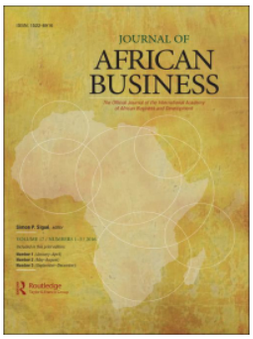

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Bank Ownership Types and Liquidity Creation: Evidence from Ghana

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ABSTRACT

In this study, we examine bank liquidity creation and the effect of ownership types on liquidity creation in Ghana for the first time. The study employs data on 26 banks obtained from Bank of Ghana between 2006 and 2016. Three panel estimation strategies including two-step GMM, Hausman-Taylor and Fixed effect models are employed to arrive at the findings. Employing the narrow liquidity creation computation approach, the results show that average bank liquidity created within the 11-year period consistently increased over the period and reported the highest liquidity created in 2016. Interestingly, when considering bank ownership types, listed, state-owned and foreign-owned banks report the highest average liquidity created compared to their unlisted, privately owned and locally owned counterparts, respectively. Employing regression models, the study finds that foreign and privately owned banks are less likely to create more liquidity compared to their locally and state-owned bank counterparts implying that state-owned and locally owned (domestic) banks create more liquidity. These results imply that while there is much room for creating more liquidity, policy-makers may hasten liquidity creation through locally and state-owned banks and at the same time designing policies that entice foreign and privately owned banks to create more liquidity which is good for economic growth.

KEYWORDS

Liquidity creation; ownership; banks; Ghana

Introduction

Financial institutions perform several critical financial intermediation roles such as asset maturity transformation, matching deficit and surplus spending units, project evaluations, monitoring corporate managers and economic agents (Berger & Bouwman, 2017, 2009; Chio, Park & Ho, 2016, 2013). Of these roles, asset maturity transformation which involves all these stated roles consist of transforming short-term liabilities funds (deposits) into long-term funds (loans) to many small investors and savers who have viable projects (Chio, Park & Ho, 2013). Thus, through the asset transformation role of financial institutions, the financial intermediation process is able to create liquidity on the balance

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sheet of deficit spending units (Berger & Bouwman, 2009; Diamond, 2007, 1984) who have need for immediate financial support to reap off gains for a viable project. On the part of financial institutions especially banking institutions, their asset transformation role which the liquidity creation process is imperatively critical for two major reasons. First, majority of bank's asset portfolios are heavily longer-term maturity assets and if no well managed with short-term liabilities can cause maturity mismatch and bank liquidity crises (Berger & Bouwman, 2017, 2009). Second, many of banks earn a large portion of the income from the asset transformation role (liquidity creation role). Thus, the sustainability of banks largely depends on how well they manage the asset transformation and liquidity creation roles.

In view of the critical nature of liquidity creation in the financial sector of many economies, banking sector literature on liquidity creation is enormous (Berger & Bouwman, 2017; Chatterjee, 2015; Horváth, Seidler, & Weill, 2014; Nguyen, Perera, & Skully, 2017) with huge empirical concentrations in United States, Europe and Asia. While no to little studies report on bank liquidity creation in Africa, studies on bank liquidity creation in the US and Europe have advanced to the point where the liquidity creation role of banks have been identified to predict crises (Berger & Bouwman, 2017; Chatterjee, 2018). Obviously, Africa and for that matter Ghana needs to empirically take stock of bank's effort to create liquidity given that liquidity creation can help boost real sector productivity and economic growth (Assefa & Mollick, 2017; Berger & Sedunov, 2017; Nyasha & Odhiambo, 2017; Taiwo, 2020; Tchamyou, 2019) and tame financial crises (Berger & Bouwman, 2017; Chatterjee, 2018). Additionally, following prior studies (see Meriläinen, 2016; Shen, Chu, & Wang, 2012) that show that ownership types can influence bank decisions, this study attempts to provide first time evidence to the best of our research abilities on the role ownership types play in determining bank liquidity creation in Ghana and Africa at large. That is, comparing state-owned banks to privately owned banks, it is argued that because state-owned banks are more economic growth and development oriented and liquidity creation is a bedrock for economic growth and development, state-owned banks are expected to create more liquidity (see Fungáčová & Weill, 2012). Similarly, following the "home field advantage hypothesis" (Saka, Aboagye, & Gemegah, 2012), local banks are assumed to have a better understanding of the local credit market and hence can create more liquidity compared to foreign banks. Again, arguing that well-capitalized and regulated banks have the financial soundness and resilience to create more liquidity, listed banks which are usually well capitalized and regulated can create more liquidity compared to their unlisted bank counterparts. With these evidences and arguments, there is limited doubts about how bank ownership type influence the ability of banks to create liquidity.

In the light of the above, this study fills the empirical and contextual gaps of scanty studies on bank liquidity creation in Ghana and Africa at large. The study further contributes to liquidity creation in Africa by providing first time evidence to the best of my knowledge on how bank ownership types affect bank liquidity creation. The importance of this study is further heightened by the structural and contextual difference in banking in Ghana where less of such studies have been conducted. Also, banks in Ghana remain a good choice given that the banking sector is fairly dominated by banks from other African countries, reflecting and capturing the different banking orientations and operations represented in banking sector of Africa. The rest of the paper is organized

into overview of liquidity creation, literature review, methodology, empirical results and discussions, Diagnostic and robustness checks and conclusions and policy recommendations.

Overview of liquidity creation in Ghana between 2006 and 2016

In this section, yearly trends in liquidity creation across different bank ownership types are reported in Tables 1 and Tables 2. In computing bank liquidity creation, the study follows Berger and Bouwman (2017, 2009) approach which is detailed in the methodology section. From Table 1, average yearly trends in liquidity created and liquidity created to total assets are presented while Table 2 presents the average liquidity created and liquidity created to total assets by banks across different ownership types. Interestingly, a consistent increase the value of bank liquidity created from 2006 to 2016 except from 2007 to 2008. However, the fall in bank liquidity created between 2007 and 2008 can be attributed the global financial crises which weakened banking intermediation functions across economies. Specifically, bank liquidity created which stood at GHC 184,573,000 in 2006 stands at GHC 849,418,800 in 2016 indicating a period growth in bank liquidity created of 360.21%. Scaling the bank liquidity create by total assets, the study observes an unstable trends in liquidity created ratio. Liquidity created scaled over total assets reports the highest value of 46.15% in 2006 indicating that on the average bank created about 46.15% of assets are liquidity created. Interestingly, 2016 reports the lowest liquidity created to total assets of 24.17% implying that in 2016 bank created liquidity to the tune of 24.17% of their total assets.

TABLE 1 Yearly Trends in Liquidity Creation in Ghana between 2006 and 2016.

Year	Liquidity Created (GHC'000)	Percentage of Liquidity Created (%)
2006	184,573	46.15
2007	224,647.7	43.26
2008	200,534	35.57
2009	217,598.7	32.35
2010	240,769.2	34.04
2011	290,071.6	30.42
2012	426,767.8	32.29
2013	448,856.5	29.33
2014	622;293.7	26.96
2015	801,428.5	30.32
2016	849,418.8	24.17

Source. Computed by Author based on Bank of Ghana Data

TABLE 2 Liquidity Creation Trends across Different Bank Ownership Types between 2006 and 2016.

Year	Liquidity Created (GHC'000)	Liquidity Created to assets (%)
Foreign	405637.2	27.88
Local	392977.4	41.88
Private	389039.9	32.2
State	482359.9	40.33
Unlisted	346308.3	32.12
Listed	525040.3	35.63

Source. Computed by Authors based on Bank of Ghana Data.

In Table 2 where period averages of liquidity created are reported across different bank ownership types, it is evident that listed and state-owned banks reported the highest average liquidity created of GHC 525, 040,300 and GHC 482,359,900, respectively. On the contrary, unlisted banks reports the lowest period average of liquidity created of GHC 346,308,300. Interestingly, local and stated-owned banks reported a period average of liquidity created to total assets of 41% and 40.33% between 2006 and 2016. This is an indication that local and stated-owned banks created liquidity to the tune of 41.88% and 40.33% of their assets as liquidity created between the periods under study. Further details (see Appendix 1) show that state-owned banks created the period lowest and highest liquidity created to total assets of 4. 96% in 2016 and 52.47% in 2007 respectively. Similarly, with the exception of 2013 and 2014 where foreign banks created more liquidity, local banks created more liquidity in all the other years. More so, state-owned banks dominated their privately owned bank counterparts in creating liquidity across the years with the exception in 2015 and 2016. Likewise, listed banks predominantly dominated the unlisted banks counterparts in liquidity creation throughout the sampled period.

From the above, it can be concluded that bank liquidity creation has largely increased over the period under study while locally owned, state-owned and listed banks creating more liquidity in monetary terms compared to the foreign-owned, privately owned and unlisted bank counterparts.

Theoretical literature review: financial intermediation theory and ownership structure theory

Traditionally, the financial intermediation or the dealership theory advance that banks are economic agents who match deficit and surplus spending units by converting short-term and demand deposits from surplus spending units into long-term loans for deficit spending units with the aim of making profit (Allen & Santomero, 1997; Kusi, Dzeha, Gyan, & Turkson, 2020; Williams, 2007). Similarly, the modern theory of financial intermediation argues that banks exist because they perform two central roles in an economy which includes liquidity creation and risk transfer (Berger & Bouwman, 2009; Bhattacharya & Thakor, 1993). From the perspective of these theories, it is obvious that liquidity creation is a fundamental role played by banks in most economies (Bhattacharya & Thakor, 1993) and essential for the real economic sector (see Smith, 1776). Thus, the advancement bank loans, letters of credit, bank guarantees and financial asset discounting activities of increase liquidity created by banks.

Interestingly, to a very large extent bank ownership type or structure according to the theory of ownership structure of firms (Meckling & Jensen, 1976) defines the rights, roles and duties of all stakeholders. Thus, ownership types shapes the long-term, short-term and operational goals of firms and hence ownership types have deterministic influences on the amount of liquidity created by banks. For instance, state-owned banks are owned by governments who are more interested in promoting economic growth and with liquidity creation being a key factor for promoting economic growth, state-owned banks create more liquidity compared to their foreign bank counterparts (see Fungáčová & Weill, 2012; Yeddou & Pourroy, 2020). Additionally, following the literature on "home field advantage hypothesis" which posits that local banks have better

appreciation and insights of the dynamics in the credit market and hence outperform foreign banks, it is expected that local banks may create more liquidity compared to foreign banks. Again, listed banks which are usually well capitalized and regulated can create more liquidity compared to their unlisted bank counterparts' because they are well capitalized and regulated compared to their unlisted bank counterparts. These theoretical evidences and arguments show the relevance and implications of ownership types on bank liquidity and leaving less room for doubts about a possible nexus between ownership types and bank liquidity creation.

Empirical literature review

In the light of empirical studies, several studies have examined liquidity creation mostly in Europe and American while liquidity creation studies in Ghana for that matter Africa remains limited and scanty. Hence, this study discusses empirical studies on liquidity creation based on continental evidences. First, Berger and Bouwman (2009) developed a comprehensive measure for bank liquidity creation using US banks that existed between 1993 and 2003. After constructing the liquidity creation measures, they report that liquidity created by banks increased every year and exceeded 2.8 USD trillion by the end of 2003. Also, they find that large, multibank holding company members, retail and recently merged banks created the most liquidity while bank liquidity creation positively induced bank value. However, they find that the relationship between liquidity creation and capital is positive for large banks but negative for small banks respectively. As well, Chatterjee (2015) investigates how monetary policy transmission channels and liquidity creation relates using data from the US economy. Four key results are presented as follows. First, asset liquidity and credit-spreads explain aggregate bank liquidity creation especially for large banks. Second, stock market liquidity rather (than credit-spread and Treasury bond market liquidity) has robust and higher effect on aggregate liquidity creation. Third, while short-term off-the -run Treasury bond market liquidity has higher impact on on-balance sheet liquidity creation, stock market liquidity better explains off-balance sheet liquidity creation. Finally, federal funds rate as proxy for monetary policy affects the liquidity creation of smaller banks compared to large banks.

Likewise, Tran, Lin, and Nguyen (2016) studied the interrelationships among liquidity creation, regulatory capital and bank profitability of US banks. Their results show that regulatory capital and liquidity creation affect each other positively when profitability is controlled for. Indeed the positive effect is largely driven by small banks and non-crisis periods. Furthermore, banks that create more liquidity have lower profitability. Also, they report that the effect of the link between regulatory capital and bank performance is not monotonic and depends on level capitalization. Finally, the show that regulatory capital is negatively related to bank profitability for well-capitalized banks but positive for lower capitalized banks. Moreover, Díaz and Huang (2017) investigated the effect of internal bank governance on bank liquidity creation in the US. Employing bank level data cover the global financial crises period (2007–2009), they analyzed whether better-governed banks created more liquidity. Findings show that better-governed banks created more liquidity but significant for only large banks holding companies. Again, particular governance internal category including CEO education, compensation structure,

progressive practices and ownership have significant positive effect on bank liquidity creation and usually visible for large banks and during the crises.

Similarly, Berger and Bouwman (2017) investigated the interplay among bank liquidity creation, monetary policy and financial crises using banks in the US. Their results show that high off-balance sheet liquidity creation helps predict crises while monetary policy has statistically significant but economically minor effects on liquidity creation by small banks in normal times and these effects are even weakened during financial crises period. Interestingly, monetary policy has very little effects on medium and large bank liquidity creation during both normal and financial crises period. Later, Jiang, Levine, and Lin (2019) examined the effect of competition on liquidity creation. Motivated by the lack of consensus on the impact of competition on liquidity creation in the USA, they find that regulatory-induced competition reduces liquidity creation. Similarly, banks pushed toward insolvency reduce risk-taking activities implying that regulatory-induced competition reduces liquidity creation more among banks with less risk-absorbing capacity. More recently, Tran (2020a) examined bank liquidity creation while focusing on how functional diversification affect liquidity creation. Employing a large US bank panel data between 2001 and 2015, their study shows that higher levels diversification leads to lower liquidity creation. The negative effect of diversification on liquidity creation is more pronounced for large banks but less pronounced for small banks. Also, during crises the negative effect of diversification on liquidity creation is lower but more for small-sized and medium-sized banks.

In the context of Europe, Fungáčová and Weill (2012) analyzed the bank liquidity creation in the Russian economy using a panel of Russian banks between the periods of 1999 to 2009. Their findings show that liquidity creation increased over the period. Interestingly, state-owned and large banks contributed most to liquidity created in Russia. More so, Horváth et al. (2014) examined the impact of capital and liquidity creation using Czech banks between 2000 and 2010. Employing quarterly bank level data, the study perform Granger-causality test in a GMM panel model which shows a strong expansion in liquidity creation prior to the global financial crises which is mainly driven by large banks. The results show that capital negatively Granger-causes a liquidity creation in a financial sector that is dominated by small banks. Interestingly, the study again observed that liquidity creation granger-causes a reduction in capital while bank liquidity creation can reduce bank solvency. Additionally, Horvath, Seidler, and Weill (2016) again evaluated the effect of competition on liquidity creation in the Czech Republican banking sector between 202 and 2010. Employing a dynamic panel GMM estimation model, the results show that enhanced competition reduces liquidity creation. The results imply that increased competition promotes financial fragility leading to reduced financial intermediation activities (lending and deposit activities). Their findings imply that pro-competitive policies in the banking sector can reduce liquidity creation. Furthermore, Berger, Bouwman, Kick, and Schaeck (2016) examined the effects of regulatory interventions and capital injections on liquidity creation using German universal banks for the period of 1999 to 2008. Their results show that regulatory interventions and capital injections are followed by lower liquidity creation. Thus, the introduction of regulatory and capital injections can reduce liquidity creation up to about 50%. Furthermore, bank risk taking decreases in the aftermath of regulatory

interventions and capital injections while bank liquidity creation market shares declines over five years following such disciplinary measures.

In Asia, Lei and Song (2013) investigate the nexus between liquidity creation and capital structure of banks in China. Testing the "financial fragility-crowding out" hypothesis and the "risk absorption" hypothesis in the bank sector of China, their results show that increased bank capital caused a reduction in bank liquidity creation which is in line with the "financial fragility-crowding out" hypothesis. On the contrary, they find that foreign banks in China have a weaker nexus between liquidity creation and bank capital which is also consistent with the "risk absorption" hypothesis. Interestingly, Berger, Boubakri, Guedhami, and Li (2019) analyzed bank liquidity creation and financial stability in Islamic banking banks and conventional banks across 24 economies between 2000 and 2014. Their findings show that Islamic banks create more liquidity compared to their conventional banks counterparts on the assets side of the balance sheet. This result holds for banks in high and low-income economies and during the global financial crises. Interestingly, while conventional bank liquidity creation reduces financial stability especially in high-income economies, Islamic bank liquidity creation does not.

Brief hypothesis development

From the theoretical and empirical reviews, two key gaps are identified. These gaps include (i) lack of empirical studies on bank liquidity creation in Ghana and Africa and (ii) limited studies on how ownership types influence liquidity creation especially in emerging economies. Given these gaps identified, this study hypothesizes that banks in Ghana, an emerging economy in Africa, banks are liquidity creators than liquidity de-creators. Again, the study hypothesizes that bank ownership types have implications for bank liquidity creation. Following the above arguments, the null hypotheses of are stated as follows:

H_1: Banks in Ghana are liquidity de-creators (Banks in Ghana do not create liquidity).

H_2: Bank ownership types have no effects on bank liquidity creation in Ghana.

Methodology

This study employs examines the effect of ownership types on bank liquidity creation in Ghana. The study employs twenty-seven (27) (see Appendix 7) in a panel form covering periods between 2006 and 2016. Baltagi (2015) 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 allows for both long and short-run effect which controls for the weakness of cross-sectional and time series techniques. Data are obtained from Bank of Ghana. The panel data technique framework is expressed as

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \quad (1)$$

where: subscript i denotes the cross sectional dimension (bank) i = 1 . . . *N* and t denotes the time series dimension (time), t = 1 . . . 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* × 1 vector of parameters to be estimated on the independent variables for the explanatory variables; *Xit is a 1* × k vector of observations on the independent variables comprising of independent variables in the model which includes controlled variables and *εit* which is iid is the error term. The study employs two-step dynamic GMM, Hausman Taylor and robust fixed effect models to estimate the results. Employing the two-step GMM technique to correct for endogeneity resulting from omitted variable biases and to control for autocorrelation and heteroscedasticity, the Hausman Taylor model is employed in place of the fixed effect model to avoid the elimination or dropping of the dummy fixed effect variables (foreign and unlisted) which are part of the variables of interest. The GMM structure is modeled as follows:

$$Y_{i,t} = \alpha Y_{i,t-1} + Z_{i,t} + \beta X_{i,t} + \varepsilon_{i,t} \tag{2}$$

where **Y** is the dependent variable and represents bank liquidity creation, **Z** is the variable of interest and represents different ownership types, **X** is a range of additional factors that are established to influence liquidity creation in the banking literature, α, Φ and β are coefficients representing the responsiveness of the respective variables and ε is the error term variables. Also, the Hausman Taylor structure is expressed as

$$y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \mathbf{\Omega}_1 Z_{1it} + \mathbf{\Omega}_2 Z_{2it} + u_i + v_{it} \tag{3}$$

where X_{1it} is a 1x k_2 vector of exogeneous, time-varying variables assumed to be uncorrelated with u_i v_{it}, X_{2it} is a 1x k_2 vector of endogenous, time-varying variables assumed to be correlated with u_i but not v_{it}, Z_{1it} is a 1x g_1 vector of exogenous, time-invariant variables assumed to be uncorrelated with u_i and v_{it}, Z_{1it} is a 1x g_1 vector of endogeneous, time-invariant variables assumed to be correlated with u_i but not v_{it}, u_i is the time invariant component of the error term and, v_{it} is the idiosyncratic term.

Contextualizing the modeling of liquidity creation, a number of prior studies (Berger & Bouwman, 2009; Horvath et al., 2016) are followed to arrive at the GMM and Hausman Taylor models in Equations (4) and (5), respectively:

$$\begin{aligned} BLC_{ij,t} = {} & \beta_0 + \beta_1 BLC_{i,t-1} + \beta_2 BOT_i + \beta_3 SFY_{i,t} + \beta_4 LCAP_{i,t} + \beta_5 CRISK_{i,t} \\ & + \beta_6 ROAZSCORE_{t,j} + \beta_7 ROASTD_{i,t+}\beta_8 SISE_{i,t} + \beta_9 HHI_t + \varepsilon_{\mathbf{i,t}} \end{aligned} \tag{4}$$

$$\begin{aligned} BLC_{ij,t} = {} & \beta_0 + \beta_1 BOT_i + \beta_2 SFY_{i,t} + \beta_3 LCAP_{i,t} + \beta_4 CRISK_{i,t} + \beta_5 ROAZSCROE_{i,t} \\ & + \beta_6 ROASTD_{i,t} + \beta_7 SIZE_{i,t+}\beta_8 HHI_t + \varepsilon_{\mathbf{i,t}} \end{aligned} \tag{5}$$

Models 4 and 5 stated above represent the dynamic GMM and Hausman Taylor (Fixed effect models, respectively. In simply terms the models show that bank liquidity creation (BLC) is determined by the previous year bank liquidity created ($BLC_{i,t-1}$ – in Model 2 only), bank ownership types (BOT – foreign, private and unlisted), search for year (SFY), capital adequacy (LCAP), bank credit risk (CRISK), financial stability (ROAZSCORE), earning stability (ROASTD), bank size (SIZE), market competition (HHI) and the error term ($\boldsymbol{\varepsilon_{i,t}}$). These variables explained and summarized in Table 3.

TABLE 3 Summary Variables Employed.

Symbols	Names	Measurements	Expected Signs
BLC	Bank Liquidity Creation	Berger and Bouwman (2009) Approach	
FOREIGN	Foreign-Owned Banks	Dummy which assumes a value of 1 if a bank has its headquarters outside Ghana and 0 otherwise	-
PRIVATE	Privately-Owned Banks	Dummy which assumes a value of 1 if majority of a bank shares are owned by private entities and 0 otherwise	-
UNLISTED	Publicly unlisted Bank	Dummy which assumes a value of 1 if a bank is not listed on the Ghana Stock Exchange market and 0 otherwise	+
SFY	Search for Yield	Interest income minus interest expense scaled over total assets	+
LCAP	Capital Adequacy	Natural log of equity	-
CRISK	Credit Risk	Nonperforming loans scaled over loans and advances	-
ROAZSCORE	Financial Stability	Capital Adequacy plus Return on Assets scaled over standard deviation of Return on Assets	-
ROASTD	Earning Instability	Changes in return on assets	-
SIZE	Bank Size	Natural log of total assets	+
HHI	Market Structure	Herfindal Hirschman Index Approcah	-/+

Variable selection and definition

Bank liquidity creation

Bank liquidity creation is employed as dependent variable in the study. In the computation of bank liquidity creation, the study follows the approach of Berger and Bouwman (2009). For this approach, liquidity creation is computed as a function of assets (A), liabilities (L) and shareholder equity (S) and modeled as:

$$LC_{i,t} = w_a A_{i,t} + w_l L_{i,t} + w_s S_{i,t} \tag{6}$$

In the case of assets and liabilities, they are further classified into liquid, semi-liquid and illiquid while shareholder equity solely classified as illiquid. Expanding Equation (4) to capture liquid, semi-liquid and illiquid assets, liabilities and shareholder equity with weights (w), the expanded equation is written as:

$$\begin{aligned} LC_{i,t} = [&(-0.5 * liquidassets) + (0.5 * illiquidasets) + (0 * semi - liquidassets) \\ &+ (-0.5 * liquidliabilities) + (0.5 * illiquidliabilities) \\ &+ (0 * semi - liquidliabilities) + (-0.5 * illiquidsurplus)] \end{aligned} \tag{7}$$

Where i and t represent insurer and year respectively; LC represents liquidity creation; A, L and S are assets, liabilities and surplus respectively; w_a and w_l are the weights assigned to liquid and illiquid assets and liabilities respectively; w_s is the weight assigned to surplus. Positive values for LC will reflect liquid creation while negative values denote the de-creation of liquidity. While liquid assets and liabilities are assigned −0.5 weights, illiquid assets and liabilities are assigned 0.5 weights respectively. In the case of illiquid shareholder equity the weight assigned is −0.5. Semi-liquid assets and liabilities are assign

a 0 weights. See Appendix 2 for items classified under each of the liquid, illiquid and semi-liquid assets, liabilities and shareholder equity.

Bank ownership types (BOT)

Bank ownership types measures the ownership structure of banks in Ghana. For the purpose of the study, foreign-owned (locally owned), privately owned (state-owned) and unlisted (publicly owned) ownership structures are used. These are captured using dummies variables which assumes a value of 1 if the bank in question has it parent company outside Ghana, if the majority of shares are owned to private entities and if the bank in question is not listed on the Ghana Stock Exchange (GSE) market and 0 otherwise, respectively.

In case of foreign banks, it is expected that they will create less liquidity compared to local banks. The study argues that foreign banks may lack an understanding of the dynamics of local banking sector and hence, repress their liquidity creation prowess. Alternatively, banking participants which majority are local people may feel more comfortable accessing credit facilities from local banks; leading to foreign bank creating less liquidity. In the case of privatelyowned banks, privately owned banks are expected to create less liquidity compared to state-owned banks. The argument is that while liquidity creation promotes real economic output and economic growth (Berger & Sedunov, 2017; Nguyen et al., 2017) and promoting economic growth is at the heart of most state-owned firms, state-owned banks more likely to create more liquidity compared to privately owned banks. Under unlisted ownership types, unlisted banks are expected to create less liquidity compare to listed banks. The study argues that listed banks are well capitalized and more visible compared to unlisted banks. These features enable listed banks to create more liquidity compared to unlisted banks.

Search for yield

Following the financial intermediation theory (Kusi, Agbloyor, Gyeke-Dako & Asongu, 2020; Ho & Saunders, 1981), the performance of financial intermediation function is largely motivated by profits or gain maximization. Thus, banking profitability measured with net interest margin (**SPREAD**) influences the liquidity creation function of banks. Profitability measured with net interest margin measures the extent to which banks gain from the financial intermediation process. The computation for NIM is the ratio interest income minus interest to total assets. Following the intermediation theory, profitability should promote bank lending given that majority of bank earnings come as a result of creating liquidity

Bank capital adequacy

Bank capital adequacy (LCAP) measures the risk absorption capacity of a bank and measured as natural log of total equity. Since capital adequacy acts as buffer funds used for soaking banking shocks and losses, it reduces banks' ability to create more liquidity through credit advancement. This is because capital adequacy funds are kept with the central bank and not utilized until banks face distress in their operations and dealings. This tired down capital with the central bank reduces the available funds at the banks

disposal to advance as loans. Hence, this limits the ability and funds available to banks to create more liquidity and hence a negative relationship between capital adequacy and liquidity creation (see Berger & Bouwman, 2009; Berger et al., 2016).

Bank credit risk

Bank credit risk (CRISK) represents undesirable outputs that arise from the financial intermediation process. It is measure as nonperforming loans to total loans. Increase in bank credit risk requires banks to set aside funds to take care of it and hence limiting the funds available for banks to advance more credit to create liquidity. Therefore, a negative nexus between bank credit risk and liquidity created (Berger & Bouwman, 2009; Horvath et al., 2016).

Financial stability

Financial stability (ROAZSCORE) is measure with Z-Score and captures the distance a bank is away from financial distress. It is measured as the natural log of capital adequacy plus return on assets scaled over standard deviation of return on assets. The expectation is that financially stable banks should have the financial muscle to take on more financial intermediation functions to create more liquidity. This leads to more banking business and dealings which increases liquidity creation by banks and hence a positive relationship between financial stability and liquidity creation (Berger & Bouwman, 2017, 2009).

Earning stability

Earning stability (ROASTD) measures the consistency or risk in the profitability of banks. It is measured as the standard deviation in return on assets. With higher values indicating instability in earnings, a negative nexus is expected given that instability in earnings reduces the confidence of banks in the lending and liquidity creation process (Berger & Bouwman, 2017, 2009). Thus, increased earning instability should reduce liquidity creation.

Size

Bank size (**SIZE**) measures the size of the bank assets and it is measured as the natural log of total assets. Following accounting and finance literature the total assets of a firms signifies the financial value of firm. Following the economies of scale and scope literature, there are efficiency gains and benefits associated with size and hence should increase banks' ability to advance more loans. Thus, the study expects a positive effect of bank size on liquidity creation following prior studies (see Horváth et al., 2014; Petersen & Rajan, 1995). However, a negative relationship may exist between size and bank lending because large bank are faced with dis-economies of scale leading to bureaucratic tendencies. This tend to reduce speed and volumes of loans bank can advance.

Herfindal Hirschman index

Herfindal Hirschman index (HHI) measures banking market concentration and show the structure of the banking sector. Following the concentration-stability and concentration-fragility literature, the effect of market concentration could be either positive or negative. However, following prior studies (Berger & Bouwman, 2009; Horvath et al., 2016; Horváth et al., 2014) that report a positive nexus between HHI and liquidity creation. However, the relationship between liquidity creation and bank market concentration is not straight forward and ambiguous.

Results and empirical discussions

This section presents the descriptive statistics, pairwise correlation matrix and the main estimation models. Table 4 presents the descriptive statistics of all variables which is employed to screen for outliers. However, no evidence of outliers are observed within the dataset. Table 4 again presents Variance Inflation Factor (VIF) which tests for the acceptability of each variable in the model in conjunction with the correlation matrix. Given the maximum VIF threshold of 10 (Wooldridge, 2009) and the Pearson's Correlation threshold (Table 5) of 0.7 (Kennedy, 2008), no evidence of multicollinearity is reported.

TABLE 4 Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max	VIF
BLC	245	.332	.242	−.995	1.195	
FOREIGN	269	.617	.487	0	1	1.45
PRIVATE	269	.87	.337	0	1	1.49
UNLISTED	269	.699	.46	0	1	1.18
SFY	258	.07	.028	0	.159	1.61
LCAP	257	11.506	1.476	8.164	18.315	6.07
CRISK	256	.041	.083	−.011	1.203	1.11
ROAZSCORE	200	22.963	38.762	−.779	425.37	1.46
ROASTD	201	.018	.014	0	.092	1.64
SIZE	258	13.336	1.241	9.296	15.895	5.48
HHI	269	.08	.02	.06	.119	1.11

Note. **Significance level** – * (10%, ** (5%) & *** (1%) – Note: bank ownership types (BOT – **foreign, private and unlisted**), search for year (**SFY**), capital adequacy (**LCAP**), bank credit risk (**CRISK**), financial stability **(ROAZSCORE)**, earning stability **(ROASTD)**, bank size (**SIZE**), market competition (**HHI**).

TABLE 5 Pairwise Correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) BLC	1.000										
(2) SFY	−0.070	1.000									
(3) FOREIGN	−0.28*	0.017	1.000								
(4) PRIVATE	−0.11*	−0.11*	0.491*	1.000							
(5) UNLISTED	−0.067	−0.27*	0.133*	0.204*	1.000						
(6) LCAP	−0.008	0.360*	−0.071	−0.90*	−0.21*	1.000					
(7) CRISK	0.031	0.146*	−0.050	−0.026	0.070	−0.025	1.000				
(8) ROAZSCORE	−0.046	0.013	0.026	0.110	0.025	0.138*	0.003	1.000			
(9) ROASTD	−0.058	0.168*	0.045	−0.039	−0.023	−0.23*	0.132*	−0.39*	1.000		
(10) SIZE	0.221*	0.262*	−0.059	−0.23*	−0.21*	0.637*	−0.029	0.086	−0.33*	1.000	
(11) HHI	0.144*	−0.33*	−0.058	−0.039	0.003	−0.22*	0.075	−0.008	0.076	−0.33*	1

*Note. **Significance level** – * $p < 0.1$.*

From Table 6, the main results for this study is presented. In the Table, there are eight (8) models. Models 1–4 are two-step dynamic model results while Models 5–8 are fixed and Hausman-Taylor model results. Specifically, Models 5 and 7 are fixed effect regression results while 6 and 8 are Hausman-Taylor regression results. The Hausman-Taylor models are used because of the omission of the foreign and unlisted dummy variables while the two-step dynamic GMM models are used to control for possible endogeneity resulting from omitted variable biases in our estimated models.

From the results, the study finds that bank ownership types are relevant in determining bank liquidity creation in Ghana. Specifically in Models 2 and 6, foreign-owned banks are reported to less likely create liquidity compared to their local (domestic) banks counterparts. The argument for this result is that foreign banks may lack a comprehensive understanding of the dynamics of local banking sector compared to local banks and hence reduce their (foreign-owned banks) lending and liquidity creation potentials to safe guard their assets and reduce credit risk. Argued from the savers and depositor perspective, banking participants (savers and borrowers) for which majority are local people may be more incline and comfortable accessing credit from local banks; leading to foreign bank creating less liquidity. This finding is consistent with the finding prior studies (Fungáčová & Weill, 2012) that show that foreign banks are less likely to create liquidity compared to its local bank counterparts.

In the case of privately owned banks, a similar result reported (Model 7) where privately owned banks are reported to create less liquidity compared to state-owned banks. This finding is not surprising given that liquidity creation is a prerequisite to economic growth (Berger & Sedunov, 2017; Nguyen et al., 2017) which is also at the heart of most state-owned firms including banks. By this state-owned banks are in the position to create more liquidity compared to privately owned banks; hence likelihood that privately owned banks create less liquidity. However, in the case of unlisted banks, no significant relationship between unlisted bank ownership type and liquidity creation in Ghana.

On the control variables, bank search for yield which is an indication bank appetite for profitability is positively related to liquidity creation (see Models 1–4, 6 and 8). This finding confirms the financial intermediation theory which states that profit maximization objective precedes financial intermediation activities including liquidity creation. Also, bank capital adequacy is reported to be reduce liquidity creation across all the models (1–8) as reported in prior studies (Horváth et al., 2014). This confirms the "financial fragility-crowding out" hypothesis that show that increasing capital adequacy of banks causes a reduction in liquidity creation. However, bank size is reported to have a positive effect liquidity creation (Models 1–8) implying that as the size of banks increase, they liquidity creation ability is enhanced. Indeed large banks have the financial muscles to create more liquidity and this is confirmed in the study of Fungáčová and Weill (2012).

Diagnostic and robustness checks

In this study a number of steps are taken to ensure results are robust and reliable. First outliers which have the potential to bias the results are screened for using Table 4 and no evidence of outliers were detected. Also, multicollinearity is screened for using the Table

TABLE 6 Effect of Bank Ownership Types on Liquidity Creation in Ghana between 2006 and 2016.

	TWO-STEP GMM				Fixed Effect/Hausman Taylor			
VARIABLES	Baseline	Foreign	Private	Unlisted	Baseline	Foreign	Private	Unlisted
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L. BLC	0.597***	0.564**	0.593***	0.579**				
	(0.201)	(0.218)	(0.206)	(0.209)				
FOREIGN		−0.0737*				−0.123**		
		(0.0426)				(0.0567)		
PRIVATE			−0.0345				−0.478***	
			(0.0406)				(0.0218)	
UNLISTED				−0.0115				−0.0301
				(0.0324)				(0.0663)
SFY	1.043**	1.071**	1.005*	1.030*	1.405	1.277**	1.215	1.293**
	(0.498)	(0.483)	(0.509)	(0.513)	(1.361)	(0.531)	(1.349)	(0.538)
LCAP	−0.078***	−0.077***	−0.077***	−0.080***	−0.105***	−0.108***	−0.107***	−0.111***
	(0.0227)	(0.0209)	(0.0224)	(0.0242)	(0.0345)	(0.0260)	(0.0353)	(0.0260)
CRISK	−0.123	−0.131	−0.127	−0.119	−0.124	−0.117	−0.142	−0.112
	(0.0882)	(0.0842)	(0.0930)	(0.0866)	(0.0885)	(0.102)	(0.108)	(0.102)
ROAZSCORE	−0.000212	−0.000229	−0.000181	−0.000202	−0.000232	−0.000256	−0.000144	−0.000237
	(0.000441)	(0.000401)	(0.000437)	(0.000445)	(0.000386)	(0.000421)	(0.000353)	(0.000423)
ROASTD	0.152	0.121	0.142	0.107	0.611	0.325	1.225	0.338
	(0.835)	(0.768)	(0.861)	(0.843)	(1.126)	(0.895)	(0.882)	(0.905)
SIZE	0.0765**	0.0736**	0.0740**	0.0776**	0.0853**	0.0917***	0.0945***	0.0925***
	(0.0304)	(0.0284)	(0.0304)	(0.0320)	(0.0343)	(0.0279)	(0.0334)	(0.0281)
HHI	0.574	0.543	0.564	0.598	0.0810	0.142	0.0455	0.127
	(0.544)	(0.548)	(0.547)	(0.545)	(0.511)	(0.545)	(0.489)	(0.548)
Constant	−0.119	−0.0392	−0.0629	−0.101	0.287	0.317	0.604***	0.281
	(0.181)	(0.184)	(0.208)	(0.187)	(0.229)	(0.201)	(0.201)	(0.210)
Observations	184	184	184	184	190	190	190	190
Banks	27	27	27	27	27	27	27	27
R-squared					0.126		0.196	
AR(1)	−2.65(0.01)	−2.43(0.02)	−2.61(0.01)	−2.58(0.01)				
AR(2)	−0.59(0.55)	−0.63(0.53)	−0.60(0.55)	−0.58(0.56)				
Instrument	18	19	19	19				
Hansen	10.19(0.34)	10.30(0.33)	10.27(0.33)	10.37(0.32))				
Sargan-Hansen						2.984(0.703)		3.745(0.587)

Note. ***Significance level*** *-)*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$–*Note: bank ownership types (BOT –* ***foreign, private and unlisted****), search for year (****SFY****), capital adequacy (****LCAP****), bank credit risk (****CRISK****), financial stability (****ROAZSCORE****), earning stability (****ROASTD****), bank size (****SIZE****), market competition (****HHI****).*

5 (Pearson's Correlation) and Variance Inflation Factor (VIF). Following a multicollinearity threshold of 0.7 (see Kennedy, 2008), there is was no evidence of multicollinearity. In the selection of the appropriate models, the results of the Breusch and Pagan Lagrangian multiplier test (Appendix 3) provided evidence in support of using generalized least squares (GLS) at the initial stages while the Hausman test (Appendix 4) provided evidence in favor of using the fixed effect model. However, to control for the presence of autocorrelation (Appendix 5), heteroscedasticity (see Appendix 6) and endogeneity are controlled for by the use of two-step dynamic GMM and Hausman-Taylor models. Given the above, the findings are robust and fit for generalization in the Ghanaian banking sector.

Conclusions, policy implications and recommendations

In this study, evidence of how bank ownership types influence liquidity creation in Ghana is reported using twenty-six banks between 2006 and 2016. To provide this evidence, the study follows Berger and Bouwman (2009) approach of computing liquidity creation and employed two-step GMM, fixed effect and Hausman-Taylor models to arrive at results. In all twenty-six banks are used in this study.

Overall, the study finds that liquidity created in 2016 was GHC 849,418,800 and the highest for the period under study. Interestingly, listed, state-owned and foreign-owned banks report the highest average liquidity created of GHC 525,040,300, GHC 482,359,900 and GHC 405,637,200 respectively compared to their unlisted, privately owned and locally owned counterparts. From the results, local and stated owned banks are inferred to be more likely to create more liquidity compared to their foreign and privately owned bank counterparts. Also, bank search for yield and size are found to promote liquidity creation while capital adequacy is found to hurt liquidity creation.

The implication of these findings are that while bank ownership types are relevant in determining liquidity created by banks, regulators and policymakers interesting in promoting liquidity creation in Ghana can rely on locally and state owned banks to do so. Typically, these ownership types possess some important features which enable them create more liquidity creation. Similarly, while the management of foreign and privately owned banks may have learn from the local and state owned banks in the quest to enhance their liquidity creation potentials, policymakers may have to design policy that entice foreign and privately owned banks to create more liquidity for effective economic growth agenda. For the purpose of future research direction, investigating how different regulatory measures and policies have impacted liquidity creation will be interest to inform policy formation and design.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendices

APPENDIX 1: Detailed Liquidity Created to Total Assets

Years	Full Sample(%)	Foreign(%)	Local(%)	Private(%)	State(%)	Unlisted(%)	Listed(%)
2006	46.15	49.95	41.6	46.19	45.9	50.25	37.37
2007	43.26	39.64	47.25	41.73	52.47	42.1	45.6
2008	35.57	25.26	48.97	33.01	52.59	35.13	36.38
2009	32.35	21.59	46.05	29.97	44.87	28.19	41.2
2010	34.04	27.6	43.06	32.52	44.64	32.26	38.37
2011	30.42	22.1	46.02	27.4	50.53	28.73	35.22
2012	32.29	27.64	40.93	31.87	34.67	31.61	33.55
2013	29.33	27.66	32.25	29.25	29.82	26.23	35.55
2014	26.96	22.69	37.33	27.41	22.02	26.6	28.03
2015	30.32	26.93	37.61	30.87	24.83	29.8	31.72
2016	24.17	22.67	28.39	25.24	4.96	23.9	24.77

APPENDIX 2: Classifications of Bank Balance Sheet Items

Assets		
Il liquid (weight = 0.5)	**Semi-Liquid (weight = 0)**	**Liquid (weight = −0.5)**
Loans and advances; pledged assets; other assets; available for sale financial assets; lease hold property; medium term invest in other securities; property, plant and equipments; investment properties & other investments; intangible assets	Investment in subsidiary companies, and associated companies; goodwill; banks' share of provision for unearned income and outstanding income; deferred acquisition costs and tax assets	Cash and balances with bank of Ghana; due from other banks financial institutions; government securities; trading assets
	Liabilities	
Illiquid (weight = −0.5)	**Semi-Liquid (weight = 0)**	**Liquid (weight = 0.5)**
Other liabilities; medium term borrowing; long term bonds; long term loans	_____	deposits; due to banks other financial institutions; interest payable & other liabilities; deferred taxation; provisions; current tax liabilities
	Surplus (Equity)	
Illiquid (weight = −0.5)		
Stated capital; income surplus; statutory reserve fund; revaluation reserve; capital surplus account; share deals; regulated reserve funds; preference share capital; other reserves		

APPENDIX 3: Breusch and Pagan Lagrangian Multiplier Test for Random Effects

Test: Var(u) = 0
chibar2(01) = 105.42
Prob > chibar2 = 0.0000

APPENDIX 4: Hausman (1978) Specification Test

	Coef.
Chi-square test value	16.221
P-value	.023

APPENDIX 5: Wooldridge Test for Autocorrelation in Panel Data

H0: no first order autocorrelation
F(1, 26) = 37.261
Prob > F = 0.0000

APPENDIX 6: Modified Wald Test for Groupwise Heteroscedasticity in Fixed Effect Regression Model

H0: sigma(i)^2 = sigma^2 for all i
chi2 (27) = 1442.91
Prob>chi2 = 0.0000

APPENDIX 7: List of Banks Used for the Study

Bank Name
Unite Bank of Africa
First Atlantic Bank
Standard Chartered Bank
EcoBank Ghana
Zenith Bank Ghana Limited
Agriculture Development Bank
Ghana Commercial Bank
Societe Generale Ghana
UniBank Ghana Limited
Stanbic Ghana Limited
Barclays Bank Ghana
Republic Bank Ghana Limited
Cal Bank
National Investment Bank
Sahel Sahara
Bank of Baroda Ghana
UT Bank Ghana Limited
Guaranteed Trust Bank
Prudential Bank Ghana Limited
Access Bank Ghana Limited
Bank of Africa
International Commercial Bank
Fidelity Bank Ghana Limited
Energy Bank Ghana Limited
The Royal Bank
First National Bank
First Bank of Nigeria