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Impact of recapitalisation and dividend payout policies on financial sustainability of rural and community banks in Ghana

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Abstract

The study examines the effect of bank recapitalization and dividend policies on the financial sustainability of rural and community banks (RCBs) in Ghana. Data from 135 RCBs from 2011 to 2020 revealed an average financial sustainability index of 0.525 over the past decade, suggesting that RCBs can finance their operations and liabilities without diminishing shareholder value. Recapitalization and dividend payouts positively impact financial sustainability, with well-capitalized, highly pay-out RCBs showing faster improvements in sustainability compared to those with retention policy. This highlights the importance of RCBs bolstering their capital base, even when not mandated by regulators, to enhance financial sustainability. Furthermore, adopting a relaxed pay-out policy can signal operational efficiency and sustainability to shareholders.

Keywords Financial sustainability, Recapitalisation, Dividend policy, Rural banking

JEL Classification G21, G35, G32

Introduction

Global financial and health crisis have shaken the financial system of most economies and this is evidenced by continuous decline in performance of banking units in the financial system of most emerging economies including Ghana. Over the last two decades, the Ghanaian banking industry has experienced instability that has led to bank failures and fall in performance of some banks with Rural and Community Banks (RCBs) getting their fair share. This is exemplified in the thirty RCBs named by Bank of Ghana (BoG) in 2016 as being imminent to collapse. As of June 2016, fourteen of the thirty were classified as marginal or weak with six out of the fourteen having negative net asset hence was predicted to go out of business by the end of 2018 [16]. Consequently, adoption of macro-prudent frameworks by regulators and policy makers to salvage the banking system has become eminent. One of such frameworks is the review of the minimum capital requirement, in which for RCBs, the recent recapitalisation pegged at One million Ghana cedis, which was to be met by the end of February, 2021. The increase is intended to strengthen and give the banks 'shock absorbers' against the risk inherent in the banking business. According to the Efficiency Monitoring Unit (EMU) report for December 2020, sixteen RCBs were yet to meet the minimum capital requirement (ARB Apex Bank 12). It is however not clear whether they will be able to meet the new minimum capital requirement any time soon. These activities by the regulator are meant to ensure a strong and financially sustainable banking sector that is capable of meeting adversities and ensure sturdiness of the financial system. As such, bank financial sustainability measurement and its determinants is key in the implementation of these frameworks. It has been argued that the strength of a banking sector is driven by the capital base of the banking units and the

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ability of the sector to attract much investment (Almarzoqi and Naceur 7). Motivated by this argument, other economies such as Malaysia, South Africa and Nigeria have embarked on series of recapitalisation in their banking sector to strengthen the capital base of their banking units coupled with banks' flexible dividend policies as a mean of enticing investments into the sector. As such, empirical studies on financial sustainability in the banking sector and the role of recapitalisation and dividend policies by the banking units have arouse the interest of researchers [35, 44]. Nevertheless, these studies have either concentrated on bank profitability as a proxy for financial sustainability and have inordinately focused on commercial banks. The current study fills this demanding gap by first, providing a much more robust measure for financial sustainability and second, focus on the rural banking industry in Ghana.

Rural banking in Ghana can be traced from 1976 when the Government of Ghana, through the Bank of Ghana, established RCBs to channel credit to productive rural ventures and promote rural development with the first rural bank established in the Central Region as a locally-owned unit bank. During that time, rural enterprise finance was limited in Ghana but the success of the first RCB compelled the BoG to establish guidelines for streamlining operations and the setting up of new RCBs, by 1985. In order to foster collaboration and information transfer, in 1980, the Association of Rural Banks (ARB) by the network of RCBs. By 1988, the number of RCBs operating across the country had grown to 122, with significant growth in deposits and consolidated loans. Unfortunately, by the turn of the same year, the performance of RCBs had hit a trough, with 98 out of the 122 banks being distressed with nonperforming loans (NPLs) amounting to over 70%. As at now, there are 141 RCBs operating in the Ghanaian rural banking industry after the regulator has embarked on several reforms such as regulatory and legal reforms, financial and institutional restructuring.

RCBs in Ghana differ from the commercial banks in terms geographical operational areas, ownership confinement to people within their catchment areas and limitation in their scope of operations. These features provide a sound foundation for an empirical investigation into the determinants of their financial sustainability. There have been some studies on RCBs in Ghana [3, 4]. However, these studies focused on short term profitability analysis of the RCBs. The current study focuses on financial sustainability which is both a short- and long-term financial condition assessment indicator. It also examines the role of capitalisation and dividend policy decisions on financial sustainability. The study is premised on two basic objectives, to measure the level of financial sustainability of RCBs in Ghana and to examine the impact recapitalisation and dividend payout policy on the level of financial sustainability of RCBs in Ghana. The rest of the study is organised as follows; the next section reviews relevant theoretical and empirical literature. This is followed by the methods employed in carrying out the study. The result and discussion of analysis of the data is then presented. The study then concludes and provide policy recommendations.

Review of relevant literature

Theoretical consideration

The study is informed by two theories; the expected bankruptcy cost theory and signaling theory. The expected bankruptcy cost theory derives it foundation from Modigliani and Miller's proposition II [65] which asserts that, firm's value is independent of its capital structure but as a firm borrows, the firm can increase its value due to the tax benefit of borrowing. However, beyond an optimum point, the associated risk tends to erodes the tax benefits and exposes the firms to financial risk which leads to distress and bankruptcy. Thus, firms need to strike a balance between borrowings and the associated risks [21]. A bank may increase its equity capital in an attempt to reduce risk of financial destress. Thus, recapitalisation of banks is expected to immune the banks from the risk of bankruptcy, thereby, making the banks financially sustainable. In this direction, the expected bankruptcy cost theory predicts a positive relationship between bank recapitalisation and financial sustainability.

The signaling theory was originally developed to be applied on the job market where it was argued that, information asymmetry exists when an employer intends to hire employee and the employer is not fully and reliably aware of the capabilities of the employee before hiring which creates some level of uncertainty, as the employer has limited information about the employee [75]. As a result, certain information about the employee as contain on the resume send signals to the employer on the employee's abilities and this is known as the *signaling effect*. The signaling theory has been applied to explain the dividend policy puzzle, where it has been argued that, dividend information can send signal to shareholder about the performance of the firm, and therefore might play a vital role in explaining why dividends affect firm value and financial sustainability. Benlemlih [20] applied the signaling theory to construct a theoretical argument to establish a linkage between financial sustainability and dividend policy, and similar argument is being advanced for the current study. According to this argument, ensuring financial sustainability is connected to dividend policy through the view that firms engaging in activities to ensure financial sustainability are fully aware

of their responsibilities towards all form of stakeholders. Payment of high dividend in fact, indicates that, managers are not only concentrating on activities to ensure financial sustainability but also appreciate their responsibilities towards their shareholders. Gregory et al. [53] indicated that a firm's cash flow might be depleted from short-term investment which may not end up in ensuring corporate financial sustainability. Thus, by increasing dividends firms can send signal to investors that the cash flow is not being drained from investing activities to ensure financial sustainability only, but also, it is an assurance to shareholders that the firm is maintaining its responsibility towards them.

Financial sustainability and bank capital

Capitalisation has demonstrated to be an important element in explaining the financial sustainability of banks, even though the direction of impact is not clear in the literature. Berger and Bouwman [23] in their study tested the hypotheses on the effect of bank recapitalisation on three dimensions of bank sustainability, survival, profitability and market performance at different market times (that is, market crises and normal time) in the USA. They find out that, increase in capital helps to improve the performance of small banks in all three dimensions of financial sustainability during market crises and normal times. Abbas et al. [1] examined the impact of various capital ratios on risk-taking in commercial banks from 2002 to 2019. The study found a positive relationship between capitalisation and risk-taking, in line with the regulatory capital hypothesis, while risk-based capital and capital buffer ratios exhibit a negative association with risk-taking, aligning with the moral hazard hypothesis. The results hold across different bank categories, except for well-capitalised and low-liquid banks. Additionally, the study explores the impact of capital ratios on risk-taking during pre-, pro-, and post-crisis eras, showing significant variation. Overall, the study provides valuable insights for regulators, emphasizing the need to consider different economic conditions when formulating banking regulations from which the current study strives. Similarly, Ali et al. [6] study in Pakistan from 2012 to 2018 shows that having an external credit rating influences non-financial firms' capitalisation decisions, leading to higher leverage. Factors such as profitability and tangibility negatively affect capital structure, while firm size has a positive impact. There's also a non-linear relationship between credit ratings and capital structure, with highly and lowly rated firms having lower leverage, and mid-rated firms having higher leverage. These findings have practical implications, as a credit rating, whether high or low, can facilitate financial market access. Trujillo-Ponce [79] also examined empirically the main determinants of financial sustainability of banks in Spain during the period 1999–2009. The study concludes that, a higher level of capitalization of analyzed banks had a positive impact on the financial sustainability in terms of total asset but negatively related to return on average equity. In Africa, Olalekan and Adeyinka [67] in their study on impact of capital adequacy on banks' profitability in Nigeria found a significant positive impact of capitalization on banks' profitability. Maaka [64] also studied the relationship between liquidity risk, capitalisation and performance of commercial banks in Kenya. The study found profitability of the commercial banks to be negatively affected due to increase in the liquidity gap but improves as capital increases. In Ghana, Boahene et al. [30] study on profitability of Ghanaian banks found support for previous empirical works that capital positively and significantly influences bank profitability. A later study on the Nigerian 2004 recapitalization exercise by Ibrahim et al. [57] concluded that the recapitalization exercise of Nigerian banks would subject banks (especially the small ones) to severe liquidity crises. Ibrahim et al. [57] used data from 2000 to 2009 period and found that the net interest margin and funding cost significantly increase during the post-recapitalization period (2005–2009), while the return on asset significantly decrease after the recapitalization. On this basis, the study hypothesizes a positive relationship between capitalization and bank's financial sustainability.

Financial sustainability and dividend policy

The linkage between financial sustainability and dividend policy decisions have not been extensively explored in the literature. Empirical studies have examined the relationship between dividend policy and financial performance. Notable among them includes Hussainey et al. [56] and Sulaiman and Migiro [78]. However, the findings by these studies are not consistent. Hussainey et al. [56] found a positive association between dividend yield as a proxy of dividend policy and long-term financial performance as an indicator for measuring financial sustainability. Sulaiman and Migiro [78] examined the long-run relationship between dividends policy decisions and long-term financial performance proxied by share prices, using panel data. Using panel unit root and panel co-integration techniques, the authors found evidence of long-run association between stock prices and dividends. In a similar study, Bitok [28] studied the effect of dividend policy on the value of the firms quoted at the New York stock market and found that, paying dividends reduces financial risk to the companies and thus influence stock price. The study also established that, dividend yield and payout ratio as proxies for dividend policy have a direct

and long-term relationship with share price, a proxy for long-term performance measure.

In Ghana, studies on dividend policy and how they influence financial sustainability of banks is limited, not to mention that of RCBs, even though studies on dividend policies of firms in Ghana is usually not far from reach. Amidu and Abor [9] examined the determinants of dividend payout ratios of listed companies in Ghana where analyses were performed using data derived from the financial statements of firms listed on the Ghana Stock Exchange over a six-year period. The study showed a positive relationship between dividend payout ratios and profitability, cash flow, and tax. The results also show negative association between dividend payout and risk, institutional holding, growth and market-to-book value. Amidu [8] also examined whether dividend policy influences firm financial performance in Ghana. His analyses were performed using data derived from the financial statements of listed firms on the Ghana stock exchange for a period of 8 years. The study finds a positive relationship between return on assets, dividend policy, and growth in sales. It also finds that bigger firms perform less with respect to return on assets. His results also revealed negative association between return on assets and dividend payout ratio, and leverage. The results of the study generally support previous empirical studies. Agyei and Marfo-Yiadom [5] studied the relationship between dividend policy and performance of banks in Ghana. Their study uses panel data constructed from the financial statements of 16 commercial banks in Ghana for a period of 5 years, from 1999 to 2003. They find evidence that the average dividend paid by banks over the study period is 24.65%. They also find that banks that pay dividends increase their performance. Their results reinforce earlier findings that leverage, size of a bank and bank growth enhance the performance of banks though the age factor presents mixed results. On the whole, their results are consistent with earlier studies that dividend policy has an effect on firm value and therefore relevant.

Other studies have also explored the linkage between other aspect of corporate sustainability and financial sustainability. Benlemlih [20] explored the linkage between environmental sustainability on firm's dividend policy. The studied achieve its objective by examining 3040 American firms during the period of 1991 to 2012. The study was carried out on the basis of two main theoretical strands, that is, the agency theory and the signaling theory where it was argued that these theories connects corporate sustainability and dividend policy through the overinvesting hypothesis and announcement hypothesis, respectively. Based on the empirical evidence gathered, the study concluded that, firms that are environmentally sustainable are likely to declare higher dividend levels and also tend to have a more stable dividend policy. The study further concluded that, the linkage between corporate sustainability and dividend levels are better aligned with the overinvesting hypothesis than announcement hypothesis, and hence, agency theory better explains the connection between these concepts. Cheung et al. [36] carried out a related study where they analysed the connection between corporate financial sustainability and dividend policy. The study made an argument through two different views of dividends, the equity cost of the capital channel and the earnings channel. The first channel argues that lower the cost of equity through its risk premium improves financial sustainability propensity of a firm as indicated by Ghoul et al. [43]. According to Cheung et al. [36] this promotes firms to hoard cash or invest, rather than pay dividends with the aim of lowering the cost of equity in order to be financially sustainable. They support this argument by referring to an earlier study by Kim and Wang [59], who was of the view that, the incentives for firms to hoard cash is higher if the cost of capital is lower, because the opportunity cost decreases in line with the cost of capital and this can lead to the assurance of being financially sustainable in the long run. This is so since as firms are less burdened with financial constraints when the cost of capital is lower, they can invest more, which means that there is less to distribute through dividends [36]. Contrary to this is the second view, which claims that increase in earnings through restricted dividend payment practices is likely to improve the propensity of financial sustainability. According to Cheung et al. [36], firms with higher earnings retention exhibit lower levels of risk and hence can fund bigger investments which is a panacea for assurance of financial sustainability. Correspondingly, the increased earnings lead to higher dividends and a positive relationship between the two variables. Cheung et al. [36] concluded that the second view was more appropriate in describing the relationship, and that firms with higher dividend payment level is likely to be financially sustainable which is a clear demonstration of bird-in-hand theory.

Methodology

Sample and data

Motivated by the positivist paradigm, the study adopts the quantitative approach and a correlational design with population of 141 RCBs licensed by the BOG to carry out rural banking business in Ghana. In selecting the sample for the study, focus was placed on RCBs that were able to meet the regulators minimum capital requirement of One million Ghana cedis by the end of 2020. Consequently, by December 2020, 121 RCBs that have met the regulatory minimum capital (herein referred to as the Met-Banks) and 14 RCBs that are yet to meet the requirement as at the reference date (herein referred to as

the Unmet-Banks). This makes up 135 RCBs which forms the sample for the study. The remaining 10 RCBs were excluded due to data unavailability at the time of data collection.

The time span for the study is from 2011 to 2020 due to the significant reforms that took place within the banking sector in Ghana. Although the sample data does not include all the RCBs in Ghana, the sampled banks show good representation of the whole rural banking industry of Ghana, as RCBs in the sample cover about 92.7% of the rural banking industry assets, 98.9% of the rural banking industry deposits and 97.8% of the rural banking industry loans. The fact that the sample covers the majority of the rural banking industry suggests that, the empirical findings of this study presents a major image of how financially sustainable Ghanaian rural banking industry has been.

Annual data was collected from Bank of Ghana and Apex bank supervision department which provides detailed financial information for RCBs in Ghana. Also, the annual reports provided by RCBs from their official websites were used as complementary sources in tracing missing data points. Since all original data were collected on the nominal value, they were deflated by using GDP deflators obtained from the World Bank with the year 2017 as the base in accordance with the rebasing policy of Ghana Statistical Service.

Measurement of financial sustainability

In measuring financial sustainability of RCBs, we depart from the existing models applied in the literature by combining the inputs used by the existing system to construct a composite index based on synthetic evaluation method known as 'fuzzy logic' [32]. The Fuzzy logic theory was initially introduced Zadeh [82] and can be described as a logic for dealing with uncertainly and imprecision which is applied to describe an environment where there are no well-defined boundaries between the variables under consideration. The theory is based on the concept of "fuzzy sets", which is a generalization of the classical set theory defined by a mathematical function based on Bernoulli outcomes, hence, only accepts binary values, meaning that it can only represent elements that fully belong to the set (represented by the value 1) and elements that do not belong to that set (represented by 0). Following the fuzzy logic, a fuzzy membership function orders value of the parameter respective to the degree of their membership in a defined set, such that, a full non-membership assumes the value zero whereas full membership corresponds to the value of one. Thus, all values that lies between zero and one characterizes different degrees of membership of the defined set, in accordance to a well-defined evaluation criterion. An advantage of applying this method in the estimation of financial sustainability is the ability to intricate a complex indicator of financial sustainability based on vectors of value and continuity that reflect financial factors associated with profitability, productivity and operational efficiency of the RCBs.

Consequently, the vector of value and continuity in the current study comprises of factors necessary to accessed financial sustainability and soundness of the RCBs based on the CAMELS methodology which are factors applied as a basis for bank rating system. These factors are based on financial ratios computed to reflect different aspects of financial sustainability which includes Capital adequacy, Assets quality, Management efficiency, Earnings, Liquidity and Sensitivity to market risk. Under the CAMELS methodology, banks are rated in relation to the quality of these factors and thus, the strength of a bank in these areas of operation determines the overall strength and sustainability of the bank. Nevertheless, these ratios were not wholly adopted, they were modified to suit the requirement and the features of the industry. These ratios are shown in Table 1. In measuring financial sustainability of RCBs, we followed the procedure adopted by Serhiy and Mirosław [73] outlined as follows;

Step 1 We transform of the influencers of financial sustainability in to fuzzy membership function. In doing so, let define the indicator X, such that $X = \{X_1, X_2, \ldots, X_{12}\}$ where X is defined to be the level of financial sustainability. The fuzzy membership function is then applied to transform the identified factors with negative impact on financial sustainability using the normalization function $\mu(X)$, such that;

$$\mu(X) = \begin{cases} 0, & x_{\max} \\ \frac{x_{\max} - x}{x_{\max} - x_{\min}}, & x_{\min} < x < x_{\max} \\ 1, & x_{\min} \end{cases} \quad (1)$$

where $x_{\max}$ is the maximum value for each factor in the set of RCBs sampled during the study period whereas $x_{\min}$ is the minimum value of the factors in the set. The variables expected to have negative impact includes loan loss provision to gross loan, non-performing loan to gross loan and then cost-to-income ratio.

For those factors that have positive impact on financial sustainability, we transformed the factors using the normalization formula;

$$\mu(X) = \begin{cases} 0, & x_{\text{mix}} \\ \frac{x - x_{\min}}{x_{\max} - x_{\min}}, & x_{\min} < x < x_{\max} \\ 1, & x_{\max} \end{cases} \quad (2)$$

Variables expected to have positive impact on financial sustainability of RCBs includes equity to total asset, Tier 1 capital adequacy, total asset growth, operating income

Table 1 Drivers of financial sustainability

Factor	Construction	Vector	References
X_1	Equity/total asset	Value	Gambetta et al. [47]
X_2	Tier 1 capital adequacy	Value	Paule-Vianez et al. [68]
X_3	Loan loss provision /gross loans	Value	Gemar et al. [51], Grier [54]
X_4	Non-performing loans/gross loans	Value	Curry et al. [39]
X_5	Cost/income ratio	Value	Barker and Holdsworth [17]
X_6	Total asset growth %	Value	Grier [54]
X_7	Operating income/asset	Continuity	Grier [54]
X_8	Net income/equity	Continuity	Vilén and Markus [80]
X_9	Net income/total asset	Continuity	Curry et al. [39]
X_{10}	Net loan/(deposit + short term funding)	Continuity	Bell 19
X_{11}	Liquid asset/(deposit + short term funding)	Continuity	Vilén and Markus [80]
X_{12}	Interbank Asset/liabilities	Continuity	Vilén and Markus [80]

to asset, net income to asset, net income to equity, net income to total asset, net loan to deposit and short-term funding, liquid asset to deposit and short-term funding and interbank asset to total liabilities.

Step 2 We defined the evaluation matrix, E which contains elements obtained from the transformed values obtained from Eqs. (1) and (2). The evaluation matrix is defined as;

$$E = \begin{bmatrix} e_{11} & e_{12} & \dots & e_{1n} \\ e_{21} & e_{22} & \dots & e_{2n} \\ . & . & & . \\ . & . & & . \\ . & . & & . \\ e_{121} & e_{122} & \dots & e_{12n} \end{bmatrix} \tag{3}$$

where $e_{ij} = \mu(X) i = 1, 2, \dots, 12; j = 1, 2, \dots, n$. Due to the uncertainty nature of financial sustainability, following the procedure adopted by Shapiro and Steven [74] and Nazemi et al. [66], we assign equal weights, w to the elements of the evaluation matrix where the weight factor is defined as;

$$w = \frac{1}{n}, \quad \sum_{i=1}^{12} w_i = 1 \tag{4}$$

where n is the number of banks considered in the study and w_i is the weight of the variable i.

Step 3 We construct a composite index of financial sustainability based on Eq. (3). This is done by applying the financial sustainability formula;

$$F_i = EW^T = \begin{bmatrix} e_{11} & e_{21} & \dots & e_{1n} \\ e_{21} & e_{22} & \dots & e_{2n} \\ . & . & & . \\ . & . & & . \\ . & . & & . \\ e_{121} & e_{122} & \dots & e_{12n} \end{bmatrix} \times (w_1, w_2 \dots w_n) = (f_1, f_2 \dots f_n) \tag{5}$$

where F_i is a vector of composite financial sustainability indicator and $f_1, f_2 \dots f_n$ are the components of the vector of the composite financial sustainability of the selected RCBs. In this case, the financial sustainability index is constructed to ensure that it is anchored on the scale of [0, 1] where an index of 1 is an indication of the highest level of financial sustainability whereas an index of 0 is an indication of extremely low financial sustainability. In constructing the index, it was assumed that financial factors included in the construction of the index are fully substitutable for each other. Thus, a deteriorating effect of one factor is compensated by improvement in another factor without adversely affecting the overall index.

Considering the fact that financial sustainability is a multifaceted concept which combines factors in which some are inversely and/or directly related to financial sustainability, the financial sustainability index, F_i, was analysed into two sub-indicators with focus on value denoted by F_1 (based on ratios that address the operational quality and efficiency) and then on continuity denoted by F_2 (based on the ability to survive in the market). This analysis is necessary in order to have a comprehensive view of the linkage between the operation and efficiency state of the bank and the tendency to survive in the banking industry which forms the foundation of the financial sustainability framework adopted in the current study. The possible outcome of the value and continuity interaction is shown in Fig. 1.

After computing financial sustainability index for each RCB in the sample, the result obtained is plotted on the value-continuity matrix in Fig. 1. The value-continuity vector defines four-quadrants which defines different state of financial sustainability. The first quadrant (Region A) is the most desirable region which indicates a region of high productivity, profitability, efficiency and survival, hence shows a high level of financial sustainability. RCBs plotted within this region can be thought to be more mature entities with a well-established market and operational position within

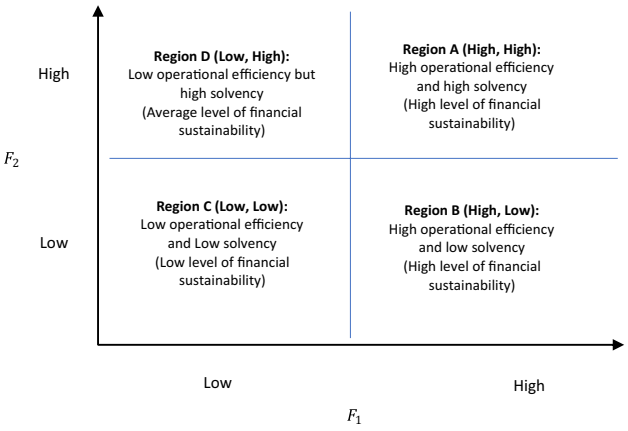

Fig. 1 Continuity and value interaction matrix. Source: Adapted from Serhiy and Mirosław [73]

the industry. Conversely, the third quadrant (Region C) demonstrate an undesirable position which indicates an area of low profitability, efficiency and solvency, thereby resulting in a low level of financial sustainability. RCBs plotted in this region are those struggling to survive the tussles within the industry, hence are experiencing persistent financial difficulties and the continuous survival cannot be predicted with high level of confidence.

The second and the fourth quadrants (Region B and Region D respectively) indicates a region of moderate level of financial sustainability. The first variant of moderate financial sustainability (Region D) shows an instance where banks retains a high level of survival, but are not efficient in generating enough profit and value for shareholders. Similarly, RCBs in Region B shows an instance where they do not exhibit features of survival but are operationally efficient in generating enough profit and value for shareholders. Kraus et al. [60] indicated that, when an entity find itself in Region B, despite high operational efficiency and creditworthiness in the short-term, it can stiffens investing activity which would intend affect the competitiveness of a company in the long-term, hence have the tendency to move a company from Region B to Region C. However, a sound financial background in terms of solvency seems to be a necessary condition for increasing the profitability and efficiency of a business which have the tendency to move an entity from Region D to Region A especially where managers of these business focuses on productivity and operating efficiency of the entity. On the other hand, in a situation where there is a rising cost of financial distress and deterioration of continuity of business, it can lead to a trade-off of the benefits from value maximization that as suggested by the trade-off theory of capital structure. Such a situation creates a threat of moving the entity from Region D to Region C. Therefore, pursuing financial sustainability requires a viable multidimensional strategy on all levels of an organization and ensures an appropriate relationship between value and continuity of business in order to remain in Region A.

Bank recapitalisation, dividend policy and financial sustainability

Finally, we focus on the variables specification and estimation procedure of the model employed in estimating the linkage between financial sustainability, recapitalisation and dividend policies of RCBs in Ghana. The variables selected for the study and their data source is summarized in Table 2.

Financial sustainability is proxied by three variables; composite index estimated based on Eq. (5) (De Marco et al. 41, [38]) with Return on Asset and Economic Value Added (EVA) [81] used as a robust check. Bank capitalisation was proxied by three variables. The ratio of equity capital to total asset (EQ/AS) as a measure of bank capital strength [77] and a dummy variable ($DummCap_{it}$) to explore the effect of bank meeting the minimum capital requirement on their financial sustainability. Another dummy variable ($DummTim_{it}$) is included in the model to capture time period for which the capitalisation of banks were implemented. Dividend policy was proxied by dividend payout ratio which is influenced by internal factors, hence, the decision to vary the policy on dividends is influenced mainly by management decisions rather than external factors [62, 69]. The expected outturn of the variable ranges from zero (0) which indicates a full retention policy to one (1) indicating a full payout policy. Three variables were employed to control for variations in the banking markets and how they impact on the financial sustainability of the rural banking industry. These are Three-firm asset concentration index (CR_3),[1] Herfindahl–Hirschman index (HHI),[2] a measure of the market concentration [27, 71] and market share. In addition to variables discussed, the study includes four bank specific variables to control for credit risk (ratio of loan loss

[1] A measure of the structure of the market defined as the percentage of market share owned by the three largest RCBs in terms total asset market share in the industry. The annual three-firm asset concentration ratio is computed as $$\sum _{i=1}^{3}{\mathrm{m}\mathrm{s}}_{it}$$ where $${ms}_{it}$$ is market share, defined as the proportion of individual bank's total assets to total asset of all banks included in the sample. Low-concentration ranges from 0 to 50 percent, medium concentration ranges from 50 to 80 percent, while 80-100 percent indicates extreme concentration such as oligopoly and/or monopoly market [11].

[2] HHI is defined as the sum of the squared market share of total assets for each bank, that is $$\sum _{i=1}^{n}{{\mathrm{m}\mathrm{s}}_{it}}^{2}$$. Lower value of HHI is an indication of the more banks in the market (Boone and Weigand 31).

Table 2 Study variables for bank financial sustainability

Variable	Description	Data source
Financial sustainability		
Composite index of financial sustainability	Index obtained based on Eq. (5)	Annual reports (2011 to 2020)
Return on Asset (ROA)	Profit before interest and tax by total asset	Annual reports (2011 to 2020)
Economic value added (EVA_{it})	Net cash operating profit less imputed interest charges	Annual reports (2011 to 2020)
Bank capitalisation		
Bank capital strength (EQ/TA)	Equity capital divided by total asset	Annual reports (2011 to 2020)
$DummCap_{it}$	Dummy where 1 denote RCB is operating with at least the minimum capital and 0 otherwise	
$DummTim_{it}$	Dummy variable where 1 denote post-recapitalisation period (2017–2020) and 0, for pre-recapitalisation era (2011–2016)	
Dividend policy		
Dividend pay-out	Proportion of earnings available to shareholders paid out as dividends	Annual reports (2011 to 2020)
Industry specific variables		
Market share (ms_{it})	Proportion of individual bank's total assets to total asset of all banks included in the sample	Apex Bank annual report (2011 to 2020)
Herfindahl–Hirschman index (HHI)	Sum of the squared market share of total assets for each bank included in the sample	Apex Bank annual report (2011 to 2020)
Bank specific variables		
Credit risk (LP/TL)	Loan loss provision to total loan	Annual reports (2011 to 2020)
Income diversification (NI/TA)	Ratio of non-interest income to total assets	Annual reports (2011 to 2020)
Loan intensity (TL/TA)	Ratio of total loan to total assets	Annual reports (2011 to 2020)
Bank size (SIZE)	Logarithm of total assets	Annual reports (2011 to 2020)
Macroeconomic variables		
Economic development (GDP)	Logarithm of gross domestic product (GDP)	WD1 (2020)
Financial sector development (SM/GDP)	Ratio of stock market capitalization to GDP	IFS (2020)
Macroeconomic risk (INFL)	Rate of inflation (INFL)	GSS (2020)

provisions to total loans), income diversification (ratio of non-interest income to total assets), loan intensity (ratio of total loan to total assets) and size (natural logarithm of total bank asset). Also, three macroeconomic variables were included in the financial sustainability model to control for economic development (Natural logarithm of gross domestic product), financial sector development (ratio of stock market capitalization to GDP) and macroeconomic risk (rate of annualized inflation) (INFL).

Empirical model specification and model estimation

In order to examine the effect of recapitalisation and dividend policy on bank financial sustainability, the approach followed by Athanasoglou et al. [15], García-Herrero et al. [48], Trujillo-Ponce [79] and Dietrich and Wanzenried [42] was followed. Consequently, a dynamic linear regression model is specified as follows,

$$\begin{aligned} F_{it} = \propto_0 + \beta F_{it-1} + \sum_{j=1}^{3} \gamma_j \mathrm{Cap}_j + \delta_k \mathrm{Div}_k \\ + \sum_{j=1}^{3} \lambda_{jm} \mathrm{Cap}_j * \mathrm{Div}_m + \sum_{n=1}^{4} \phi_n \mathrm{BSpeci}_n \\ + \sum_{q=1}^{3} \psi_q \mathrm{Macro}_q + \eta_i + \varepsilon_{it} \end{aligned} \tag{6}$$

where F_{it} denote a measure of bank financial sustainability, Cap_j measures recapitalisation of RCBs, Div_j denotes the dividend policies, BSpeci_n and Macro_q are vectors representing bank specific and macroeconomic control variables. η_i captures bank specific effect and ε_{it} captures the random error where $\varepsilon_{it} \sim iid(0, \sigma_u^2)$.

In estimating the model in Eq. (6), Berger et al. [24] suggests that, performance persist over time reflecting impediments to market competition, informational

Table 3 Financial sustainability indexes of RCBs in Ghana

Fin. Sus. index	Bank	Mean	Std. deviation	Minimum	Maximum	Skewness
F	Met-Bank	0.531	0.077	0.287	0.792	−0.052
	Unmet-Bank	0.468	0.074	0.263	0.683	−0.188
	All Banks	0.525	0.079	0.263	0.792	−0.045
F_1	Met-Bank	0.501	0.093	0.205	0.788	−0.022
	Unmet-Bank	0.507	0.086	0.274	0.708	−0.056
	All Banks	0.502	0.092	0.205	0.788	−0.028
F_2	Met-Bank	0.620	0.139	0.285	0.981	0.072
	Unmet-Bank	0.352	0.125	0.065	0.651	0.146
	All Banks	0.592	0.160	0.065	0.981	−0.230

opacity, and sensitivity to macroeconomic shocks. Besides, García-Herrero et al. [48] pointed out that, potential endogeneity is highly possible when assessing bank performance drivers. Thus, empirical works on the determinants of bank performance may suffer from several sources of inconsistencies, such as highly persistence performance, omitted variables, and endogeneity bias [70]. Consequently, a dynamic panel model is employed where the first lag of the dependent variable is introduced in the model as an explanatory variable and estimated using system Generalized Methods of Moments (GMM) estimator introduced by Arellano and Bond [14], Arellano and Bover [13], and Blundell and Bond [29]. This estimation method allows the control for possible persistency and endogeneity, hence, estimation yields consistent estimates. The reliability of system GMM depends critically on its assumptions; the error terms are not autocorrelated, and that the instruments used are valid. The presence of first-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent, rather the presence of second-order autocorrelation suggests that the estimates are inconsistent [18]. As a result, we test the hypothesis of no autocorrelation in the error term and report the results together with the main results. Also, the validity of the instrument is evaluated with the Hansen test of overidentifying restrictions, asymptotically distributed as χ^2 in the number of restrictions. A rejection of the null hypothesis that instruments are orthogonal to the errors would indicate that the estimates are not consistent [18], [63].

Result and discussion

Financial sustainability index of the rural banking industry

Applying the fuzzy approach, we derive a composite index to describe the financial sustainability level of RCBs in Ghana. Three indexes were derived; Overall financial sustainability (F), Operational and efficient sustainability index (F_1) and Market sustainability index (F_2). These indexes were derived for All banks, Met-Banks and Unmet-Banks. The descriptive statistics of the indexes is presented in Table 3.

Overall financial sustainability index of RCBs in Ghana over the study period is 0.525 with some RCBs achieving as low as 0.263. This implies that, RCBs in Ghana banks can averagely finance their operations and liabilities over time without adversely affecting the worth of other stakeholders. The story seems similar in the case of Met-Banks but that of Unmet-Banks fell below the expected average. It could therefore be stated that, relatively, banks that met the minimum capital requirement could continue to sustain their operations in terms of operational and liability financing as compared to those who could not. The standard deviation of both bank category indicates that, their sustainability score over the study period is around the average score, even though is much skewed to the left.

In terms of operational quality and efficiency, RCBs over the period of study, achieved an average operational efficiency sustainability index of 0.501 indicating an acceptable level of operational efficiency and quality of operations in general. This observation is similar in the case of both the Met-Banks and the Unmet-Banks as their operational efficiency sustainability index is around that of the industry index. In term of market survival index, with the average industry index of 0.592, the index for Unmet-Banks is lower showing evidence of threat of exit the industry. The low market survival index arising from the Unmet-banks may be attributed to their inability to capitalized and thus are exposed to high operational and financial risk.

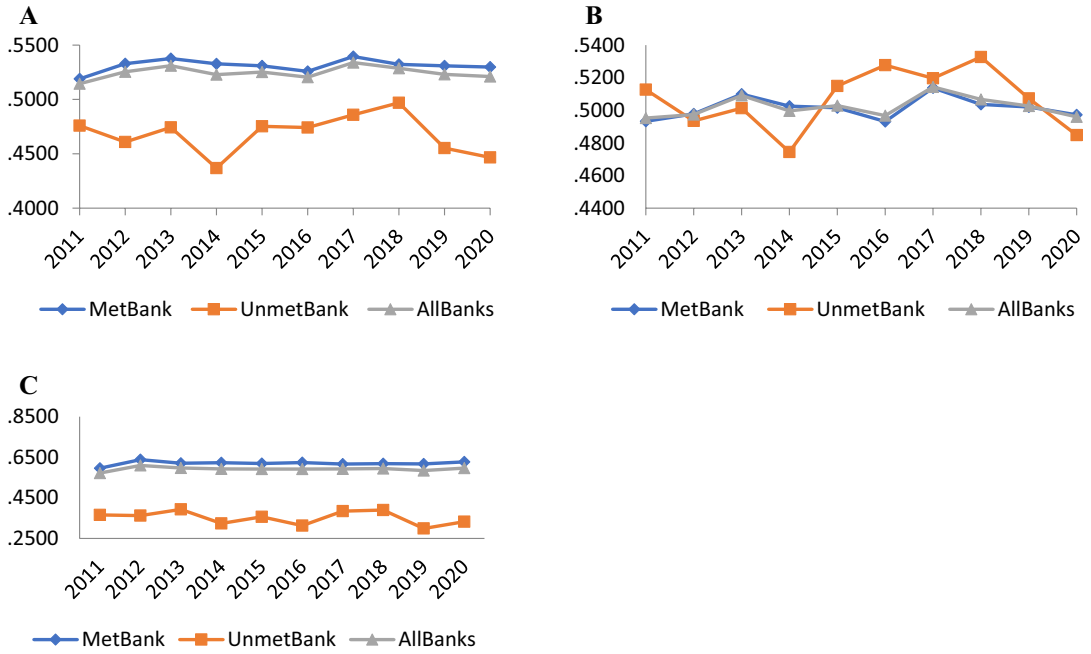

Fig. 2 **A** Annual Financial sustainability index (*F*) of RCBs. **B** Annual operational and efficiency sustainability index (F_1) of RCBs. **C** Annual market survival sustainability index (F_2) of RCBs

Trend of financial sustainability of RCBs

Annual sustainability scores of RCBs over the study period is shown in Fig. 2A–C. An examination of the trend values in Fig. 2A suggests that, the rural banking in Ghana has been relatively stable over the period except in 2017 and 2018 where there was a general decline in the financial sustainability of the industry. The index of the Met-Banks fluctuates between the scores 0.589 (in 2011) and 0.539 (in 2017) whereas Unmet-Banks recorded financial sustainability index a lowest index of 0.437 (in 2014) and the highest index of 0.497 (in 2018). The movement of the financial sustainability index for all the banks is consistent to that of the Met-Banks. Both the Met-Banks and the Unmet Banks exhibited a fall in sustainability level during the latter part of the study period. This may be attributable to the pressure on these banks to meet the regulators minimum capital requirement of GHS100 million, hence shifting the focus of the RCBs from efficiency in productivity to financing coupled with the effect of the COVID-19 pandemic.

In terms of operational and efficiency index as shown in Fig. 2B, the Met-Banks reported relatively stable indexes ranging between 0.493 (in 2011 and in 2016) and 0.513 (in 2017). During the same period, the Unmet-Banks show a highly undulating performance in terms of their operational and efficiency index ranging between 0.474 (in 2014) and 0.533 (in 2018). Nevertheless, both the sample and the sub-samples depicted a fall in operational and efficiency sustainability indexes during the latter part of the study period. The empirical justification of the trend observed is eminent and consistent with the happenings in the Ghanaian rural banking industry over the study period. During the early part of 2013, banks suffered decrease in financial performance due to the impact of the world financial crisis and as a result the balance sheet of most banks from 2013 to 2016 was filled with 'toxic assets' in which RCBs were not an exception. BOG as result instituted a lot of financial sector reforms meant to 'clean up' the financial sector which include recapitalization, asset quality audit and enhanced corporate governance structures which in effect saw an improvement in the financial performance of these banks during 2017 and 2018. However, with the quest to meet the minimum capital requirement in 2018 coupled with the impact of the COVID-19 pandemic, the financial performance of most banks fell during the latter part of the study period which had direct impact on their financial sustainability, hence the observed trend.

In terms of market survival, the existence of the Unmet-Banks appears to be threatening as their index are far below that of the industry. This indicates that, maintaining a stronger capital based is a contributing factor to firms' survival in the industry. This finding is consistent with Fries and Taci [46], Kumbhakar and Wang [61] and Berger et al. [25] who suggest that as banks strive to

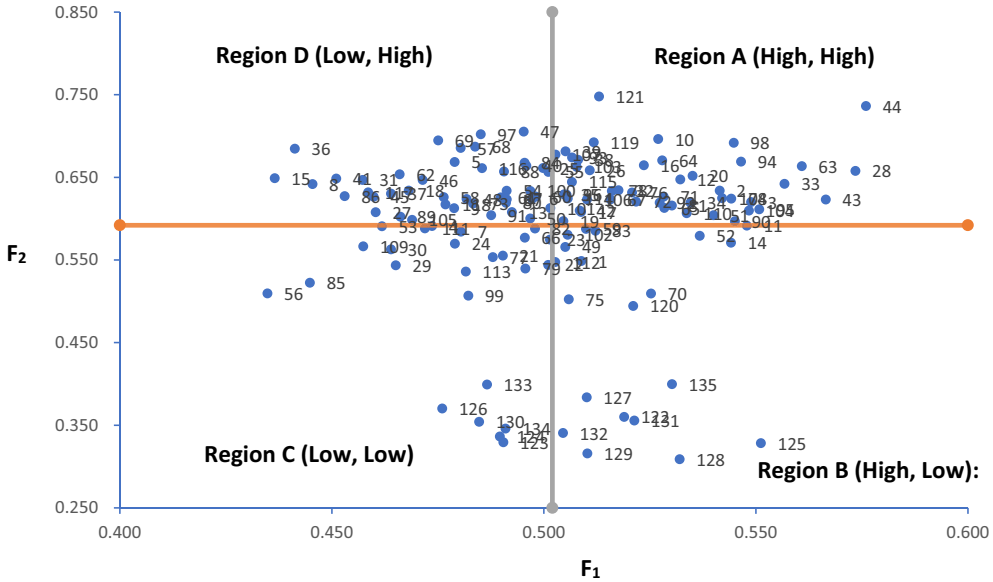

Fig. 3 Continuity and value interaction matrix of RCBs in Ghana

increase their capital level, it equips them to absorbed shocks which is necessary to build strong banks.

Financial sustainability of RCBs

For each RCB, we compute overall financial sustainability score, operational and efficiency sustainability score and market survival score which make is possible to plot RCB's score on the continuity and value interaction matrix in Fig. 3. The RCBs overall average financial sustainability indexes ranges from 0.450 (Bank 123[3]) to 0.616 (Bank 44) even though the other component of financially sustainability shows a comparatively higher index. In terms of ranking based on overall financial sustainability, Bank 44 was ranked to be the most financially sustainable banks over the study period with an operational and efficiency sustainability indexes of 0.576 and 0.786, respectively, placing Bank 44 in Region A as shown in Fig. 3. Similar story could be told for the banks ranked from 2nd to 5th (that is Bank 28, Bank 63, Bank 98 and Bank 43). All these banks showed higher overall financial sustainability index coupled with higher operational and efficiency sustainability index and high market survival index, hence were all plot in Region A in Fig. 3. It is interesting to note that, all the banks that were ranked higher and hence plot in Region A are Met-Banks. Conversely, Bank 56, Bank 130, Bank 124, Bank 123 and Bank 126 were the least five ranked banks from 131st to 135th, respectively. These banks were plot in Region C where they were considered to have a low operational and efficiency index and well as low market survival index. All these banks, interestingly happened to be Unmet-Banks. Thus, five banks are considered as highly financially sustainable as their sustainability scores are within the top 25th percentile of the scores of the banks considered with the financial sustainability scores exceeding 0.580.

All the banks within the top 25th percentile are banks that have met the minimum capital requirement of the regulator as at the end of the study period and they include Bank 44, 28, 63, 98 and 43 which were ranked 1st, 2nd, 3rd, 4th and 5th, respectively. Five banks showed average financial sustainability score with the lower 25th percentile with score below 0.455 and they include Bank 56, 130, 124, 123 and 126. Out of these banks, only one, Bank 56 is a Met-Bank. The remaining banks fall within the middle 50th percentiles with efficiency scores ranging between 0.455 and 0.580. The distribution of financial sustainability scores of the banks is shown in Table 4.

Effect of bank recapitalisation and dividend policy on financial sustainability of RCBs

A summary of the descriptive statistics of the variables used in the estimation of the determinants of the financial sustainability is shown in Table 5. To satisfy the assumption of no multicollinearity among the explanatory variables, correlation matrix of the explanatory variables (not presented) showed that, in general the correlation between the explanatory variables is not strong (highest absolute correlation efficient being 0.58) suggesting that

[3] Names of RCBs have represented by Bank numbers for the sake of confidentiality. Name of RCB associated with Bank number shall be provided on request.

Table 4 Distribution of average overall financial sustainability scores of RCBs

Bounds[1]	Average overall financial sustainability range	Number of banks		
		Met-Bank	Unmet bank	Total
Top 25th percentile	$F \geq 0.580$	5	–	5
Middle 50th percentile	$0.455 < F < 0.580$	115	10	125
Lower 25th percentile	$F \leq 0.455$	1	4	5
Total		121	14	135

[1] Financial sustainability bounds were defined based on percentiles

Table 5 Descriptive statistics of study variables

Variable	Min	Max	Mean	Std dev
Overall Financial Sustainability Index	0.263	0.792	0.525	0.079
Return on asset (ROA_{it})	−0.211	0.334	0.098	0.213
Economic values added on total asset (EVA_{it})	0.013	0.297	0.081	0.131
Bank capital strength (EQ/TA)	0.189	0.300	0.241	0.032
DummCap	0.000	1.000	0.896	0.305
Dummtime	0.000	1.000	0.613	0.425
Dividend payout	0.021	0.315	0.216	0.045
Three-firm concentration (CR_3)	0.198	0.341	0.262	0.113
Herfindahl–Hirschman index (HHI)	0.053	0.109	0.089	0.019
Market share	0.017	0.221	0.190	0.087
Credit risk (LP/TL)	0.013	0.336	0.162	0.144
Income diversification (NI/TA)	0.005	0.017	0.009	0.102
Loan intensity (TL/TA)	0.012	0.948	0.427	0.162
Bank size (SIZE)	2.171	12.136	7.215	1.812
Economic development (GDP)	3.157	13.217	9.321	2.113
Financial sector development (SM/GDP)	0.213	0.713	0.413	0.172
Macroeconomic risk (INFL)	0.070	0.231	0.172	0.115

multicollinearity problems are not severe [58]. As such, we proceed with the estimation of the model parameters.

As stated earlier, sustainability model was estimated using the system GMM. The result is presented in Table 6. Generally, the coefficients of the variables of interest remains stable and consistent across the various regression models in terms of direction and magnitude indicating the robustness of the financial sustainability measure. Secondly, the highly significant and positive lagged financial sustainability variable's coefficient across the models suggest that, financial sustainability among RCBs in the current year is significantly and positively affected by its previous year's financial sustainability level. This confirms the dynamic nature of the model specification, thus justifying the use of dynamic panel data model estimation. Same story could be told for using ROI and EVA. Finally, the F-test result shows that, the model generally fits the data. Again, for all the regression models estimated, the Hansen test statistics for overidentifying restrictions shows that, at 5% level of significance, the instruments used are appropriately orthogonal to the error terms. Besides, the Arrelano–Bond $AR(2)$ test shows that, at the 5% significance level, no second-order serial correlation can be detected.

The regression result showed a positive and significant relationship between RCBs tendency to meet the minimum capital requirement and financial sustainability. This observation suggests that, RCBs raising capital to meet the regulator's capital requirement helps them to be financially sustainable, indicating the acceptance of Expected bankruptcy cost theory.

This is evidenced in capital strength showing a positive and significant relationship with financial sustainability across the dependent variables. Similar result was obtained for the time in which the RCB have been capitalized, the estimated coefficient was found to be positive and significant across all the dependent variables specified. This result is in line with the result obtained by Garza-Garcia [49] who concluded that raising enough capital is an important driver of banks' financial

Table 6 Panel GMM result of recapitalisation, dividend policy and financial sustainability

Model	(I)	(II)	(III)	(IV)	(V)	(VI)
Dependent Var	F	ROI	EVA	F	F	F
Part A: Model coefficients						
con_	5.154*	3.154*	4.308*	3.077*	4.385*	3.923**
	(3.035)	(1.867)	(2.362)	(1.568)	(2.237)	(2.146)
Lag dep. var	0.079***	0.064***	0.036***	0.093***	0.057***	0.059***
	(0.021)	(0.004)	(0.006)	(0.032)	(0.005)	(0.013)
DummyCap	0.065**	0.149***	0.056**	0.064**	0.131***	0.043**
	(0.025)	(0.058)	(0.020)	(0.019)	(0.045)	(0.017)
Dummytime	0.205***	0.189**	0.362***	0.142***	0.220**	0.386**
	(0.058)	(0.071)	(0.091)	(0.044)	(0.110)	(0.186)
Capital strength	0.194***	0.064***	0.072***	0.127**	0.049***	0.062***
	(0.050)	(0.023)	(0.016)	(0.052)	(0.013)	(0.007)
Dividend payout				0.107***	0.053	0.031***
				(0.051)	(0.006)	(0.007)
DivPay*DummyCap				0.076**		
				(0.034)		
DivPay*Dummytime					−0.092	
					(0.029)	
DivPay*Capital Strength			0.053			
						(0.018)
CR3	−0.024***	−0.044**	−0.005**	−0.008**	−0.053**	−0.007*
	(0.007)	(0.021)	(0.002)	(0.003)	(0.022)	(0.004)
HHI	−0.182***	−0.077*	0.255*	−0.214***	−0.034**	0.198*
	(0.057)	(0.042)	(0.155)	(0.044)	(0.016)	(0.108)
Market share	0.067***	0.168**	0.068*	0.076***	0.067***	0.051***
	(0.007)	(0.082)	(0.031)	(0.028)	(0.024)	(0.006)
Credit risk	−0.087	−0.087**	−0.039**	−0.039**	−0.087	−0.087**
	(0.066)	(0.045)	(0.015)	(0.020)	(0.082)	(0.024)
Income Div	0.262***	0.180*	0.287***	0.198***	0.279**	0.179***
	(0.092)	(0.127)	(0.107)	(0.033)	(0.076)	(0.013)
Loan intensity	0.021***	0.169	0.077**	0.106***	0.035*	0.176*
	(0.006)	(0.111)	(0.030)	(0.030)	(0.014)	(0.097)
Bank Size	0.176**	0.170	0.078	0.196***	0.131	0.203***
	(0.091)	(0.070)	(0.057)	(0.069)	(0.073)	(0.051)
Economic dev't	0.310*	0.219	0.161**	0.290*	0.194	0.168*
	(0.176)	(0.062)	(0.078)	(0.156)	(0.097)	(0.097)
Fin. Sec dev't	−0.297	−0.192	−0.249	−0.209	−0.180	−0.243
	(0.348)	(0.110)	(0.229)	(0.192)	(0.104)	(0.233)
Macro. Risk	−0.196	−0.190	−0.170	−0.124**	−0.072	−0.105**
	(0.162)	(0.190)	(0.111)	(0.033)	(0.022)	(0.041)
Part B: Model statistics						
F-test	28.714***	22.571**	31.714**	23.143**	22.857**	24.378**
Number of observations	1202	1202	1995	1202	1202	1202
Number of instruments	165	162	167	163	162	161
Number of groups	135	135	135	135	135	135
AR(1) *p* value	0.092	0.086	0.026	0.079	0.105	0.103
AR(2) *p* value	0.216	0.216	0.147	0.176	0.137	0.371
Hansen *p* value	0.265	0.265	0.255	0.176	0.167	0.173

All the regressions were estimated with the Windmeijer-corrected standard error version of the two-step system GMM model, with small-sample adjustments and orthogonal deviations. $***p < 0.01$; $**p < 0.05$; $*p < 0.1$. Robust standard error in parenthesis

sustainability. Furthermore, strong capital base is essential for banks in developing economies necessary to provide a shock absorber in times of financial crises and also provide safety for depositors during unstable macroeconomic conditions [77].

The study controlled for the effect of market structure and how it explains the variability in the RCBs financial sustainability. Concentration is inversely related to financial sustainability as both CR_3 and HHI showed a negative and significant relationship with financial sustainability of the RCBs. This suggest that, concentration in the rural banking market threatens financial sustainability. Higher CR3 means the three biggest RCBs have acquired a higher market share and hence have higher domination in the market. To increase dominance, the biggest three banks need to perform expansion. Market expansion creates expenses to the bank, and some of the expansion does not create profit especially during the early years. In this regard, an increase in market shares of the three biggest banks would be followed by a decrease in return on asset. Moreover, bigger RCBs tend to have a better economic of scale which may be associated with a lower marginal cost. Such banks may have the option to reduce its price to gain more market shares. A decline in price can reduce bank financial sustainability tendency, especially if the market is highly inelastic. This observation however contradicts Structure-conduct-performance hypothesis.

Similarly, the estimated coefficient of HHI is negative and significant for financial sustainability scores and ROI but positive and significant when EVA is used as a measure of financial sustainability. Thus, in terms of financial sustainability scores and ROI, the result tends to be inconsistent with the Relative Market Power hypothesis, which postulate that, as firms gain higher market power through increased market share, financial sustainability tend to increase. The negative relation between HHI and banks' financial sustainability indexes can be explained by the fact that RCBs with larger market share suffer low financial sustainability due to massive accumulated non-performing loans, although the amount has been reduced substantially in recent years following BOG prudent loan management guidelines. Conversely, considering financial sustainability as value addition to the firm (i.e., measured using the EVA), the result tends to provide an overwhelming support for the Relative Market Power hypothesis. Thus, the applicability of the Relative Market Power hypothesis on the Ghanaian rural banking market largely depends on how banks' financial sustainability is defined.

The observed relationship between market concentration and financial sustainability indicates that, Ghanaian rural banking industry is not controlled by a few RCBs who can exploit the market to gain abnormal profits. This finding contradicts earlier work by Busch and Mathisen [34] who found the Ghanaian banking sector to be controlled by few firms over the period 1998 to 2003. The present study however uses recent data covering 2011 to 2020, thus, it could be an indication that the sector is becoming more competitive over time. Between the time of Busch and Mathisen study and now, there have been a lot of reforms by the regulator that has aimed at varying the market structure to make it more competitive, hence could be a possible reason for the varied result from Busch and Mathisen [34]. Besides, this study focused on the rural banking market whereas Busch and Mathisen study focused on the commercial banking market, a probable reason for variation in the observed results. This finding are however, consistent with that of Athanasoglou et al. [15] and Garza-Garcia [50] who found an inverse and significance relationship between market concentration and bank financial long term financial performance in Greece and Mexico, respectively.

In respect to competition, there exist a positive and significant relationship with banks' financial sustainability proxies across all models. This implies that, higher market share is associated higher the value of the financial sustainability proxies. The observed relation tends to confirm the assertion of Berger et al. [22] and Boyd and De Nicolo [33] who are of the view that, as competition in the banking sector motivate banks to endorse riskier investments for purposes of boosting their profit margins which may lead to loss of their investment. This result contrasts the observed concentration–sustainability relationship which shows a higher concentration in the market breeds lower return on asset. All other thing being equal, a highly concentrated market is expected to be an indication of low competition and the regression result again suggest an inverse relationship between competition and banks' financial sustainability which somewhat suggest a contradiction between concentration- sustainability relationship and competition- sustainability relationship. The opposite result of both regressions result suggests a U-shaped relationship between rural banking market structure and financial sustainability. This implies that, concentrated market or highly competitive market does not create avenue for firms operating in the Ghanaian rural banking industry to be financially sustainable.

With respect to credit risk, it consistently showed a negative relationship (though not significant across all dependent variables) with banks' financial sustainability, suggesting that banks with higher loan loss provision tend to report lower returns on asset and hence, deteriorating financial sustainability indexes. The observed result is consistent with the literature [40, 45, 72] and theory, the *skimping* hypothesis [26]. The findings clearly suggest that, banks operating in the Ghanaian rural

banking sectors should focus on managing credit risk exposure in the quest to improve their financial sustainability, which has been proven to be problematic in the recent past.

As expected, income diversification has consistently exhibited positive and significant impact on bank financial sustainability. The results imply that banks that derives a significant proportion of its income from non-interest sources such as fee-based services and other income tend to report improve profit and hence financially sustainable. This observation may be attributable to synergetic effect between core and related activities, which makes diversified banks much more competitive advantageous over their less diversified counterparts. Besides, non-core banking activities are associated with limited losses as compared to the core banking activities which is generally characterised by huge losses on loans. This empirical finding provide support to earlier studies such as Chiorazzo et al. [37], Elsas et al. [45], Stiroh and Rumble [76] who suggested that revenues generated from new business units have significantly contributes to improve bank performance.

Loan intensity measures liquidity risk of the bank, basically focus on the proportion of RCBs' assets converted to loans investment. A higher loan intensity is detriment to the bank's liquidity but assuming these loans translate to interest income, is expected to improve financial sustainability. Thus, the intensity of loans showed a positive and significant relationship with banks financial sustainability indicating that, higher loans provided by the RCBs translate to interest revenue which intend translate to profit. Banks size seems to be positively and significantly associated with financial sustainability. Hauner [55] offers two potential explanations for which size could have a positive impact on bank long-term financial performance. First, it is assumed that, size is associated with market power and as such, through the enjoyment of economies of scale, large banks should pay less for their inputs which directly translate to financial sustainability. Secondly, as firm expands, there may be increasing returns to scale through the allocation of fixed costs over a higher volume of services or from efficiency gains from a specialized workforce. However, the result should be interpreted with caution since the coefficient of the variable is only statistically significant across the reduced models but not significant in the full model where we control for dividend variables.

The results of the relationship between GDP and banks' financial sustainability appear to provide evidence in support the argument on the linkage between economic growth and financial sector's performance. The result suggests that, a high economic growth encourage RCBs operating in Ghana to lend more, charge appropriate margins, and improve the quality of their assets. The level of financial development is largely insignificant in determining bank return on assets, but the negative coefficients clearly advocate that, during the period under study, Ghana stock markets offers substitution possibilities rather than complements the products and services offered by banks to borrowers. Similarly, the coefficient of the macroeconomic risk seems to be negatively association with bank's return. Rising inflation reduces the real value of non-performing loans and since most bank contracts are not inflationary adjusted, it tends to be detrimental to banks' financial sustainability.

Role of dividend policy of RCBs

To determine the role dividend policy in the financial sustainability and capitalisation relationship, Eq. (6) is re-estimated where we moderate dividend policy proxied by dividend payout. The results are presented in Model (IV) to Model (VI) of Table 6. These models suggest a positive relationship between *dividend policy* and banks' financial sustainability. This empirical finding comes not as a surprise as this is consistent with the Bird-in-hand theory by Gordon [52] which postulate that dividends payout serves as a positive signals of expected cash flow which is essential for determining the financial sustainability of a firm. The observed result is also consistent with the literature such as Abreu and Gulamhussen [2] who concluded that, dividend policy decisions is key to the creation of an environment that allows attraction of sustainable financing which is a panacea for ensuring a sustainable financial performance especially for smaller and less marketable financial institutions such as RCBs. It can again be observed that, the interaction between dividend payout and the recapitalisation status of the banks is not significant indicating that, dividend policy decision, even though significant in determining the financial sustainability of the banks included in the study, it presents does not influence the relationship between the recapitalisation status of the banks and financial sustainability.

Also, the interaction between the dividend payout and time of recapitalisation is negative but not significant, indicating that, as the dividend decision of the RCBs have less role to play in determining the nature of relationship between the time the banks recapitalised and their level of financial sustainability. However, the interaction between dividend payout and capital strength of the RCBs is positive and significant indicating that, when RCBs pays higher dividend, it has the tendency of positively influencing the relationship between their capital based and financial sustainability. Thus, dividend policy decision has a conditioning effect of capital strength on banks' financial sustainability.

In essence, the empirical findings from this study highlight that role of policy decisions in determining the linkage between recapitalisation and financial sustainability of RCBs in Ghana. The observation seems to suggest that, when banking institutions adopts the right dividend policy decisions, it would go a long way to improve the financial sustainability of these institutions [10].

Conclusion and policy recommendation

The study examines the effect of recapitalisation on bank financial sustainability. The study used data from 135 RCBs over the period 2011–2020 and the system GMM to assess how dividend policy affects the relationship between recapitalisation and bank financial sustainability. The results reveal a positive relationship between capital strength and financial sustainability, indicating that RCBs with strong capital base are financially sustainability. Dividend policy shows a positive relationship with financial sustainability, suggesting that more pay-out improve financial sustainability of RCBs. However, there is some indication that the impact of recapitalisation on financial sustainability is sensitive to dividend level. It is therefore concluded that as banks strengthen their capital base, highly pay-out RCBs improves financial sustainability faster than those adopting retention policies. The results of the study have important policy implications. The fact that improved capitalisation is associated with high financial sustainability suggests that RCBs should adopt strategies such as share issues to improve their capital base, even if they are not required by the regulator to do so. This has the tendency to improve their sustainability financially. Also, RCBs should adopt a relaxed pay-out policy as this tend to send signal to the shareholders of their operational efficiency and sustainability.

Abbreviations

GMM Generalized method of moment
RCBs Rural and community banks

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Author contributions

All aspect of the study was done by the author.

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Availability of data and materials

The datasets generated and analysed during the current study are not publicly available due the confidentially agreement entered into by the researcher and the study units but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study has followed the ethical guidelines issued by the Research Review Board of University of Education, Winneba and all data collected were based on the confidentially agreement with the participants not to publish their names.

Consent for publication

The author has consented to publish the output of this study in Future Business Journal.

Competing interests

The author declare that he has no competing interests.

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