Monetary policy decisions and bank profitability: evidence from an emerging economy

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Abstract

Purpose – This study provides empirical evidence for the first time on how different measures of monetary policy affect banking profitability in Ghana.

Design/methodology/approach – Providing empirical evidence on how different measures of monetary policy affect banking profitability in Ghana using 29 banks for period between 2006 and 2016, new monetary indexes are developed and a robust panel random effect models is employed with year effect controls.

Findings – The results show that while increase in monetary policy basis point reduced banking profitability, average monetary policy rate stimulated banking profitability. Interestingly, the monetary policy basis point and rate indexes developed reduced and enhanced banking profitability, respectively. While these results may sound contradictory, they have both theoretical and empirical backing. Thus, basis point increments serve a monetary policy tightening condition which leads to higher loan prices, lower borrowing and declined profitability in the short run. However, in the long run, banks adjusted their loan prices and deposits to reflect basis point changes in their favor, hence the positive effect of average monetary policy rate on banking profitability. Additionally, monetary policy easing which represents decline in monetary policy basis point and rate enhances banking profitability.

Practical implications – These findings imply bank managers may take advantage of monetary policy easing to maximize profits in the banking sector of Ghana. Also, the monetary policy committee must be mindful of monetary policy tightening through basis point change since upward basis point increments reduce banking profitability.

Originality/value – This study provides empirical evidence for the first time on how different measures of monetary policy (developing indexes from monetary policy basis point and monetary policy rate) affect banking profitability in an emerging economy as Ghana.

Keywords Monetary policy, Profitability, Banks, Ghana

Paper type Research paper

Introduction

The literature on central banks posits that central banks have existed as far back as 17th century (Goodhart, 2011; Cukierman, 2009). Their primary functions at the time were banker and custodian to government, providing funds for public expenditure financing, enactment of laws, customs and policy instruments to resolve a myriad of objectives such as balance of payment, high levels of economic growth, unemployment and price stability (Goodhart, 1988, 2011; Cukierman, 1994, 2009). However, events such as improvement in monetary policy knowledge, financial crises reforms and pressure from economic agents and groups have helped shape and expanded the functions of central banks to include the regulation of banks

and their activities (Kusi *et al.*, 2019; Garriga, 2016). That is, issues on banking price stability and monetary policy are recent add-on functions for central banks.

Interestingly, while central banks are to create enabling banking environment and protect the interest of financial market participants through monetary policy decisions, banks are also risk-averse economic agent who seek to maximize profits from the financial intermediation process and functions (Ho and Saunders, 1981; Maudos and De Guevara, 2004). Intuitively, the survival and continuous existence of banks as supported by the going concern accounting principle is achieved through the profits and or gains they earned through their intermediation functions. In practice, banks use the monetary policy rate set by the central bank monetary policy committee to gauge the pricing of the loans and deposits. Following the financial intermediation theory (or dealership theory), banks set loan prices above the monetary policy rate and set deposit prices below the monetary policy rate (Amuakwa-Mensah and Marbuah, 2015; Aboagye *et al.*, 2008; Maudos and De Guevara, 2004). Thus, banks in their bid to maximize profit take advantage of the monetary policy rate in the loans and deposits markets to earn the spread or markup. Simply put, the monetary policy rate is the rate at which the central bank lends to banks and hence to make profit, banks must set their loan and deposit prices above and below the monetary policy rate, respectively.

From the above, several studies (Borio *et al.*, 2017; Altavilla *et al.*, 2018; Aydemir and Ovenc, 2016; Genay, 2014; Hancock, 1985a, b; Flannery, 1981) have investigated the relationship between monetary policy and bank profitability mostly in Europe, America and Asia. While literature predominantly reports a positive relationship between monetary policy rate and banking profitability, empirical literature on this relationship in Ghana is nonexistent. It is worthwhile noting that prior studies in Ghana on monetary policy focus on its effects on bank credit, lending and lending behavior (Amidu, 2006; Amidu and Wolfe, 2008; Zulkhibri, 2013), and no indication of how it affects banking profitability in Ghana. Interestingly, while prior studies (Loayza and Pennings, 2020; Mirzaei *et al.*, 2013; Hancock, 1985a, b) show that financial structure and system characteristics vary widely across advanced and emerging economies, such findings obtained from advanced economies may be less relevant and applicable in the context of an emerging economy like Ghana. Interestingly, Loayza and Pennings (2020) show that the financial structure and systems of developing and emerging economies like Ghana have shallow financial markets, poorer regulatory and governance regimes and constrained fiscal space which translates into lower efficiency and effectiveness of monetary policy stimulus compared to the financial structure and systems of advanced economies. Furthermore, the study of Zimmermann (2019) stated that the link between monetary policy and banking profitability is state dependent when examined monetary policy and profitability across 17 economies, implying that results and implications of monetary policy and banking profits vary across states or countries.

Furthermore, while prior empirical studies (Loayza and Pennings, 2020; Mishra *et al.*, 2014; Mirzaei *et al.*, 2013) show that monetary policy decision transmissions may be slow, small and ineffective in emerging and developing economies due shallow financial systems, poor regulator systems and weak governance, it provides strong indication on why the effect of monetary policy and banking profitability should be studied in the Ghanaian context where prior studies (Amidu and Wolfe, 2008; Amidu, 2006) have largely ignored the effect of monetary policy on banking profitability. All these point to the difference in financial systems across advanced and emerging economies, which influence the monetary policy decision outcomes in these economies. Additionally, with limited and scanty empirical literature on monetary policy studies in emerging economies like Ghana, the need to have a study on how monetary policy influences banking profitability is further heightened or necessitated given that findings of prior studies from advanced economies may have less relevance and application to emerging economies like Ghana. Hence, this study attempts to expand the literature on the relationship between monetary policy and banking profitability by, first,

computing an index of monetary policy using monetary policy basis point changes and monetary policy rate decisions taken by Bank of Ghana Monetary Policy Committee for the first time, which provides a new perspective for examining monetary policy. Second, the study further classifies monetary policy decisions into expansionary and contractionary monetary policy decisions to further our knowledge on how these forms of monetary policy decisions influence banking profitability in Ghana. Third, the study employs different measures of monetary policy to examine the effects of monetary policy measures on banking profitability in Ghana. These contributions when achieved fill up the contextual and empirical gap on monetary policy and banking profitability in emerging economies in Africa and further present new perspectives on how monetary policy tightening and easing impact banking profitability using newly developed monetary policy indexes. In sum, this study presents first time evidence on how monetary policy decisions influence banking profits in Ghana while contributing to monetary policy literature by creating a new index for monetary policy. The rest of the paper is organized into overview of monetary policy measures and banking profitability in Ghana, literature review, methodology, empirical results and conclusions and policy implications.

Overview of monetary policy and banking profitability in Ghana

This section presents useful information on monetary policy and banking profitability in the Ghanaian banking sector. The section presents and discusses information covering 2006 to 2016. Specifically, monetary policy meetings, decision outcomes (monetary policy rate and basis point changes) and profitability of banks are reported in Table 1 and Appendix 5. These facts are collected, computed and reported based on the information provided in Bank of Ghana Annual Financial Reports between 2006 and 2016. Ghana's Monetary Policy Committee (MPC) derives its legitimate mandates from Section 27 of the Bank of Ghana Act, 2002 (Act 612) [1]. The Act makes the MPC the sole committee responsible for the formulation of the monetary policy of the Central Bank of Ghana. The Committee through Act 612 is mandated to appoint seven members. The members of this committee include: the Governor, the two Deputy Governors, the head of department responsible for economic research, the head of department responsible for financial markets and two other persons appointed by the Board, who are not employees of the Bank but have knowledge and experience relevant to the functions of the MPC [2]. The Committee is mandated to meet at least four times every year to deliberate and decide whether to review the monetary policy rate. While the

Year	MPBP	AMPR	NIM	MPBPINDEX	AMPRINDEX	MEETINGS
2006	−300	14.17	4.35	−0.28571	0.076069	4
2007	100	12.75	4.9	0.095238	0.068463	5
2008	350	15.55	6.4	0.333333	0.083497	5
2009	100	18.40	6.93	0.095238	0.098801	5
2010	−450	14.30	7.41	−0.42857	0.076785	5
2011	−100	12.75	6.84	−0.09524	0.068463	6
2012	250	14.60	7.39	0.238095	0.078396	5
2013	150	15.80	8.37	0.142857	0.08484	5
2014	500	18.80	7.68	0.47619	0.100949	5
2015	500	23.20	8.52	0.47619	0.124575	5
2016	−50	25.92	8.35	−0.04762	0.139162	6

Source(s): Computed by author based on information collected from Bank of Ghana Annual Financial Statement – *MPBP*, monetary point basis point change; *AMPR*, average monetary policy rate; *NIM*, net interest margin; *MPBPINDEX*, monetary policy basis point index; *AMPRINDEX*, average monetary policy rate index

Table 1.
Monetary policy
measures and net
interest margin
(206–2016)

Committee met four times in 2007 and six times in 2006, 2011 and 2016, then again met five times in 2008, 2009, 2010, 2012, 2013, 2014 and 2015 (Appendix 5). The various meetings led to different conclusions on the monetary policy outcomes.

In Table 1, average monetary policy rate and basis point changes and their indexes (see Table 2 for the measurement or computation of the monetary policy indexes) are reported to capture monetary policy dynamics in Ghana. These are used to measure and represent monetary policy other than interest rates used by prior studies (Kumar *et al.*, 2020; Campmas, 2020; Borio *et al.*, 2017; Hancock, 1985a, b) because these measures directly reflect the decisions and outcomes of monetary policy committee and hence provides a better reflection

Variable	Measurement	Indicator	Expected sign
NIM	[interest income-interest income]/total assets	Banking profitability	
MPBP	Reported basis point change	Monetary Policy Basis Point change	−
AMPR	Sum of monetary policy rates in a given year/the number of meetings leading to the monetary policy rate decisions	Average Monetary Policy Rate	+
MPBPINDEX	[Basis point changes for a given year/ sum of basis point for the study period] *[one/number of meetings	Monetary Policy Basis Point Index	−
AMPRINDEX	Average monetary policy rate in a given year/sum of average monetary policy rate for the study period	Average Monetary Policy Rate Index	+
EXPANDMPBP	Dummy which assumes a value of 1 if the monetary policy basis point index declined in a given year and 0 otherwise	Expansionary Monetary Policy based on basis point	+
EXPANDMPR	Dummy which assumes a value of 1 if the monetary policy rate index declined in a given year and 0 otherwise	Expansionary Monetary Policy based on average monetary policy rate index	+
FINCRISES	Dummy variable which assumes a value of 1 for 2007, 2008 and 2009 global financial crises period (Goddard *et al.*, 2009a, b)	Financial Crises	
LCAP	natural log of shareholder equity or capital	recapitalization	−
LOANS	loans/total assets	structure of assets	+
ASSETQUALITY	Provisions for bad and doubtful loans/ loans and advances	loan quality	±
DEPOSITS	Customer deposits/total liabilities	financial structure	+
COSTINCOME	Operating expenses/operating income	Efficiency	−
BANKSIZE	natural log of total assets	Bank size	±
HHI	$[\sum(L^2)/(\sum L)^2]$	Industry market structure	±

Note(s): *NIM* (dependent variable), net interest margins; *MPBP*, monetary policy basis point; *MPBPINDEX*, monetary policy basis point index; *EXPANDMPBP*, expansionary monetary policy based on basis point change; *AMPR*, average monetary policy rate; *AMPRINDEX*, monetary policy index based on average policy rate; *EXPANDMPR*, expansionary monetary policy based on monetary policy rate; *FINCRISES*, financial crises; *ASSETQUALITY*, quality of loans; *LCAP*, bank capitalization; *COSTINCOME*, cost efficiency; *BANKSIZE*, size of bank; *HHI*, market structures; *DEPO*, deposits; *LOANS*, loans granted

Table 2.
Summary of variables

of monetary policy dynamics and outcomes. First, monetary policy basis point (MPBP) measures the sum of basis point changes for the given number of meetings in a year. From MPBP values, 2006, 2010, 2011 and 2016 reported reduction in MPBP of 300, 450, 100 and 50, respectively. Intuitively, it can be argued that these are years of expansionary monetary policy because reduction in monetary policy basis points translate into reduction in monetary rate and loan prices and hence encourages borrowing in the credit market. Within the period under review, the highest reduction (−450) in monetary policy basis point was reported in 2010 while highest increases (500) in monetary policy basis point were reported in 2014 and 2015. Average monetary policy rate which computed as the sum of monetary policy rate arrived at for the given number of meetings scaled over the number of meetings report its period highest of 25.92% in 2016 while reporting the period lowest of 12.75% in 2007 and 2011, respectively.

Likewise, net interest margin measured as the difference between interest income and interest expenses scaled over total assets reports a period high and low of 8.52% and 4.35% in 2015 and 2006, respectively. From the values presented in Table 1, none of the monetary policy variables are stable. Based on MPBP and AMPR, monetary policy basis point index (MPBPINDEX) and average monetary policy rate index (AMPRINDEX) are computed. To compute the indexes for monetary policy basis point and rate, the monetary policy basis point and rate for each year are scaled over the sum of monetary policy basis point and rate for the study period is obtained. For each of the two indexes created, lower values indicate lower monetary policy decision and directly indicate the contribution of each year's monetary policy decision on the entire period monetary policy decision. In terms of monetary policy committee meeting, 2006 reported the least number of monetary policy committee meetings attended while 2011 and 2016 reported the highest number of monetary policy committee meetings.

To enhance understanding of the values captured in Table 1 and graphically capture the relationship between monetary policy measures and bank profitability captured as net interest margins, Figure 1 is produced. In Figure 1, four graphs are reported. The graphs on the left capture the link between monetary policy basis point and its index and net interest margins, while the graphs on the right capture the link between monetary policy rate and its index and net interest margins. From the graph, it is observed that all four measures of monetary policy are positively associated with banking profitability measure as net interest margin in the Ghanaian banking sector between 2006 and 2016. While a consistent relationship is observed between monetary policy measures and banking profitability given the graphs, the strength of this relationship cannot be used to conclude that a nexus exists between banking profitability and monetary policy. Thus, the graphical measure is too weak and shallow to arrive at such a conclusion, hence a need to employ a more reliable method of analysis.

Literature review
From a theoretical perspective, monetary policy is a critical factor that shapes banking profitability (Kumar *et al.*, 2020; Campmas, 2020; Amidu, 2006). Thus, following the financial intermediation theory or (dealership theory), banks are profit-maximizing economic agents who seek to profit from the financial intermediation process and functions by mainly setting the loan and deposit prices above and below the monetary policy rate set by the central bank (Kusi *et al.*, 2020; Ho and Saunders, 1981). Thus, banks use the monetary policy rate to gauge their loan and deposit prices in order to earn a spread in the intermediation process and functions. Specifically, banks in the deposit market set their deposit prices below the monetary policy rate to earn the spread between the monetary policy rate and their deposit prices (Allen, 1988). However, in the loans market, banks set their loan prices above the
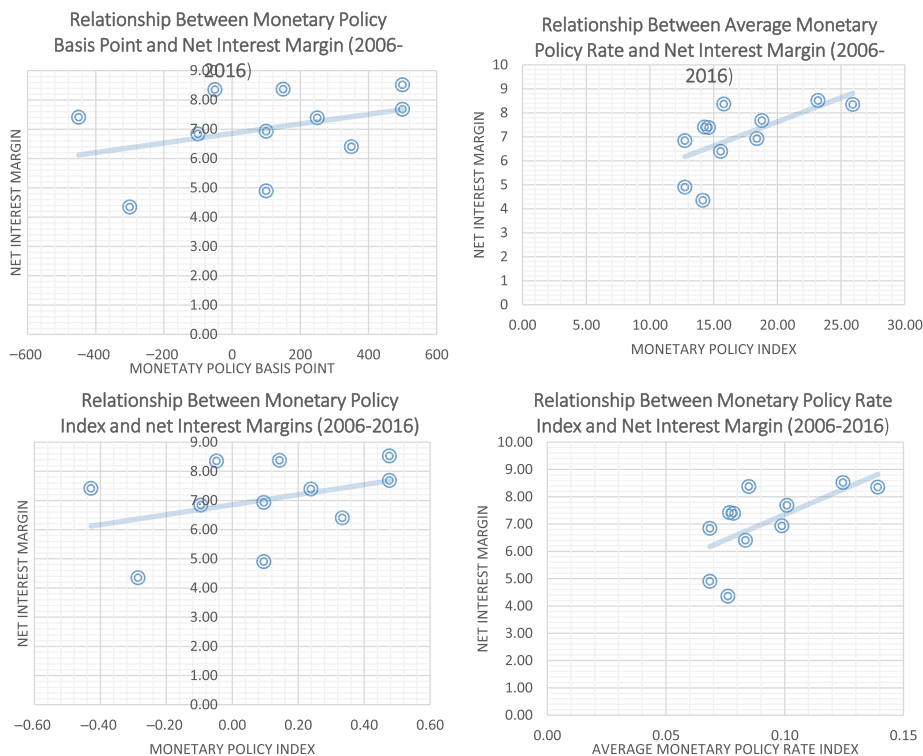
Figure 1.
Trends in monetary
policy measures and
bank profitability in
Ghana (2006–2016)

Relationship Between Monetary Policy
Basis Point and Net Interest Margin (2006-2016)

Relationship Between Average Monetary
Policy Rate and Net Interest Margin (2006-2016)

Relationship Between Monetary Policy
Index and net Interest Margins (2006-2016)

Relationship Between Monetary Policy Rate
Index and Net Interest Margin (2006-2016)

Source(s): Computed by Author based on Information collected from Bank of Ghana Annual Financial Statement

monetary policy rate to earn the spread between their loan prices and monetary prices. This practice of setting and adjustment loan and deposit prices using the monetary policy rate as the reference point enables banks to profit from the financial intermediation process. Hence, this theory suggests a positive relationship between monetary policy and banking profitability. Further interrogation into the monetary policy literature suggests that monetary policy can be classified as either being expansionary or contractionary (Altavilla *et al.*, 2018; Tan *et al.*, 2010; Kishan and Opiela, 2006). Similar to the law of demand, expansionary monetary policy which represents reduction in monetary policy (Fisher, 1933; Hayek, 1939; Kindleberger, 1978) lowers loan prices and causes an increase in the demand for loans. This promotes banking business leading to more borrowing and profitability. On the contrary, contractionary monetary policy which indicates increased in monetary policy increases loan prices and causes a reduction in the demand for loans and hence derails banking business leading to less borrowings and profitability. Hence, while a positive relationship is expected between monetary policy indicators and banking profitability, this study argues that expansionary monetary policies enhance banking profitability more compared to contractionary monetary policies.

From an empirical perspective, a few studies have investigated the nexus between monetary policy and banking profitability. For instance, Kumar *et al.* (2020) investigated the effect of monetary policy on banking profitability using New Zealand banks between 2006

and 2018. Employing a generalized methods of moments (*GMM*) panel of 19 banks from New Zealand, their results show that increasing short-term rate leads to increase in banking profitability, while increase in long-term rates leads to reduction in banking profitability. Hence, the effect of monetary policy on banking profitability is dependent on the monetary policy rate being examined. In addition, capital adequacy, nonperforming loans and cost to income ratios are found to be significant drivers of banking profitability. Likewise, Campmas (2020) examined the effect of European policy interest rates on banking profitability using 445 banks cross 26 European economies between 1999 and 2015. Using a dynamic panel data, the study reveals that monetary policy negatively affects bank profitability. However, lower interest rate which depicts expansionary monetary policy affect net interest margins positively while impacting return on assets and equity negatively.

Furthermore, Zimmermann (2019) examined the effect of monetary policy on banking profitability using 17 economies across different continents between 1970 and 2015. Employing cumulative projection estimation models and country level data, the study shows that monetary policy tightening (contractionary monetary policy) increases both deposit and lending spreads but reduces banking profitability. Interestingly, the variation in spread and profitability is driven by loan losses and contraction in credit growth. Also, the profitability effect of monetary policy is reported to be highly state dependent. Again Borio *et al.* (2017) studied how monetary policy influences banking profitability using 109 international banks in 14 advanced economies between 1995 and 2012. Employing a dynamic generalized method of moments (GMM) model, they find a positive relationship between level of short-term rates and slope of the yield curve on banking profitability measured as return on assets, interest income to total assets and noninterest income to total assets. Additionally, they show that the positive effect is stronger when interest rates are lower and the yield curve is less steep. This is an indication lower interest rate which is an expansionary monetary policy induces banking profitability more.

Similarly, Altavilla *et al.* (2018) analyzed the effect of standard and nonstandard monetary policy on banking profitability using both proprietary and commercial banking data on the euro area. Employing the GMM model of 288 bank quarterly data between 2000 and 2016, they found that monetary policy easing or decrease in short-term interest rate (expansionary monetary policy) and flattening of the yield curve is not associated with lower banking profitability. Additionally, accommodative monetary conditions have varying significant effect on banking profitability. Thus, while accommodative monetary conditions positively influence noninterest income and loan loss provisions, it at the same time reduces net interest margins. Again, protracted period of low monetary rates leads to decline in profitability which is only significant after long periods of low monetary policy rate. Moreover, Aydemir and Ovenc (2016) investigated the effect of short-term interest rate and the slope of yield curve on banking profitability in Turkey between the periods of 2002 and 2014. Using a dynamic panel data of 26 banks, their findings showed that while short-term interest rate and slope of yield curve have a significant derailing effect on profits in the short run, the effect of these monetary policy variables turn out to be positive in the long run. Comparing the sensitivity of profitability of banks in Turkey to banks in UK, they conclude that the profitability of banks in emerging markets is more sensitive to monetary policy rates.

From the theoretical and empirical review, there is evidence of a possible relationship between monetary policy and banking profitability. However, it is observed that majority of the studies reviewed used interest rates (short-term and long-term interest rate) as measures for monetary policy. Similarly, while some find that a positive and negative nexus exists from short-term and long-term monetary policy rates to banking profitability, both positive and negative effects of monetary policy are reported on profitability of banks in the long and short runs, respectively. Again, it is observed from the review that monetary policy easing decisions (expansionary monetary policy decisions) which is monetary policy rate cuts or reduction leads to higher banking profitability but if it persistent for long periods leads to reduction in banking

profitability. Again, following the review, it is observed that studies on monetary policy and banking profitability are focused on European, American and Asian economies and advanced economies, while limited studies focus on Ghana and Africa at large and developing or emerging economies. These results clearly show that the dynamisms between monetary policy and banking profitability are dependent on the measure of monetary and the context of study. In view of this, this present study employs central bank monetary policy rate and basis point changes which are a better reflection of monetary policy compared to interest rate (short term or long term) which are mostly used in the literature. By using central bank monetary policy rate and basis point changes and further developing an index from central bank monetary policy rate and basis point changes, this study offers an improved measure of monetary policy which helps to enhance our understanding on the relationship between monetary policy and banking profitability especially in Ghana, an emerging economy, where there are limited studies on how monetary policy influence banking profitability. Hence, in this study, while the relationship nexus between monetary policy and banking profitability is examined for the first time in Ghana to fill the contextual and empirical gap of how monetary policy decisions influence banking profitability in emerging economies, this is done using new and improved monetary policy measures to examine this relationship in Ghana. Hence, the contribution of this study includes: (1) providing first time evidence on how monetary policy influence banking profitability in Ghana, an emerging economy in Africa; (2) develop monetary policy basis point and rate indexes for the first to examine and enhance our understanding on the nexus between monetary policy indexes and banking profitability; and (3) provide evidence of how expansionary monetary policy (contractionary monetary policy) influences banking profitability in Ghana for the first time.

Methodology and data

This study employs panel data technique to examine the relationship between monetary policy and banking profitability in Ghana using 29 banks between 2006 and 2016. The availability of the data allows us to employ a panel data strategy. Baltagi (2015, 2008) posits that the panel data technique presents more convincing and conclusive results than the traditional cross-sectional and time series techniques as the panel takes advantage of the strengths and corrects for the weaknesses of both time series and cross-sectional technique. Similarly, the panel data present that ability to control for omitted variable and allow for both long- and short-run effect which controls for the weakness of cross-sectional and time series techniques (Imbens and Wooldridge, 2009). Data are obtained from Bank of Ghana. The panel data technique framework is expressed as

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \tag{1}$$

$\varepsilon_{it} = \alpha_i + \gamma_t + e_{it}$: α_i = bank fixed effect γ_t = time fixed effect e_{it} = *idiosyncratic term* where: subscript i denotes the cross sectional dimension (bank) $i = 1 \ldots N$ and t denotes the time series dimension (time), $t = 1 \ldots T$; *Yit* is the dependent variable; α_i is scalar and constant term for all periods (t) and specific to a bank fixed effect (i); γ_t is the time fixed effect t; β is a $k \times 1$ vector of parameters to be estimated on the independent variables for the explanatory variables; X_{it} is a $1 \times k$ vector of observations on the independent variables comprising of independent variables in the model which includes controlled variables and ε_{it} which is iid is the error term.

Empirical data and estimation

The study employs random effect models to estimate the results following standard econometric procedures. Originally, Breusch and Pagan Lagrangian multiplier test

(Appendix 1) is used to justify the selection between ordinary least square (OLS) and random effect model. Given the Breusch and Pagan Lagrangian multiplier test results, there is evidence in favor of using the random effect, while between the random and fixed effect models, the Hausman test (Appendix 2) provides evidence in favor of using the random effect model. Additionally, the study tests for time and technological effects (Appendix 3) and found the need to control for time and technological effects as the results from Appendix 3. Also, controlling for time and technological effects, the cross-sectional dependence observed in Appendix 4 is corrected.

In modeling banking profitability, this study follows Trujillo-Ponce (2013) who investigated factors determining profitability of banks in Spain. Hence, this study adopts his model and modifies it by including monetary policy measures as independent variable of interests. Hence, the modified model is expressed as:

$$NIM_{it} = \beta_0 + \beta_1 MPV_t + \beta_2 FINCRISES_t + \beta_3 ASSET - QUALITY_{it} + \beta_3\ \beta_4 LCAP_{it}$$
$$+ \beta_5 COSTINCOME_{it} + \beta_6 BANKSIZE_{it} + \beta_7 HHI_{it} + \beta_8 DEPO_{it} + \beta_9 LOAN_{it} + \varepsilon_{it}$$

$$(2)$$

Net interest margin (*NIM*) represents banking profitability and is used as the dependent variable. It is measured as the difference between interest income and interest expense scaled over total assets. It is argued that NIM is the best measure for banking profitability since it fully reflects and captures the core financial intermediation functions of banks (Kusi *et al.*, 2020; Ho and Saunders, 1981). Monetary policy variables (*MPV*) are employed as the variable of interest in their study and measured in six different ways other than how prior studies proxy monetary policy. Thus, while prior studies largely employ interest rate (short-term and long-term) to proxy monetary policy (Kumar *et al.*, 2020; Campmas, 2020; Borio *et al.*, 2017; Altavilla *et al.*, 2018; Aydemir and Ovenc, 2016), this study employs central bank monetary rate and basis point changes which are direct and better reflections of monetary policy decisions and outcomes. First, monetary policy basis point changes and average monetary policy rate are obtained from the Bank of Ghana Annual Report. Based on these two monetary policy variables, the study computes monetary policy basis point index and monetary policy rate index, respectively (see Table 2). Thus, monetary policy basis point index (*MPBPINDEX*) is computed as the monetary policy basis point for each year and scaled over the sum of monetary policy basis point for the study period multiplied to one divided by the number of monetary policy committee meetings in the given year. Similarly, average monetary policy rate index (*AMPR*) is computed as the average monetary policy rate for each year and scaled over the sum of average monetary policy rate for the study period. To capture expansionary monetary policy, years in which there is reduction in monetary basis point and average monetary policy rate are captured as years of expansionary monetary policy using a dummy of 1 and 0 otherwise. The study anticipates a positive relationship between monetary policy measures banking profitability following the prior studies (Kumar *et al.*, 2020; Borio *et al.*, 2017). Additionally, the study expects expansionary monetary policy measures to further promote banking profitability following prior studies (Altavilla *et al.*, 2018; Borio *et al.*, 2017).

On the control variables, financial crisis is expected to reduce banking profitability *because* banking businesses which lead to profitability are reduced during crises periods and hence shrink banking profitability. Financial crisis (*FINCRISES*) is captured as a dummy variable which assumes a value of 1 for 2007, 2008 and 2009 global financial crises period (Goddard *et al.*, 2009a, b). Asset quality (*ASSET-QUALITY*) measures provision for operational risk of banking and computed as provision for bad and doubtful loans to total loans and advances. The relationship between asset quality and banking profitability could

be negative or positive. Thus, following the risk-return hypothesis, a direct relationship exists between risk and return (the higher the risk, the higher the return) (Tarus *et al.*, 2012; Athanasoglou *et al.*, 2008; Angbazo, 1997). However, following the accounting procedure of computing profitability, provision for bad and doubtful loans is deducted from income and hence reduces profitability. Hence, the relationship between asset quality and profitability is not straight forward. Capital adequacy (*LCAP*) measured as natural log of total equity is expected to promote banking profitability. Thus, well-capitalized banks have the financial muscle to take up more banking business to generate more profit, hence a positive effect of banking capitalization on profitability (see Ben Naceur and Goaied, 2008; Pasiouras and Kosmidou, 2007; Berger, 1995). Following the accounting and financial preparation of profit and loss account, costs are deducted from revenues generated and hence reduces profitability. Thus, a negative relationship is expected between cost–income ratio and profitability of banks (see Kusi *et al.*, 2017b). The relationship between bank size (*BANK SIZE*) and profitability could be positive or negative following the economies and diseconomies of scale concept (Kusi *et al.*, 2017a, b). Thus, while economies of scale concept argue that there are efficiency gains associated size which helps lower cost and promote profitability, diseconomies of scale argue that larger banks have bureaucratic process, poor supervision and monitoring which leads to poor performance. Hence, the relationship between bank size and profitability is ambiguous. Market concentration (*HHI*) measured with Herfindal–Hischman index. Following the concentration fragility and concentration stability hypothesis, the effect of market structures on banking profitability could be either positive (Kusi *et al.*, 2020; Islam and Nishiyama, 2016; Maudos and De Guevara, 2004) or negative (see De Haan and Poghosyan, 2012; Tarus *et al.*, 2012). Also, the study expects a positive effect of deposits and loans on banking profitability. Thus, banks per the dealership theory are profit maximizers and would only take and advance deposit and loans, respectively, when they are likely to be profitable (Ho and Saunders, 1981; Allen, 1988). The study therefore expects positive effects of deposits and loans on banking profitability. Table 2 summarizes the variables used for this study.

Empirical results and discussions

Table 3 presents the summary statistics and normality of the variables employed in this study. From the summary statistics, outliers which have the possibility to influence the consistency, efficiency and biasedness of coefficients were not observed in the data set. The Shapiro Wilk's normality test is used to test for the normality of the data. Thus, the Shapiro Wilk's test has a null hypothesis of no normal distribution was rejected for all the variables indicating that the variables were all normally distributed around their means. Interestingly, the variations in observations across Tables 3 and 5 are due to the unbalanced nature of the data where not all banks appear for all the years.

Pearson's correlation matrix (Table 4) serves as a mechanism for checking and controlling multicollinearity. Following Kennedy (2008), the study sets the multicollinearity threshold between to independent variables to 0.7. Hence, the results presented in Table 4 show no evidence of multicollinearity.

The main results for this study are reported in Table 5. Six models are reported to establish the effect of monetary policy measures on banking profitability in Ghana between 2006 and 2016. Models 1–3 show how monetary basis point change, index and reduction (expansionary monetary policy) influence banking profitability. Similarly, Models 4–6 show how average monetary policy rate, index and reduction (expansionary monetary policy) influence banking profitability.

Starting with monetary policy basis point change (Model 1), it is observed and reported that increase in monetary policy basis point change leads to reduction in banking

Variable	Obs	Mean	Std. Dev	Min	Max	SWILK
NIM	258	0.07	0.028	0	0.159	1.965[**]
MPBP	269	100.372	295.993	−450	500	1.856[**]
MPBPINDEX	269	0.096	0.282	−0.429	0.476	1.856[**]
AMPRINDEX	269	0.091	0.021	0.068	0.139	7.181[***]
AMPR	269	16.875	3.972	12.75	25.917	7.181[***]
EXPANDMPBP	269	0.123	0.329	0	1	5.182[***]
EXPANDMPR	269	0.394	0.49	0	1	3.105[***]
FINCRISES	269	0.275	0.447	0	1	1.907[**]
ASSETQUALITY	256	0.041	0.083	−0.011	1.203	11.267[***]
LCAP	257	11.506	1.476	8.164	18.315	5.607[***]
COSTINCOME	268	0.637	0.368	0.08	4.145	9.977[***]
BANKSIZE	258	13.336	1.241	9.296	15.895	3.248[***]
HHI	269	0.08	0.02	0.06	0.119	8.280[***]
DEPO	257	0.615	0.191	0	1.771	6.591[***]
LOANS	247	0.687	0.347	0.006	3.824	8.121[***]

Note(s): Significant: [***]$p < 0.01$, [**]$p < 0.05$, [*]$p < 0.1$ – *NIM* (dependent variable), net interest margins; *MPBP*, monetary policy basis point; *MPBPINDEX*, monetary policy basis point index; *EXPANDMPBP*, expansionary monetary policy based on basis point change; *AMPR*, average monetary policy rate; *AMPRINDEX*, monetary policy index based on average policy rate; *EXPANDMPR*, expansionary monetary policy based on monetary policy rate; *FINCRISES*, financial crises; *ASSETQUALITY*, quality of loans; *LCAP*, bank capitalization; *COSTINCOME*, cost efficiency; *BANKSIZE*, size of bank; *HHI*, market structures; *DEPO*, deposits; *LOANS*, loans granted

Table 3.
Descriptive statistics

profitability as expected. This relationship is consistent even when the monetary policy basis point index developed is used (Model 2). From the prior empirical studies (see Campmas, 2020; Zimmermann, 2019), basis point increase depicts monetary policy tightening which leads to increase in loan prices and reduction in demand for loans. This translates into low banking businesses and dealings and hence reduction in banking profitability. Moving on to Models 4 and 5 which show how average monetary policy rate affects banking profitability, the study finds a significant positive relationship between average monetary policy rate and its index on banking profitability which contradicts the earlier finding on monetary policy basis point change. However, this study argues that unlike monetary policy basis point change, banks have the opportunity to adjust their loan and deposit rates or prices to reflect monetary policy rate to their favor and hence a positive effect. Following the study of Aydemir and Ovenc (2016) which shows that in the short run monetary policy derails banking profitability while improving banking profitability in the long run. Similarly, while the monetary policy basis point in the short run reduces profitability of banks, banks' ability to adjust loan and deposit prices to reflect monetary policy rate in the medium to long run ensures monetary policy rate works in their favor. Hence, these two findings are empirical and theoretical sound and consistent. Furthermore, decomposing monetary policy into expansionary monetary policy (see Models 3 and 6), the study shows that expansionary monetary policy through basis point and policy rate reduction induces profitability of the banks. This finding is consistent with prior studies (Borio *et al.*, 2017; Altavilla *et al.*, 2018) and shows that monetary policy easing (expansionary monetary policy) is a mechanism for enhancing banking profitability in Ghana.

On the control variables, financial crisis negatively and significantly impacts banking profitability. This is consistent with literature (see Goddard *et al.*, 2009a, b), given that banking business and dealings during crises reduce leading to less income and profit generation by banks. In terms of asset quality, a positive and significant relationship reported on banking profitability. Thus, provision for bad and doubtful loans boosts banks'

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) NIM	1.000														
(2) MPBP	0.173*	1.000													
(3) MPBPINDEX	0.173*	1.000*	1.000												
(4) AMPRINDEX	0.288*	0.382*	0.382*	1.000											
(5) AMPR	0.288*	0.382*	0.382*	1.000*	1.000										
(6) EXPANDMPBP	-0.215*	-0.286*	-0.286*	-0.177*	-0.177*	1.000									
(7) EXPANDMPR	-0.256*	-0.685*	-0.685*	-0.619*	-0.619*	0.464*	1.000								
(8) FINCRISES	-0.200*	0.175*	0.175*	-0.186*	-0.186*	-0.154*	-0.054	1.000							
(9) ASSETQUALITY	0.146*	-0.067	-0.067	0.046	0.046	-0.019	0.057	-0.060	1.000						
(10) LCAP	0.360*	0.172*	0.172*	0.322*	0.322*	-0.148*	-0.227*	-0.348*	-0.025	1.000					
(11) COSTINCOME	-0.311*	-0.139*	-0.139*	-0.130*	-0.130*	0.199*	0.158*	0.150*	0.006	-0.315*	1.000				
(12) BANKSIZE	0.262*	0.231*	0.231*	0.421*	0.421*	-0.334*	-0.384*	-0.355*	-0.029	0.637*	-0.419*	1.000			
(13) HHI	-0.333*	-0.443*	-0.443*	-0.504*	-0.504*	0.469*	0.619*	0.056	0.075	-0.224*	0.196*	-0.330*	1.000		
(14) DEPO	0.291*	0.011	0.011	0.011	0.011	-0.448*	-0.187*	-0.054	0.364*	0.151*	-0.046	0.251*	-0.110*	1.000	
(15) LOANS	0.002	0.176*	0.176*	0.085	0.085	0.061	-0.047	0.098	-0.105*	0.035	-0.079	0.094	-0.105	-0.374*	1.000

Note(s): Significant: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ – *NIM* (dependent variable), net interest margins; *MPBP*, monetary policy basis point; *MPBPINDEX*, monetary policy basis point index; *EXPANDMPBP*, expansionary monetary policy based on basis point change; *AMPR*, average monetary policy rate; *AMPRINDEX*, monetary policy index based on average policy rate; *EXPANDMPR*, expansionary monetary policy based on monetary policy rate; *FINCRISES*, financial crises; *ASSETQUALITY*, quality of loans; *LCAP*, bank capitalization; *COSTINCOME*, cost efficiency; *BANKSIZE*, size of bank; *HHI*, market structures; *DEPO*, deposits; *LOANS*, loans granted

Table 4.
Pairwise correlations

Variables	(1) NIM	(2) NIM	(3) NIM	(4) NIM	(5) NIM	(6) NIM
	Monetary policy basis point change sample			Average monetary policy rate sample		
MPBP	−3.26e-05** (1.38e-05)					
MPBPINDEX		−0.0343** (0.0145)				
EXPANDMPBP			0.0161** (0.00680)			
AMPR				0.00297** (0.00126)		
AMPRINDEX					0.554** (0.234)	
EXPANDMPR						0.0163** (0.00647)
FINCRISES	−0.0273*** (0.00619)	−0.0273*** (0.00619)	−0.0156*** (0.00558)	−0.00713 (0.00752)	−0.00713 (0.00752)	−0.0316*** (0.00751)
ASSETQUALITY	0.0226*** (0.00833)	0.0226*** (0.00833)	0.0226*** (0.00833)	0.0226*** (0.00833)	0.0226*** (0.00833)	0.0192*** (0.00844)
LCAP	0.00332** (0.00144)	0.00332** (0.00144)	0.00332** (0.00144)	0.00332** (0.00144)	0.00332** (0.00144)	0.00319** (0.00142)
COSTINCOME	−0.0204*** (0.00570)	−0.0204*** (0.00570)	−0.0204*** (0.00570)	−0.0204*** (0.00570)	−0.0204*** (0.00570)	−0.0204*** (0.00585)
BANKSIZE	−0.0138*** (0.00262)	−0.0138*** (0.00262)	−0.0138*** (0.00262)	−0.0138*** (0.00262)	−0.0138*** (0.00262)	−0.0127*** (0.00275)
HHI	−1.331*** (0.264)	−1.331*** (0.264)	−1.146*** (0.205)	−0.352 (0.250)	−0.352 (0.250)	−1.459*** (0.235)
DEPO	0.0317*** (0.00965)	0.0317*** (0.00965)	0.0317*** (0.00965)	0.0317*** (0.00965)	0.0317*** (0.00965)	0.0353*** (0.00972)
LOANS	0.00353 (0.00497)	0.00353 (0.00497)	0.00353 (0.00497)	0.00353 (0.00497)	0.00353 (0.00497)	0.00133 (0.00515)
Constant	0.326*** (0.0579)	0.326*** (0.0579)	0.298*** (0.0520)	0.178*** (0.0561)	0.178*** (0.0561)	0.322*** (0.0570)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	247	247	247	247	247	247
Banks	29	29	29	29	29	29
F-stats	391.02(0.00)	391.02(0.00)	391.02(0.00)	391.02(0.00)	391.02(0.00)	391.02(0.00)
R-squared	0.2743	0.2743	0.2743	0.2743	0.2743	0.2743

Note(s): Robust standard errors in parentheses – Significant* $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ – NIM (dependent variable), net interest margins; MPBP, monetary policy basis point; MPBPINDEX, monetary policy basis point index; EXPANDMPBP, expansionary monetary policy based on basis point change; AMPR, average monetary policy rate; AMPRINDEX, monetary policy index based on average policy rate; EXPANDMPR, expansionary monetary policy based on monetary policy rate; FINCRISES, financial crises; ASSETQUALITY, quality of loans; LCAP, bank capitalization; COSTINCOME, cost efficiency; BANKSIZE, size of bank; HHI, market structures; DEPO, deposits; LOANS, loans granted

Table 5.
Effect of monetary
policy on bank
profitability

motivation to undertake more banking business and dealings. This therefore increases banking profitability and hence a positive effect of asset quality on banking profitability (see Tarus *et al.*, 2012; Athanasoglou *et al.*, 2008). Capitalization has a positive effect on banking profitability as reported in Table 5 and consistent across all the models. Empirical literature suggests (see Ben Naceur and Goaied, 2008; Pasiouras and Kosmidou, 2007) that well-capitalized banks have the financial muscle to undertake riskier but profitable businesses leading to enhanced profitability. Cost to income ratio which depicts operational expenses negatively influence banking profitability (Kusi *et al.*, 2017a, b; Athanasoglou *et al.*, 2008). Following accounting preparation of profits, expenses are deducted from revenues and hence lower realized profits. Herfindal–Hischman index which is used to proxy market structure reports a negative effect on banking profitability implying that concentration in the banking sector reduces banking profitability. This finding follows the concentration–fragility hypothesis (see De Haan and Poghosyan, 2012; Tarus *et al.*, 2012). Deposit is also reported to promote banking profitability and is consistent with prior studies that show that deposit mobilization enables banks to undertake their lending function from which majority of the revenues and profits come from. Hence, the positive effect is expected (see Ho and Saunders, 1981; Allen, 1988).

Conclusions, policy implication and recommendations

Existing literature suggests that monetary policy measures are crucial for the determination of banking profits. Surprisingly, existing literature tends to be focused on Europe, America and Asia, while less is reported on Ghana and Africa at large on this nexus. While Loayza and Pennings (2020) advance that financial structures and systems in emerging economies have different characteristics and less developed, the results obtained from advanced economies may not be applicable to the emerging economy setting. Hence, it has become imperative to investigate how monetary policy measures influence banking profitability in Ghana in order to contextualize his nexus. Again, with Ghana being an emerging economy in Africa that has the potential for growth with many banks from other African economies represented (see Appendix 6), Ghana provides a good case study for studying monetary policy and banking profitability. It is against this background that this study investigates how banking profitability is influenced by monetary policy.

The study obtains data on 29 banks between 2006 and 2016 from Bank of Ghana. This presents a data limitation given that data are not available for more recent years largely due to unavailability of data by the regulator coupled with the COVID-19 situation. Additionally, our results are limited to Ghanaian banking sector. Employing a robust panel random effect model with year effect controls, the results show that increase in monetary policy basis point reduces banking profitability while average monetary policy rate improves banking profitability. While these findings seem to be contradictory, they are consistent with empirical literature. The study explains that increase in monetary policy basis point in the short run serves as monetary policy tightening condition leading to raise in loan prices which translates into reduction in demand for loans and lower profitability. However, unlike monetary policy basis point, banks have the opportunity to adjust their loan and deposit prices in the medium to long run to capture changes in monetary policy rates to their favor. Additionally, considering monetary policy easing (expansionary monetary policy), the study shows that easing monetary policy conditions are conditions for propelling banking profitability in Ghana. These findings are consistent with both theoretical and empirical literature on monetary policy and banking profitability.

These findings have policy implications and recommendations for policy makers, bank managements and researchers. First, bank managers or management may take advantage of monetary policy easing to maximize the gains or profits in the banking sector of Ghana.

Hence, banks must position and equip themselves to absorb the benefits that come with monetary policy easing. Second, the monetary policy committee must be mindful of monetary policy tightening through basis point changes since higher basis point increments reduce banking profitability. Also, researchers may have to replicate this study using a larger and more recent data given that the present study had data challenges. Finally, researchers may have to replicate this study in other economies to confirm or disconfirm how the developed monetary policy indexes are reliable and accurate.

Notes

1. https://new-ndpc-static1.s3.amazonaws.com/CACHES/PUBLICATIONS/2016/09/04/BANK+OF+GH ANA+ACT,+2002+(Act+612).pdf

2. https://www.bog.gov.gh/monetary-policy/the-establishment-of-mpc/

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Appendix 1
Breusch and Pagan Lagrangian multiplier test for random effects
Test: $Var(u) = 0$

chibar2(01) = 119.39.

Prob > chibar2 = 0.0000.

Appendix 2
Hausman (1978) specification test

	Coef
Chi-square test value	6.418
P-value	0.378

Appendix 3

Time and Technological Effects
$F(7, 241) = 2.38$.
   Prob $> F = 0.0228$.

Appendix 4

Pesaran (2015) test for weak cross-sectional dependence
H0: errors are weakly cross-sectional dependent.
   CD $= 3.251$
   p-value $= 0.001$.

Appendix 5

Years	Monetary policy indicator	Meeting 1	Meeting 2	Meeting 3	Meeting 4	Meeting 5	Meeting 6
2006							
	MPR (%)	14.5	14.5	14.5	14.5	14.5	12.5
	MPBPC	−100	0	0	0	0	−200
2007							
	MPR (%)	12.5	12.5	12.5	13.5		
	MPBPC	0	0	0	100		
2008							
	MPR (%)	13.5	14.25	16	17	17	
	MPBPC	0	75	175	100	0	
2009							
	MPR (%)	18.5	18.5	18.5	18.5	18	
	MPBPC	150	0	0	0	−50	
2010							
	MPR (%)	16	15	13.5	13.5	13.5	
	MPBPC	−200	−100	−150	0	0	
2011							
	MPR (%)	13.5	13	12.5	12.5	12.5	12.5
	MPBPC	0	−50	−50	0	0	0
2012							
	MPR (%)	13.5	14.5	15	15	15	
	MPBPC	100	100	50	0	0	
2013							
	MPR (%)	15	16	16	16	16	
	MPBPC	0	100	0	0	0	
2014							
	MPR (%)	18	18	18	19	21	
	MPBPC	200	0	0	100	200	
2015							
	MPR (%)	21	22	22	25	26	
	MPBPC	0	100	0	300	100	
2016							
	MPR (%)	26	26	26	26	26	25.5
	MPBPC	0	0	0	0	0	−50

Table A1.
Trends in monetary policy committee activities in Ghana between 2006 and 2016

Note(s): MPR – monetary policy rate (%); MPBPC – monetary policy basis point change

Appendix 6

Bank		Country of origin
United Bank for Africa	1	Nigeria
First Atlantic Bank	2	Ghana
Standard Chartered Bank	3	United Kingdom
Ecobank Ghana	4	Togo
Zenith Bank Limited	5	Nigeria
Intercontinental Bank of Ghana	6	Ghana
Agricultural Development Bank	7	Ghana
Ghana Commercial Bank	8	Ghana
The Trust Bank	9	Ghana
Société Générale	10	France
UNIBANK Ghana	11	Ghana
STANBIC Bank Ghana	12	South Africa
Barclays Bank Ghana	13	United Kingdom
Republic Bank	14	Trinidad and Tobago
CAL Bank	15	Ghana
National Investment Bank	16	Ghana
OmniBSIC Bank Ghana	17	Ghana
Bank of Baroda	18	India
Unique Trust Bank	19	Ghana
Guarantee Trust Bank	20	Nigeria
Prudential Bank Limitted	21	Ghana
Access Bank Limited	22	Nigeria
Bank of Africa	23	Mali
Universal Merchant Bank Ghana	24	Ghana
International Commercial Bank	25	Nigeria
Fidelity Bank Limited	26	Ghana
Energy Bank Limited	27	Nigeria
The Royal Bank	28	Ghana
First National Bank	29	South Africa

Table A2.
List of Banks

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