "market-to-book" ratio (ratio of market value of firm to book value of assets)	25.81%	3.42	9.1%a	5.0%a	9.1%a	5.0%a	18.2%a	30.0%a	63.6%a	60.0%a	7.1%a	5.9%a	0.0%1	11.8% a	35.7% a	17.6% a	57.1%a	64.7% a
i) size (small firms being riskier)	32.26%	3.42	9.1%a	5.0%a	9.1%a	0.0%1	9.1%a	45.0%b	72.7%a	50.0%a	7.1%a	5.9%a	0.0%1	5.9%a	35.7% a	29.4% a	57.1%a	58.8% a
J) momentum (recent stock price performance)	25.81%	3.23	0.0%1	10.0%a	9.1%a	20.0%a	27.3%a	25.0%a	63.6%a	45.0%a	7.1%a	5.9%a	7.1%a	23.5% a	28.6% a	23.5% a	57.1%a	47.1% a

Listed Companies using 11 firm characteristics with 22 subgroups (in his Table 13), shows 0 out of 22 subgroups significantly use average historical returns on common stock, Capital Asset Pricing Model (CAPM, the "beta" approach), CAPM but including some extra "risk factors", investors requirement, regulatory needs and discounted dividend/earnings model

Ghana's frontier market CFOs' disinterest in CoE estimation is not strange in the literature. Hermes et al. (2007) observe that almost 36% of the Dutch CFOs and 65% of Chinese CFOs in their sample do not estimate the CoE. These results establish that the Dutch CFOs are more inclined to use more sophisticated methods to estimate CoE. The lack of interest by Chinese CFOs in CoE estimation is similar among Ghanaian CFOs. This implies that Chinese CFOs and Ghanaian CFOs may be applying CoD as CoC. This is because CoC should be the weighted cost of equity plus the weighted cost of debt plus the weighted cost of hybrid source of funding; in this case, there seems to be no CoE and definitely no cost of hybrid, which are more complex to handle.

3.3. The influence of firm characteristics on the application of cost of capital techniques

3.3.1. Basic firm characteristics and the application of CoC techniques

Size by sales results from Table 4 indicates that medium firms in Ghana significantly use a risk-matched discount rate per project and a divisional level discount rate differently than large firms (rating of 3.00 versus 1.57 and rating of 2.00 versus 0.91, respectively). Additionally, there is a comparatively high usage for CFOs of medium and large firms in Ghana in applying a single common company-wide discount rate for evaluations of all projects. Also, CFOs of medium firms significantly apply a risk-matched discount rate per project. This result could be that medium firms in Ghana are more sensitive to risk than large firms, which are likely to be more financially robust and diversified. Notably, Graham and Harvey (2001) find that large firms are significantly more likely to use the risk-matched discount rate than small firms (rating of 2.34 versus 1.86).

P/E Ratio results show that non-growth firms in Ghana's front market significantly use a risk-matched discount rate per project differently than growth firms (rating of 2.22 versus 1.13). Additionally, there is a comparatively high usage for CFOs of growth firms in applying a single common company-wide discount rate for evaluations of all projects. Similarly, Graham and Harvey (2001) find that growth firms are more likely to use a company-wide discount rate to evaluate projects. Leverage results indicate a comparatively high usage for CFOs of high-leverage firms in Ghana applying a single common company-wide discount rate for evaluations of all projects.

Dividend results show a comparatively high usage for CFOs of non-dividend and dividend-paying firms in applying a single common company-wide discount rate for evaluations of all projects. Also, CFOs of non-dividend-paying firms significantly use a risk-matched discount rate per project. Industry results indicate a comparatively high usage for CFOs of manufacturing firms in Ghana in applying a single common company-wide discount rate for evaluations of all projects.

3.3.2. Ownership characteristics and the application of CoC techniques

Management Ownership results show a comparatively high usage for CFOs of high management ownership firms using a single common firm-wide discount rate for evaluating all projects and a different discount rate for each component of cash flow with a different risk characteristic.

Institutional Investors' results indicate a comparatively high usage for CFOs of low institutional investor firms in Ghana's frontier market using a single common firm-wide discount rate for evaluating all projects.

3.3.3. CEO Characteristics and the application of CoC techniques

CEO Age results show a comparatively high usage for CFOs of older CEO firms using a single common firm-wide discount rate to evaluate all projects. Also, CFOs of young CEO firms significantly apply a different discount rate for each cash flow component with a different risk

characteristic. CEO Tenure results indicate a comparatively high usage for CFOs of short and long-tenure CEO firms in using a single common firm-wide discount rate for evaluating all projects.

CEO MBA (education) results in Table 4 show a significant difference as non-MBA CEOs are more likely to use a common company-wide discount rate to evaluate all opportunities than MBA CEOs (rating of 2.93 versus 2.12). However, there is a comparatively high usage for CFOs of non-MBA CEO firms in using a single common firm-wide discount rate to evaluate all projects and a different discount rate for each component of cash flow that has a different risk characteristic. CEO Nationality results show a comparatively high usage for CFOs of Ghanaian CEO firms using a single common firm-wide discount rate for evaluating all projects. Also, CFOs of non-Ghanaian CEO firms significantly apply a different discount rate for each cash flow component with a different risk characteristic.

3.3.4. Other firm-related characteristics and the application of CoC techniques

Target Debt Ratio results in Table 4 indicate that firms with some form of target debt ratio significantly apply a different discount rate for each component of cash flow with a different risk characteristic, differently than firms with no target debt range (rating of 2.59 versus 1.71). However, there is a comparatively high usage for firms with no target debt ratio using a single common firm-wide discount rate to evaluate all projects. Also, CFOs of firms with some form of target debt range significantly apply a different discount rate for each cash flow component with a different risk characteristic.

Foreign Sales results show that firms with foreign sales in Ghana significantly use a different discount rate for each cash flow component with a different risk characteristic, differently than firms with no or zero foreign sales (rating of 2.60 versus 1.45). However, there is a comparatively high usage for firms with no foreign sales using a single common firm-wide discount rate for evaluating all projects. Also, CFOs of firms with some foreign sales significantly apply a different discount rate for each cash flow component with a different risk characteristic.

Business structure results indicate that there is a comparatively high usage for CFOs of a firm with a single operation using: a single common firm-wide discount rate for evaluation of all projects, a different discount rate for each component of cash flow that has a different risk characteristic, and a risk-matched discount rate per project. Also, CFOs of a firm with group operations significantly apply a single common firm-wide discount rate to evaluate all projects.

Operating years results show comparatively high usage for CFOs of firms with long operation years using a single common firm-wide discount rate for evaluation of all projects. Also, CFOs of firms with short operation years extensively apply a different discount rate for each cash flow component with a different risk characteristic.

3.3.5. Summary of interaction between firm characteristics and the application of CoC techniques

The results in the CoC sections above and Table 3 show that Ghana's frontier market CFOs of various firm characteristics subgroups significantly use the following techniques in practice. Nineteen out of 30 subgroups apply a single common firm-wide discount rate to evaluate all projects. Also, 8 out of 30 subgroups apply a different discount rate for each cash flow component with a different risk characteristic. Similarly, 3 out of 30 subgroups apply a risk-matched discount rate per project. Lastly, 0 out of 30 subgroups apply a divisional discount rate for evaluating projects. These results are in line with Graham and Harvey (2001), who note that remarkably most firms (59% always or almost always) apply a single company-wide discount rate to evaluate the project, although the hypothetical project is likely to have different risk profiles. Their result deviates from this study with their last two results, which note that 51% always or almost always use a risk-matched discount rate to evaluate this project, and lastly, very few firms use a different discount rate to separately value different cash flows within the same project (rating of 0.66).

In line with prior sections, we use our definition of high or significant usage of a rating of 2.4 or more or 60% or more to interpret the results from comparative literature. In emerging market-related literature, Hermes et al. (2007), interacting with Chinese managers, find using 5 firm characteristics grouped into 10 subgroups (in their Table 4) that 3 out of 10 subgroups significantly use weighted average cost of capital (a firm-wide discount rate), 0 out of 10 subgroups significantly Project-dependent (risk-adjusted) cost of capital, Cost of debt (CD), and Other methods. They further note that 53% use the common CoC most frequently, 30% mention they applied CoD as CoC, while 16% state that they use the project-specific CoC most often.

In the developed market, Graham and Harvey (2001), using US data associated with 15 firm characteristics and 30 subgroups, show (in their Table 5) that 23 out of 30 subgroups significantly use a discount rate for the entire company, 3 out of 30 subgroups significantly use a risk-matched discount rate for this particular project (considering both country and industry), 0 out of 30 subgroups significantly use a discount rate for the overseas market (country discount rate), a divisional discount rate (if the project line of business matches a domestic division), a different discount rate for each component cash flow that has a different risk characteristic. Similarly, Hermes et al. (2007), using data from CFOs in the Netherlands, find using 5 firm characteristics grouped into 10 subgroups (in their Table 4) that 9 out of 10 subgroups significantly use the weighted average cost of capital (a firm-wide discount rate). While 0 out of 10 subgroups significantly Project-dependent (risk-adjusted) cost of capital, cost of debt (CD), and other methods. They note that 67% of Dutch firms use the common CoC for discounting purposes. Only 10% of the firms use a project-specific CoC. In addition, they observe that a relatively large number of Dutch firms (14%) use the simple cost of debt (CoD) as the discount rate (CoC)—similar to the result in the previous section.

The result in this section provides evidence that using a firm-wide discount is dominant among CFOs globally—developed, emerging, and frontier markets. A review of the literature shows that firm-wide discount rate is used by: 19 out of 30 subgroups in Ghana, 3 out of 10 subgroups in China, 23 out of 30 subgroups in the US, and 9 out of 10 subgroups in the Netherlands. This global trend could be driven by simplicity as it is easy to use a single common firm-wide discount rate to evaluate all projects rather than adjusting the discount rate per each project, country, division or cash flow.

3.4. The Influence of Firm Characteristics on the application Risk Adjustment Techniques for other Types of Systemic Risk

3.3.6. Basic Firm Characteristics and the application of Risk Adjustment Techniques

Size by sales results from Table 5 shows that medium firms in Ghana significantly apply risk adjustment for both (discount rate and cash flow) for size risk differently than large firms (rating of 62.5% versus 21.7%). Additionally, there is a comparatively high usage for CFOs of medium firms performing both (discount rate and cash flow) risk adjustment for interest rate and size risk.

P/E Ratio results indicate growth firms significantly apply risk adjustment for both (discount rate and cash flow) for GDP or business cycle risk differently than non-growth firms (rating of 62.5% versus 21.7%). Additionally, there is a comparatively high usage for CFOs performing both (discount rate and cash flow) risk adjustment for interest rate risk for non-growth firms and GDP risk for growth firms.

Leverage results from Table 5 show that high-leverage firms in Ghana significantly apply risk adjustment for both (discount rate and cash flow) for the risk of unexpected inflation differently than low-leverage firms (rating of 73% versus 35%). In addition, there is a comparatively high usage for CFOs of high-leverage firms performing both (discount rate and cash flow) risk adjustment for the risk of unexpected inflation.

Dividend results indicate that non-dividend-paying firms in Ghana's frontier market significantly apply risk adjustment for discount rate only for interest rate risk differently than dividend-paying firms (rating of 50% versus 4%). There is a significant difference in applying risk adjustment for cash flow only for GDP risk and momentum for non-dividend-paying and dividend-paying firms (rating of 75% versus 22% and rating of 50% versus 11%, respectively). Additionally, there is a comparatively high usage for CFOs of dividend-paying firms performing cash flow-only risk adjustment for GDP or business cycle risk.

Industry results show a comparatively high usage for CFOs of manufacturing firms in Ghana performing both (discount rate and cash flow) adjustment interest rate risk.

3.3.7. Ownership characteristics and the application of risk adjustment techniques

Management Ownership results from Table 5 indicate that high managerial ownership firms significantly apply risk adjustment for both (discount rate and cash flow) for commodity price risk differently than low managerial ownership firms (rating of 57% versus 17%). Similarly, low management ownership firms significantly apply risk adjustment for neither (discount rate and cash flow) for commodity price risk differently than high managerial ownership firms (rating of 58% versus 14%).

Institutional Investors' results show that firms with a low number of institutional investors significantly apply risk adjustment for cash flow only for commodity price risk than firms with a high number of institutional investors (rating of 50.0% versus 14%).

3.3.8. CEO characteristics and the application of risk adjustment techniques

CEO age results indicate that firms with young CEOs significantly apply risk adjustment for cash flow only for market-to-book ratio differently than firms with older CEOs (rating of 50% versus 3%). CEO Tenure results show that firms with long CEO tenure significantly apply risk adjustment for both (discount rate and cash flow) for interest rate risk differently than firms with short CEO tenure (rating of 69% versus 33%). In the same vein, CEO tenure shows a significant difference in risk adjustment for neither (discount rate and cash flow) for interest rate risk for firms with short and long CEO tenure (rating of 47% versus 13%). In addition, there is a comparatively high usage for CFOs performing both (discount rate and cash flow) risk adjustment for interest rate risk for firms with long CEO tenure in Ghana.

CEO MBA results indicate that firms with MBA CEOs in Ghana's frontier market significantly apply risk adjustment for both (discount rate and cash flow) for distress risk and momentum differently than a firm with a non-MBA CEO (rating of 41% versus 7% and rating of 41% versus 7.1%, respectively). In the same vein, CEO education shows a significant difference in risk adjustment for neither (discount rate and cash flow) for distress risk, size risk, and momentum for firms with non-MBA and MBA CEOs (rating of 77% versus 41%, rating, of 79% versus 41%, and rating of 71% versus 35%, respectively). In addition, there is a comparatively high usage for CFOs in performing both (discount rate and cash flow) risk adjustment for interest rate risk for firms with non-MBA CEOs.

CEO Nationality results show that firms with Ghanaian CEOs significantly apply risk adjustment for both (discount rate and cash flow) for size risk differently than firms with non-Ghanaian CEO (rating of 45% versus 9%). Additionally, there is a comparatively high usage for CFOs in performing both (discount rate and cash flow) risk adjustment for risk of unexpected inflation for firms with Ghanaian CEOs.

3.3.9. Other firm-related characteristics and the application of risk adjustment techniques

Target debt ratio results indicate that CFOs of firms with some form of target debt ratio significantly perform no risk adjustment for the market-to-book ratio.

Foreign Sales show a significant difference for risk adjustment for neither (discount rate and cash flow) for GDP nor business cycle risk for firms with no and some foreign sales (rating of 64%

versus 25%). Additionally, there is a comparatively high usage for CFOs of firms with some foreign sales performing both (discount rate and cash flow) risk adjustment for interest rate risk.

Business Structure results indicate a significant difference in risk adjustment for both (discount rate and cash flow) for term structure risk, distress risk, and size risk for firms with single and group structures (rating of 75% versus 9%, rating of 63% versus 13% and rating of 75% versus 7%, respectively). In the same vein, the business structure shows a significant difference in risk adjustment for neither (discount rate and cash flow) for distress risk, market-to-book ratio, and size for firms with a group and single operating business structure (rating of 70% versus 25%, rating of 74% versus 25% and rating of 74% versus 13% respectively). Additionally, there is a comparatively high usage for CFOs performing both (discount rate and cash flow) risk adjustment for risk of unexpected inflation, interest rate risk, term risk, distress risk, and size risk for firms with a single-operation business structure.

Operating Years results show that for neither nor non-action behaviour, CFOs of firms with less or equal to 10 years of business operation significantly perform no risk adjustment for distress risk and momentum. Also, CFOs of firms with more than 10 years of operation significantly perform no risk adjustment for the market-to-book ratio.

3.3.10. Summary of interaction between firm characteristics and the application of risk adjustment techniques

From Table 5, CFOs in practice make significant risk adjustments to both discount rate, and cash flow for the following firm characteristic subgroups: 6 out of 30 subgroups significantly apply interest rate risk adjustments, 3 out of 30 subgroups significantly apply unexpected inflation risk adjustments, 2 out of 30 subgroups significantly apply GDP or business cycle risk adjustments, 2 out of 30 subgroups significantly apply size risk adjustments, 1 out of 30 subgroups significantly apply term structure risk adjustments, 1 out of 30 subgroups significantly apply distress risk adjustments, and 0 out of 30 subgroups significantly apply commodity price risk, foreign exchange risk, market-to-book, and momentum risk adjustments.

In line with prior sections, we use our definition of high or significant usage of a rating of 2.4 or more or 60% or more to interpret the results from comparative literature. Graham and Harvey (2001), using US data associated with 15 firm characteristics and 30 subgroups, show (in their Table 4) that 0 out of 30 subgroups significantly any other types of other systemic risk factors investigated. This means that market risk captured by beta (β) is the most relevant system risk in the developed markets. Their work also shows significant results for certain subgroups for inaction or neither, but we ignored it as the study is focused on significant usage.

An overview of the other type of systemic risk indicates that they are mainly macroeconomic factors that are usually unstable. From the results, the most dominant significant risk adjustment to both discount rate and cash flow is interest rate risk. Owusu-Ankamah and Sakyi (2020), using an autoregressive distributed lag and bounds test approach to cointegration, observe that for macroeconomic instability effect on interest rate is positive and significant with a coefficient of 0.09. This implies that a unit increase in macroeconomic instability is associated with a 9% increase in the current difference in interest rate spreads. In the short-run, banks would react to changes in the macroeconomic instability by charging a higher risk premium in the case of deteriorating stability in subsequent quarters and vice versa. In the long-run, they note a positive relationship between macroeconomic instability proxies like inflation and exchange rate volatilities on one hand and interest rate spreads on the other.

The influence of Ghana's unstable macroeconomic factor may be forcing CFOs to adjust both discount rate and cash flow for interest rate risk, unexpected inflation risk, GDP or business cycle risk adjustments, size risk, term structure risk, and distress risk in descending order. Interest rate risk adjustments may be prominent among Ghana's frontier market CFOs because interest payments take

cash away from the business, promotes earning volatility and increase with macroeconomic instability. For example, between the 4th of April 2022 to the 12th of December 2022, the 91-day treasury bill interest rate (risk-free rate) moved from 14.84% to 35.57% (Bank of Ghana, 2022). The macroeconomic fundamentals are deteriorating to the extent that Government is in bailout talks with the IMF (World Bank, 2022). Therefore, Ghana's CFOs may be experiencing commercial interest rates between 40% and 45% per year. It makes sense for Ghana CFOs to prioritise interest rate risk adjustments to ensure access to credit facilities to support business continuity.

4. Conclusion

This study investigates the influence of firm characteristics on the techniques applied during the investment decision process in a frontier market using listed firms in Ghana as a sample. The research applies the notion that the type of market environment (developed, emerging and frontier markets) interacts with firm characteristics which influence investment decisions uniquely through manager adaptation to the risk and hurdle in their market. This work investigates the interaction between 30 firm characteristics subgroups and 37 investment decision techniques grouped under capital budgeting, cost of equity, cost of capital, and the need to adjust discount rates to reflect other types of systemic risk as proxies for the study.

The research objectives include investigating the influence of firm characteristics on the use of capital budgeting tools, cost of equity estimation techniques, cost of capital techniques, and risk adjustment to discount rates or cash flows for other types of systemic risk factors during the project evaluation. This study is likely to help increase understanding of how managers of a firm with a particular characteristic in a frontier market are likely to make investment decisions. The research harnesses survey data from 31 out of the 38 targeted firms on the GSE. The data is processed using SPSS software to generate the total mean, category percentages, and firm characteristic mean values with statistical significance (independent t-test). This study assumes a rating with a mean value of 2.4 or more to be of high usage, equivalent to a 60% or more response usage rate, to help standardise the definition of high usage. Each investment decision technique and tool are associated with a frequency and a ranking to ensure a clear conclusion and interpretation of the results.

In the capital budgeting section: 27 out of 30 subgroups apply PBK, 26 out of 30 subgroups apply NPV, and 12 out of 30 subgroups apply PI. This implies that CFOs in Ghana with various firm characteristics prefer PBK, NPV, and PI the most in descending order when making their investment decisions. Also, there is a comparatively high usage for CFOs of large firms in Ghana's frontier market applying NPV, IRR, and PBK. Large firms with a turnover of more than GHS 5,000,000 (≤ $1,009,570.73) per year are likely to have top-notch CFOs who are well vest in discount cash flow techniques. Also, there is a possibility that CFOs are using PBK as a supplementary tool to support their decision-making process due to its simplicity and intuitiveness. Damodaran (2014) supports this idea and suggests that firms are much more likely to apply PBK as a secondary investment decision rule and use it as a constraint in decision-making.

Responding CFOs on applying the cost of equity estimation techniques shows that 0 out of 30 subgroups significantly apply any investigated techniques. The implications are that CFOs are not interested in estimating CoE, maybe ignoring the CoE component of the Cost of Capital (CoC) estimation, and are likely to be to considering the Cost of Debt (CoD) only as CoC. The result could be due to the prevailing high interest being experienced by CFOs: PWC Ghana (2020) in the Ghana Banking Survey indicated that the average commercial bank lending rate is 23.7%. Moving forward to December 2022, the 91-day treasury bill interest rate (risk-free rate) is 35.57% (Bank of Ghana, 2022), superseding the average commercial bank lending rate of 23.7% in 2020. Also, the disinterest in CoE estimation may be because CAPM is mostly not applicable to the Ghana Stock Exchange (GSE). Acheampong and Swanzy (2016) find that on the GSE, excess portfolio returns cannot be explained by a uni-factor model like the (CAPM) but the multi-factor asset pricing model, that is, the Fama–French Three-Factor Model, was more applicable. This multi-factor model requires more rigour than CAPM and may not be worth it for CFOs.

On the use of the cost of capital techniques, the significant results show that: 19 out of 30 subgroups apply a single common firm-wide discount rate for evaluation of all projects, 8 out of 30 subgroups apply a different discount rate for each component of cash flow that has a different risk characteristic, and 3 out of 30 subgroups apply a risk-matched discount rate per project. These results align with Graham and Harvey (2001), as most CFOs lean towards applying a firm-wide discount rate, although most opportunities for the firm are likely to have varying risk profiles.

A probe into risk adjustment for the discount rate and cash flow for other types of systemic risk significant results shows that: 6 out of 30 subgroups significantly apply interest rate risk adjustments, 3 out of 30 subgroups significantly apply unexpected inflation risk adjustments, and 2 out of 30 subgroups significantly apply GDP or business cycle risk adjustments, and 2 out of 30 subgroups significantly apply size risk adjustments. The dominant pattern of CFOs making adjustments to discount rate and cash flow for interest rate risk is valid as between 4th of April 2022 to 12th of December 2022, the 91-day treasury bill interest rate (risk-free rate) moved from 14.84% to 35.57% (Bank of Ghana, 2022). In addition, Owusu-Ankamah and Sakyi (2020), find a significant positive relationship between macroeconomic instability and interest rate spreads, which is likely to impact the cost of debt and, subsequently, the cost of capital. This may be the reason interest rate risk is a major concern to Ghana's frontier market CFOs.

This study contributes to the literature on the frontier market and Ghana by documenting how firm characteristics are likely to influence the managerial application of investment decision techniques. The study theoretically contributes to the idea that the firm's life cycle theory which supports varying firm characteristics and analysis with time, may differ due to the risk and hurdles associated with the host market type—be it a developed, emerging and frontier market. For practitioners in the frontier market, simple and low information cost techniques such payback period, no cost of equity estimation and using a single common firm-wide discount rate may support value-adding decision-making, although they do not properly account for time and risk. Governments of frontier market countries should endeavour to promote policies that reduce uncertainties or macroeconomic instabilities as it may encourage the use of time and risk-adjusted investment techniques, which may help improve firm value within their economy, promoting growth. For future research, considering the infant nature and the small number of firms on the GSE, it would be recommendable to perform this study again when the listing exceeds one hundred (100) to provide more depth and breadth to this knowledge area in Ghana. Also, performing this study across West Africa or Africa would be insightful. The main limitation of this work is that the study has no way of verifying whether the responses provided by CFOs are indeed what they do in practice.

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Appendix A

Appendix: Basic Firm Characteristics Summaries

Panel A: Sales revenue data summary (firm size)

Description	Count	Column N %	Grouping	
			Medium > GHC 5 million	Medium > GHC 5 million
<=GHC 90, 000	0	0.00%	0.00%	
> GHC 90K - <=5 million	8	25.81%	25.81%	
> GHC 5 million	23	74.19%		74.19%
Total	31	100.00%	25.81%	74.19%

Panel B: Price-earnings (PE) ratio data summary

Description	Count	Column N %	Grouping	
			Non-Growth <=15.97	Non-Growth <=15.97
<=15.97	23	74.19%	74.19%	
>15.97	8	25.81%		25.81%
Total	31	100.00%	74.19%	25.81%

Panel C: Leverage (long term debt/total assets) data summary

Description	Count	Column N %	Grouping	
			Low <=13.19%	Low <=13.19%
<=13.19%	20	64.52%	64.52%	
>13.19%	11	35.48%		35.48%
Total	31	100.00%	64.52%	35.48%

Panel D: Pay dividend data summary

Description	Count	Column N %	Grouping	
			No	No
No	4	12.90%	12.90%	
Yes	27	87.10%		87.10%
Total	31	100.00%	12.90%	87.10%

Panel E: Industry sales data summary

Description	Count	Column N %	Grouping	
			Manufacturing	Manufacturing
Retail and Wholesale	0	0.00%		0.00%
Mining Construction	3	9.68%		9.68%
Manufacturing	11	35.48%	35.48%	
Transport / Energy	2	6.45%		6.45%
Communication / Media	2	6.45%		6.45%

(*Continued*)

Bank / Finance / Insurance	11	35.48%		35.48%
Tech (Software/ biotech/etc.)	1	3.23%		3.23%
Education	1	3.23%		3.23%
Total	31	100.00%	35.48%	64.52%

Appendix: Ownership Characteristic Summaries

Panel A: Managerial ownership data summary

Description	Count	Column N %	Grouping	
			Low <=5%	Low <=5%
<=5%	24	77.42%	77.42%	
>5- <=10%	3	9.68%		9.68%
10-20%	2	6.45%		6.45%
>20%	2	6.45%		6.45%
Total	31	100.00%	77.42%	22.58%

Panel B: Institutional Investors data summary

Description	Count	Column N %	Grouping	
			Low <=5	Low <=5
<=5	10	32.26%	32.3%	
6-10	4	12.90%		12.90%
>10	17	54.84%		54.84%
Total	31	100.0%	32.26%	67.74%

Appendix: CEO Characteristics Summaries

Panel A: CEO age data summary

Description	Count	Column N %	Grouping	
			Younger (<40)	Younger (<40)
< 40	2	6.45%	6.5%	
40-49	9	29.03%		29.0%
50-59	5	48.39%		48.4%
> 60	5	16.13%		16.1%
Total	31	100.00%	6.45%	93.55%

Panel B: CEO tenure data summary

Description	Count	Column N %	Grouping	
			Short (<=4years)	Short (<=4years)
<=4 years	15	48.39%	48.4%	
5-10 years	8	25.81%		25.8%
> 10 years	8	25.81%		25.8%
Total	31	100.00%	48.39%	51.61%

(*Continued*)

(Continued)

Panel C: CEO education level data summary

Description	Count	Column N %	Grouping	
			MBA	MBA
Undergraduate	2	6.45%		6.5%
MBA	17	54.84%	54.8%	
non-MBA masters	4	12.90%		12.9%
> master's degree	8	25.81%		25.8%
	31	93.55%	54.84%	45.16%

Panel D: CEO's Nationality data summary

Description	Count	Column N %	Grouping	
			Non-Ghanaian	Non-Ghanaian
Non-Ghanaian	11	35.48%	35.48%	
Ghanaian	20	64.52%		64.52%
Total	31	100.0%	35.48%	64.52%

Appendix: Other Firm-Related Summaries

Panel A: Targeted debt ratio data summary

Description	Count	Column N %	Grouping	
			No	No
No target range	14	45.16%	45.2%	
Flexible target range	10	32.26%		32.26%
Somewhat tight target range	2	6.45%		6.45%
Strict target range	5	16.13%		16.13%
Total	31	100.0%	45.16%	54.84%

Panel B: Foreign sales data summary

Description	Count	Column N %	Grouping	
			No	No
0%	11	35.48%	35.5%	
1 - 24%	15	48.39%		48.39%
24 - 49%	2	6.45%		6.45%
50%	3	9.68%		9.68%
Total	31	100.0%	35.48%	64.52%

Panel C: Business structure data summary

Description	Count	Column N %	Grouping	
			Single operation	Single operation
Single operation	8	25.81%	25.81%	
Parent Company	8	25.81%		25.81%
Subsidiary	15	48.39%		48.39%
Total	31	100.00%	25.81%	74.19%

(*Continued*)

Panel C: Operating years sales data summary				
Description	Count	Column N %	Grouping	
			<10years	<10years
<= 5years	2	6.45%	6.5%	
6-10 years	2	6.45%	6.5%	
> 10 years	27	87.10%		87.10%
Total	31	100.00%	12.90%	87.10%

Appendix B

Firm Characteristics	Size	P/E	Leverage	Dividend	Industry	Mgt Ownership	Institutional investors	CEO age	CEO tenure	CEO MBA	CEO Nationality	Target debt ratio	Foreign sales	Business Structure
P/E	0.348**													
Leverage	-0.025	0.025												
Dividend	0.213	0.227	-0.117											
Industry	0.333*	-0.025	0.127	0.117										
Mgt Ownership	-0.387**	0.034	0.083	-0.060	-0.083									
Institutional investors	0.382**	-0.066	-0.209	-0.252	0.498***	-0.122								
CEO age	0.445**	0.155	-0.080	-0.101	0.080	0.142	0.381							
CEO tenure	0.019	-0.314*	0.044	-0.373**	-0.044	0.214	0.298*	0.271						
CEO MBA	-0.205	-0.091	0.004	-0.037	-0.140	0.130	0.072	-0.026	-0.029					
CEO Nationality	-0.437**	-0.179	-0.014	-0.084	-0.127	0.078	-0.079	-0.195	0.226	-0.004				
Target debt ratio	0.057	0.091	0.131	0.231	0.140	0.025	-0.072	-0.238	-0.230	0.172				
Foreign sales	0.179	-0.025	0.127	-0.084	0.295*	0.078	0.354*	0.080	0.361**	0.131	-0.127	0.140		
Business Structure	0.495***	0.179	-0.025	0.213	0.333*	-0.210	0.224	0.145	0.019	-0.057	-0.283	-0.091	0.025	
Operating years	0.445**	0.155	-0.354*	-0.101	-0.195	-0.172	0.100	0.466*	0.008	-0.026	-0.195	0.026	0.080	0.145

Index of mean square contingency or ϕ is reported This statistic measures the correlation of order groups of attributes. Cross-tabulation is conducted by size (medium (≤GHC5 million to Large (> GHC 5 million), P/E (Non-Growth (≤15.97) and Growth(>15.97), Leverage (Low (≤13.19%) and High(>13.19%), Pay dividend (No and Yes), Industry (Manufacturing and Others), Management Ownership (Low (≤5%) and high (>5%), Institutional investors (Low ≤5% and high> 5%), CEO age (Young ≤40 and older>40), CEO tenure (Short ≤4 years and Long > 4), CEO MBA (MBA and non-MBA), CEO Nationality (Ghanaian and non-Ghanaian), Target debt ratio (No target range and Some form of target range), Foreign sales (0% and 1–100%), Business Structure (Single operation and Group operation and Operating years (Short ≤ 10 years and Long > 10 years). ***, **, * denotes a significant difference at the 1%, 5% and 10% level respectively. All Table columns are defined in the Table.

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