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Original Research

The Role of Regulatory Capital and Ownership Structure in Bank Liquidity Creation: Evidence From Emerging Asian Economies

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Abstract

We examine the effect of regulatory capital and ownership structure on banks' liquidity creation in emerging Asian economies. We find a positive association between regulatory capital and bank liquidity creation, which is consistent with the risk-absorption hypothesis. Bank size has a positive relation with liquidity creation, implying that large banks have more capacity to create liquidity as they enjoy more of the safety net provided by lenders of last resort in the event of crisis, the advantage of reputational benefit, and easier access to external market funding. The negative effect of the bank funding structure is that, as the subordinate debt is typically uninsured, higher funding costs lead banks to reduce liquidity creation. The results imply that an increase in interest rates worsens liquidity creation. For ownership structure, the results show the significance of the impact of ownership concentration on liquidity creation. Banking institutions having higher equity and higher concentration ownership leads to improved liquidity creation.

Keywords

regulatory capital requirement, ownership structure, liquidity creation, bank funding structure, emerging Asian markets

Introduction

The subprime crisis of 2007 led to capital and liquidity shortfall in the banking system worldwide and became a huge risk to the global financial system. To restore the stability of the international financial system, the Basel III accord was proposed by the Basel Committee on Banking Supervision (BCBS), in December 2010, to make financial sector reforms in the areas of liquidity, capital, and credit risk. The Basel framework offered the first standardized agenda on regulatory capital requirements and was a reaction against increasing globalization and diverse capitalization in the banking industry (Tanda, 2015).

In 2008, the subprime financial crisis proved the Basel II provisions insufficient. An essential element of Basel III is the institution of liquidity risk as substantial item, distinct from the earlier risks recognized in Basel II. Basel III improves the requisite capital level with respect to risk-weighted assets, however the financial repercussions of this change are still not clear. Banks can improve their capital ratios, either by growing their capital levels or reducing their risk-weighted investments. A rise in capital level is perceived to be good deleveraging by regulators, whereas a decrease in risk-weighted investment is likely to have an adversarial effect if banks instantaneously reduce the credit supply, that is, decrease consumer and commercial loans, ultimately hindering their role as liquidity creators (Admati et al., 2018). Basel III also proposes two liquidity measures, the liquidity-coverage ratio (LCR) and net-stable-funding ratio (NSFR), to cope with the banking sector's short- and long-run liquidity needs (BCBS, 2013). Banks create liquidity through financing long-run illiquid assets (i.e., loans) by short-run liquid obligations (i.e., deposits). They also generate off balance sheet liquidity through loan commitments and similar

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claims. Therefore, the question of how banks amend their liquidity creation in reaction to new capital regulations is critical and has genuine implications.

The literature reveals that banks' capital and liquidity indicators are closely related, with bank capital either improving or hindering liquidity formation. Although the theory proposes causality from bank equity to liquidity formation, in reality, both could be mutually determined. The debate about the relationship between equity requirements and liquidity creation is summarized by Berger and Bouwman (2009), in two competing views, the "financial-fragility/crowding-out" and "risk-absorption" hypotheses. The financial-fragility/crowding-out proposition forecasts the impact of regulatory capital on liquidity to be negative, as high levels of capital are either linked with reduced monitoring, which leads to low liquidity formation, or high capital ratios crowding out deposits and decreasing liquidity formation. However, the influence of bank equity on liquidity formation is positive with respect to the risk-absorption proposition, as bank capital develops risk-taking ability.

The repeated crises of the past three decades have led to financial sector reforms by presenting new business practices with the conventional role of intermediation. The outcome of these developments has been banking sector consolidation with changes in patterns of ownership, particularly increased numbers of institutional investors. This transforms banks' risk-taking activities and therefore hampers their role as liquidity creators (Barry et al., 2016). Empirical studies show that liquidity creation is influenced by ownership structure, because of the presence of significant agency problems between management and ownership. According to Gorton and Rosen (1995), entrenched management is apt to take on more risk in an impaired financial structure, consistent with the problem of moral hazard. In a situation of increasing expected competition, management which has enhanced evidence about the quality of portfolios has a greater chance of following a relaxed approach than investors who are likely to be enormously risk-taking *ex-post*. Thus, this study is an attempt to test the validity of the financial-fragility/crowding-out or risk-absorption hypotheses in the presence of the agency hypothesis.

Previous work provides substantial evidence of the relationships between liquidity formation and regulatory capital (Distinguin et al., 2013; Fu et al., 2016; Horváth et al., 2014; Xie, 2016), liquidity creation and economic growth (Berger & Sedunov, 2017), liquidity creation and government intervention (Berger et al., 2016), liquidity creation and bank governance (Díaz & Huang, 2017) liquidity, capital and risk (Mahdi & Abbes, 2018), and liquidity and credit risk (Hassan et al., 2019), as well as the cyclicality of liquidity creation (Davydov et al., 2018). There exists, however, no study that examines the combined effect of capital requirements and ownership structure on banks' liquidity creation in emerging Asian economies. We consider the combined impact of regulatory capital requirements, along with ownership structure,

on liquidity creation. We examine how liquidity changes with changes in regulatory capital under various ownership structures, to explore which ownership structures are more effective in preserving bank liquidity creation.

This study adds to the existing literature in many ways. First, we examine the relation between liquidity formation and regulatory capital by considering the liquidity indicators associated with the recent Basel III regulatory requirements, that is, the net stable funding ratio (NSFR) and liquidity creation indicator introduced by Berger and Bouwman (2009). Second, ownership structure is considered a factor of liquidity creation, and we examine how it moderates the relation between bank capital and liquidity. This is the first study, to the best of our knowledge, that considers the interaction effect of bank equity requirements on liquidity formation depending on ownership structure. Third, although Basel III was introduced after the subprime crisis of 2007, which largely effected Western nations, the regulatory reforms are not only meant to avoid financial crises, but to close gaps in regulatory frameworks worldwide. Throughout the global crisis, Asian economies and banks fared well in comparison to their developed Western counterparts (Batten, 2011). Hence, we add a crisis dummy that takes the value of 1 during the period 2008 to 2010 and 0 otherwise. We analyze this along with regulatory capital to test how bank capital effects liquidity creation in crisis periods in emerging Asian economies. Fourth, we add a Basel III dummy, taking the value of 1 from 2010 onward and 0 otherwise. We analyze this along with regulatory capital to test how bank capital effects liquidity formation after the introduction of Basel III.

The findings show a positive relationship between capital ratio and liquidity formation consistent with the risk-absorption hypothesis. Bank size and loan-to-deposit ratio have a positive relationship, while bank funding structure has a negative relationship with the liquidity indicator. The results imply that an increase in interest rates worsens liquidity creation. The findings also show a significant negative relationship between economic growth (gross domestic product [GDP]) and liquidity formation, which supports the argument that some financial institutions may act in an extremely lax way during economic booms. They do not consider the cyclic nature of economic growth and are hence inclined to undervalue risk. This lax behavior through times of economic growth hampers banks' ability to create capital buffers and hence reduces liquidity creation. For ownership structure, the results show the significance of the effect of managerial owners and concentrated ownership structure on liquidity creation. Management ownership has a positive impact, while concentrated ownership has a negative impact on bank liquidity creation. Also, banks with high capital ratios and concentrated ownership structures tend to grow their liquidity creation.

The rest of the study is structured as follows. The literature review and empirical evidence is presented in section "Literature Review." The selection of the sample and data

collection sources are given in section "Data and Variables." The methodological framework and empirical model are discussed in section "Method and Model." Section "Results and Discussion" presents the results, and the conclusions are presented in the last section.

Literature Review

Modern financial intermediation theory explains the main roles performed by banks in the economy, that is, risk transformation and liquidity creation. Banks play a transformation role by accepting risk-free deposits and using them to supply risky lending. Banks create liquidity by financing long-run illiquid assets (i.e., loans) by short-run liquid obligations (i.e., deposits). Furthermore, they create off balance sheet liquidity by loan commitment and similar claims. Both functions coincide, so it is important to examine these functions to get an enhanced understanding of banks' role in the modern financial system. Previous literature related to the banking sector mostly considers risk transformation, while the literature on banks' liquidity role is scarce, but improving.

Capital Requirements and Liquidity Creation

Previous literature examining the association between capital requirements and liquidity formation is rare. The latest advancement in the literature is the pioneering study of Berger and Bouwman (2009) into the formation of liquidity reforms under Basel III (particularly, NSFR and LCR) (BCBS, 2010). Four liquidity measures are proposed by Berger and Bouwman (2009), built on loan type, maturity, and the decision to contain or omit off balance sheet items. The study uses U.S. banks over the period 1993 to 2003 as a sample, and the findings imply a positive association, between regulatory capital and liquidity formation for big banks, and a negative association for small banks. The findings suggest that high regulatory capital requirements under Basel III improve the liquidity formation of large banks more than smaller institutions.

Distinguin et al. (2013) employ simultaneous equation analysis to examine the relationship between capital requirements and liquidity indicators, measured through on balance sheet activities, using a sample of registered banks in the United States and Europe over the period 2000 to 2006. The findings show that regulatory capital and liquidity measures are closely related: high regulatory capital entails low liquidity formation and banks reduce regulatory capital to generate further liquidity. Horváth et al. (2014) use a dynamic panel generalized method of moments (GMM) estimator and perform Granger causality analysis with a Czech banking sector data set, comprising mostly small banks, over the period 2000 to 2010. Analogous to Distinguin et al. (2013), the findings of the study imply that bank capital has a negative impact on liquidity formation and high liquidity ratios lead to

decreased bank equity. Fu et al. (2016) examine the link between regulatory capital and liquidity creation in a sample of 14 Asia-Pacific countries over the period 2005 to 2012. The findings are similar to Distinguin et al. (2013) and Horváth et al. (2014), implying a significant inverse bidirectional relationship between regulatory capital and bank liquidity. Fungáčová et al. (2017) investigate the effect of deposit insurance introduction on the relationship between equity requirements and liquidity formation in an emerging economy. The study shows that the deposit insurance system has a diverse effect on the link between equity requirements and liquidity formation, across various banking categories, and those with somewhat higher domestic deposit ratios are more likely to be affected. Deposit insurance moderates the effect of equity requirements on liquidity formation in case of Russian banks.

Recently, a number of studies emphasize the significance of banking sector contribution for liquidity formation and foreseeing economic crises. Berger and Sedunov (2017) find that liquidity formation directly relates to economic output, showing that both the on and off balance sheet liquidity indicators directly affect the economy. Similarly, Berger and Bouwman (2017) investigate the interaction between liquidity ratios, financial crises, and monetary policy. The study concludes, *ceteris paribus*, that higher liquidity indicators help to foresee crises, proposing that the system must observe banks' role as liquidity creators to forecast and lessen the possibility of economic crises.

Tran et al. (2016) investigate the interrelationship between regulatory capital, liquidity formation, and profitability in the U.S. banking sector. The study shows that regulatory capital positively relates to liquidity creation, by keeping bank profitability constant, in the case of small banks in noncrisis periods. Banks showing high illiquidity risk results in low profitability and the relationship between regulatory capital and bank profitability is nonlinear and depends on capital level. Umar et al. (2017) examine the effect of variations in regulatory capital on bank liquidity using data for all Indian banks over the period 2000 to 2014. The results show that the financial fragility/crowding out proposition holds in case of narrow liquidity measure use and change in capital has no effect on broad liquidity measures. The risk-absorption proposition holds in the listed bank scenario before the crisis, where liquidity is measured by employing both on and off balance sheet activities. Casu et al. (2019) investigate the relationship between regulatory capital requirement and bank liquidity formation, employing simultaneous equation analysis, subsequent to Basel III's implementation. The findings show a bidirectional negative relationship, which proposes that banks decrease liquidity as capital rises, and as liquidity rises, banks decrease capital ratios. Le (2019) finds a negative bidirectional relationship between equity requirements and liquidity formation in the Vietnamese banking sector from 2007 to 2015. The results show that banks' off balance sheet actions play little part in liquidity creation

measures. On the basis of the previous literature, the following hypothesis is tested in this study:

Hypothesis 1 (H1): There exists a significant relationship between regulatory capital ratios and bank liquidity creation.

Ownership Structure and Liquidity Creation

In recent decades, the banking sector has been presented with serious challenges and repeated financial crises. Particularly, the crisis in 2007 reveals a convincing substantiation of how rapidly the liquidity in the system can dissolve and the subsequent shortage remain for an extended period of time. Liquidity problems arise in the early stages of crisis, even in institutions with sufficient capital ratios, and the BCBS has determined that the banking industry has been unsuccessful in following the basic moralities of liquidity management in periods of abundant liquidity (Bank of International Settlements [BIS], 2009). Financial deregulation and market integration have reformed banking sector activities resulting in banking sector consolidation and a change in the pattern of ownership, particularly an increased number of institutional investors (Barry et al., 2016).

Foreign ownership of banks in developing countries has been the focus of considerable academic interest, and the literature is divided into two arguments: one side backing the global advantage proposition and the other favoring the home-field advantage proposition. The first hypothesis predicts that foreign-owned banks are more efficient and profitable than domestic-owned banks (Bonin et al., 2005; Brown et al., 2009; Havrylchyk & Jurzyk, 2011; Laidroo, 2016). The reasons include easier access to capital markets, better capacity for risk diversification, and advanced technology for the collection and evaluation of "hard information" (Berger et al., 2005). The other strand of literature proposes the negative impact of foreign ownership on bank efficiency because of the domestic bank advantage, particularly in developing nations, such as easier access to "soft information" related to the native setting (Berger et al., 2003; Lensink & Naaborg, 2007). Previous literature has not, so far, produced decisive evidence for which proposition better fits the banking industry (Andries & Billon, 2010; Bonin et al., 2005).

The literature on bank ownership's role in influencing liquidity risk is scant and far from conclusive. Brei and Schclarek (2015) take a theoretical view on the lending behavior of public and private banks, findings that private bank lending reduces to a greater extent than that of public banks, as public banks have more access to extra funding and usually do not undergo deposit withdrawal. Comparable findings are obtained by De Haas et al. (2012), Cull and Peria (2013), and Bertay et al. (2012). With reference to foreign versus local ownership, Vazquez and Federico (2015) find that small local banks are comparatively more exposed to liquidity risk during financial crisis, than larger foreign institutes which have better access to internal capital markets and stable financing bases. Conversely, Claessens and Van Horen (2014) and De Haas and Van Lelyveld (2014) state that domestic-owned banks are better insulated from financial crisis and have more stable lending activity than international banks. Mirza et al. (2019) examine the significance of firms' management political ties on risk-taking in China and show that firms with more political relations are greater risk-takers than those with lesser political ties.

The role of the construction of bank ownership in risk-taking and performance has been the focus of research over the past few years (Barry et al., 2011; Busta et al., 2014; Dong et al., 2014; Hammami & Boubaker, 2015; Haw et al., 2010; Mukhopadhyay & Chakraborty, 2017; Oino, 2018; Saona & Azad, 2018; H. Vu & Nahm, 2013; M. C. Vu et al., 2018; Zheng et al., 2017). Reverchuk et al. (2013) investigate the efficiency of the banking sector in developing countries, before and during the period of the 2007 financial crisis, by employing cluster analysis. However, literature on the role of ownership structure in liquidity management is still disputed and scarce. Duqi and Al-Tamimi (2018) examine the impact of ownership type on regulatory capital ratios and liquidity risk, employing a data set from the Middle East and North Africa (MENA) region. The findings imply that foreign and private ownership show a strong inclination for high capital levels, while the role of government investors in liquidity risk remains indecisive. Furthermore, private ownership banks demonstrate low liquidity risk throughout the 2007 financial crisis, because of tight budgetary restrictions and more convincing liquidity requirements. On basis of this discussion, we formulate the following hypotheses:

Hypothesis 2 (H2): There exists a significant relationship between ownership type and liquidity creation.
Hypothesis 3 (H3): There exists a significant relationship between ownership concentration and liquidity creation.
Hypothesis 4 (H4): The effect of regulatory capital ratios on liquidity creation depends on ownership type.
Hypothesis 5 (H5): The effect of regulatory capital on liquidity creation depends on ownership concentration.

Data and Variables

Data Sample

This study employs the Financial Times Stock Exchange (FTSE) Russell (2018) grouping of economies and emerging economies index of Morgan Stanley Capital International (MSCI) for the sample. These indexes are used to measure capital market performance in global emerging economies. Hence, the sample selected comprises the emerging Asian economies which are included in both indexes, that is, the FTSE and MSCI indexes of emerging economies.

The sample selected comprises seven emerging Asian economies, Pakistan, China, Indonesia, India, Thailand, Philippines, and Malaysia. The final sample includes the banks registered on the domestic stock exchanges and the data range is from 2004 to 2017. The sample starts from year 2004 because we have collected the regulatory capital and financial data of seven emerging economies from Standard & Poor's Capital IQ database. This database contains the data of most of the selected countries and regulatory variables from year 2004. Also, Basel III is introduced in 2010 and we need the data both before and after Basel accord introduction time periods to investigate the new accord introduction effect. The criteria for selection of banks are that they must have sequential availability of 10 or more years' of data and the availability of regulatory capital data throughout the period.

The regulatory capital ratios and financial data are collected from the selected countries' banks' financial reports and Standard & Poor's Capital IQ database. The annual reports are used to collect ownership data. The World Bank development indicators database and International Monetary Fund are used for macroeconomic information. The study employs the secondary panel data set over the period 2004 to 2017.

Liquidity Creation Measures

The literature related to the banking sector reveals that the majority of studies that examine liquidity creation use ratios calculated from accounting data. But employing such liquidity indicators can be incorrect in certain situations. Consequently, the current study uses two liquidity measures, the first measure being dependent on the regulatory reforms suggested by the BCBS. Besides the various policies, Basel III proposes the use of the NSFR, which creates resilience in the long run by generating extra benefits to finance bank operations with secure sources of funding on a continuous basis (BIS, 2009; Hossain et al., 2018). The NSFR indicator is the ratio of the existing amount of secure funds to the requisite quantity of secure funds. The existing quantity of established funds is the sum of an institution's equity, debts with a useful life of one or more years, part of the "stable" demand deposits (i.e., short-term funds with less than 1 year maturity that are likely to "stay" in the institution), and of term deposits with less than 1 year maturity that are likely to "stay" in the institution. The requisite quantity of funds is aggregate of specific assets that may not be monetized by sale or utilized as guarantee for safe borrowing throughout a liquidity episode which lasts 1 year. The higher the requisite quantity of stable funds, compared with the existing quantity of stable funds, the more illiquid the bank is believed to be (BIS, 2009). The reciprocal of net stable funds (*INSFR*) is the ratio of the requisite quantity of stable funds to the available quantity of stable funds. The inverse of the NSFR is calculated as:

INSFR = "Required amount of stable funding / Available amount of stable funding."

= "0 * (cash + interbank assets + short-term marketable assets) + 0.5 * (long-term marketable assets + customer acceptances) + 0.85 * consumer loans + 1 * (commercial loans + other loans + other assets + fixed assets) / 0.7 * (demand deposits + saving deposits) + 0 * (short-term market debt + other short-term liabilities) + 1 * (long-term liabilities + equity)."

The second proxy for liquidity is the narrowed liquidity measure (*LCI*) given by Berger and Bouwman (2009) that only includes balance sheet items. To calculate this variable, first, all liabilities and assets are categorized as liquid, semiliquid or illiquid with reference to type and maturity. Second, every asset and liability factor is weighted. The liquidity creation indicator (*LCI*) is computed as:

LCI = "(0.5 * illiquid assets + 0 * semiliquid assets − 0.5 * liquid assets + 0.5 * liquid liabilities + 0 * semiliquid liabilities − 0.5 * illiquid liabilities) / Total Assets."

A high liquidity measure (LCI) shows more liquidity creation in the system and poses banks to accumulation of illiquid investments, since banks put additional liquid liabilities (i.e., deposits) into illiquid assets (i.e., bank loans). To conform with the liquidity creation indicator (LCI), this study considers the reciprocal of the net stable funding ratio (INSFR) as a liquidity indicator (BIS, 2009). A high value of both determinants indicates the more liquidity formation in the system, which means the highly illiquid bank assets that is, investments in bank loans. High illiquidity means that banks put extra liquid debts into illiquid assets, which leads to an increase in bank liquidity creation.

The detail of the variables employed in the study are presented in Table 1.

The bank-specific variables are the size, bank market power, subordinate debt ratio (SDR), loan loss provision ratio, profitability, and price-to-book value (PBV). Bank size is included as a control variable in the study, because the previous studies find mixed evidence regarding its impact on bank liquidity creation. Distinguin et al. (2013) find a positive relationship between bank size and liquidity creation, as the large banks have more capacity to create liquidity and enjoy more of the safety net provided by lenders of last resort in the event of crisis. Other studies find a negative relation between bank size and liquidity creation implying that small banks generate more liquidity per asset than large banks (Fu et al., 2016; Horváth et al., 2014). The literature also shows that market competition (i.e., low bank market power) is a significant determinant of bank liquidity creation, but the effect is vague (Berger et al., 2016; Horváth et al., 2014). On

Table 1. Description of Variables.

Classification	Variable		Description
Regulatory Capital (CAP)	Regulatory Capital Ratios	CAP	Tier 1 capital ratio/total capital ratio
Liquidity Indicators (LIQ)	Liquidity Creation Ratio	LIQ	Liquidity creation indicator (LCI)
	Inverse of Net Stable Funding Ratio		Net stable funding ratio (INSFR)
Bank-Specific Control Variables (BSV)	Profitability	ROE	Return on equity
	Net Loans to Deposits Ratio	NLTD	Net loans divided by total deposits of banks
	Bank Risk	LLPR	Loan loss provisions to total loans ratio
	Bank Size	SIZE	LN of Total assets
	Bank Funding Structure	SDR	Subordinated debt to total debts ratio
	Bank Charter Value	PBV	Price-to-book value ratio
Ownership Variables (OWN)	Ownership Concentration	OC	Share % equal to or greater than 10% held by first three investors (OC10)
			Share % equal to or greater than 5% held by first three investors (OC5)
	Ownership Type	MO	Share % held by managerial owners
		FO	% of shares held by foreign owners
Macroeconomic Variables (MACRO)	Inflation	INF	Inflation
	GDP Growth Rate	GDP	GDP growth rate
	Monetary Policy Indicator	MPI	Policy rate of central bank
	Domestic Credit to Private Sector	DCPS	% of domestic credit to private sector
Regulatory Pressure Variables (RPV)	Bank Market Power	BMP	Ratio of total bank assets i in country j to total banking system assets in country j

one hand, high competition (or low bank market power) leads to more liquidity creation as banks offer more exciting terms to their customers, but on the other, the "financial fragility view" states that bank competition reduces liquidity, as the increase in competition leads to reduced profitability and motivates banks to decrease deposit activity and credit supply to avoid financial runs (Horváth et al., 2014). So, we include the market power as a measure of competition and regulatory pressure variable. The study also incorporates PBV and SDR as determinants of bank liquidity creation. We control for bank profitability by including return on equity in the model, as an increase in profits may impact bank capital positively, which in turn enhances liquidity creation (Flannery & Rangan, 2008; Gropp & Heider, 2010). This argument is in line with pecking-order theory, arguing that bank equity mostly relies on internal funds as external equity issuance is expensive.

Liquidity creation is also affected by the macroeconomic environments of countries, so we control for macroeconomic factors using the annual growth of gross domestic product, inflation, domestic credit to the private sector, and monitory policy indicators. We expect a positive relationship between economic growth and liquidity creation, as, in an economic boom, the bank's liquidity creation is improved (Distinguin et al., 2013). However, Ayuso et al. (2004) argue that the negative impact of economic growth on liquidity creation supports the argument that some financial institutions may act in an extremely lax way during economic booms. They do not consider the cyclic nature of economic growth and are hence inclined to undervalue risk. This lax behavior in periods of financial growth hinders banks from creating capital buffers

and hence reduces liquidity creation. The literature reveals the positive relationship between inflation and liquidity creation, which means that as inflation in an economy surges, banks create further liquidity to restrain its effect in the economy (Singh & Sharma, 2016). We also incorporate central bank policy rate as a monetary policy indicator (MPI), as it may influence the liquidity creation in the system (Berger & Bouwman, 2017).

Method and Model

Estimation Techniques

This study uses the secondary panel data set for the time period 2004 to 2017. There are two types of panel methodology, static and dynamic, with dynamic panel models more suitable to address the problem of endogeneity bias. The causal linkage in the dynamic panel model is usually dynamic across time for a given phenomenon. Dynamic panel estimation techniques employ dependent variable lags as instruments in the model to avoid endogeneity bias (Ullah et al., 2018). Static models are classified by fixed or random effects, considering the individual effects as constants across time in both cases. This restriction limits the effectiveness of the static model for addressing the time varying dynamics or endogeneity issue. However, dynamic data techniques treat the problem of endogeneity within the model by the instrumental variables approach (Mileva, 2007).

The development of dynamic panel data analysis offers new prospects for endogenous variable examination. To address the endogeneity problem, two key methods are used in addition to conventional instrumental variable regression.

The first technique, difference GMM, introduced in 1991 by Arellano and Bond (1991), uses the lags in difference as instruments. The second uses the lags in level and difference as instrumental variables and is called system GMM, developed by Arellano & Bover in 1995. System GMM has the option to perform investigation by two methods, depending on the assumptions of the weighting matrix variation, that is, one and two step methods. The literature shows that the two-step GMM methodology is useful when employing a heteroscedastic assumption in the analysis. The two main issues related to two-step GMM are the proliferation of instruments and autocorrelation of error terms (Labra & Torrecillas, 2018). Roodman (2009) undertakes a comprehensive analysis and suggests a mechanism for effectively checking for the presence of the overidentification problem. The number of cross sections should be higher than the number of instruments employed to avoid overidentification.

This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM technique, due to the endogeneity problem. The panel data used in this study contains a large number of cross sections (155 banks) and a short time period (14 years), which is the most common data type in the dynamic panel, known as a short panel, so the problem of overidentification is avoided. The Arellano and Bond test is employed to examine the autocorrelation problem in error terms.

Model Specification

Earlier empirical literature specifies regulatory capital requirements as a determinant of bank liquidity formation. Most previous studies use simultaneous equation analysis to address the potential endogenous relationship between liquidity formation and regulatory capital ratios (Berger & Bouwman, 2009; Casu et al., 2019; Distinguin et al., 2013; Horváth et al., 2014). However, this study employs the Arellano and Bover (1995) system dynamic panel technique to address the endogeneity problem, between liquidity formation and equity requirements, and the persistence of the relationship over time. The empirical model is specified by the following set of equations (subscripts i and t, stand for cross section and time period, respectively):

$$LIQ_{it} = \beta_0 + \beta_1 LIQ_{it-1} + \beta_2 CAP_{it} + \sum_{m=1}^{M} \beta_m BSV_{mit} + \sum_{n=1}^{N} \beta_n MACRO_{nit} + \lambda RPV_{it} + v_{it}. \quad (1)$$

In Equation 1 (i.e., the liquidity determinant model), the liquidity factor is regressed on the set of explanatory variables recognized in the literature. In the above equation, CAP and LIQ correspond to regulatory capital and liquidity variables, respectively. BSV_m and $MACRO_n$ are the mth and nth bank specific and macroeconomic control variables, respectively;

RPV represents the regulatory pressure variable measured by bank market power; and *Vit* is the random disturbance term. In Equation 2, we further add the ownership pattern as a determinant of liquidity creation and in Equation 3 we add the interaction term between regulatory capital and ownership structure:

$$LIQ_{it} = \beta_0 + \beta_1 LIQ_{it-1} + \beta_2 CAP_{it} + \beta_k OWN_{it} + \sum_{m=1}^{M} \beta_m BSV_{mit} + \sum_{n=1}^{N} \beta_n MACRO_{nit} + \lambda RPV_{it} + v_{it}, \quad (2)$$

$$LIQ_{it} = \beta_0 + \beta_1 LIQ_{it-1} + \beta_2 CAP_{it} + \beta_k OWN_{it} + \lambda OWN_{it} * CAP_{it} + + \sum_{m=1}^{M} \beta_m BSV_{mi,t} + \sum_{n=1}^{N} \beta_n MACRO_{nit} + \lambda RPV_{it} + v_{it}. \quad (3)$$

In Equations 2 and 3, OWN_{it} refers to the ownership structure measured by type of ownership and degree of concentrated ownership. The study contributes to the present literature by examining the combined impact of regulatory capital requirements and ownership structure on banks' liquidity creation. The combined effect is tested by analyzing the interaction between capital ratios and ownership variables.

Results and Discussion

This study employs Arellano and Bover (1995) two-step dynamic panel system GMM technique for model estimation, due to the endogeneity problem. Table 2 shows the sample description, including the sample countries, number of banks, and frequency of data. India comprises 28.5% of sample the data while China and Indonesia comprise 20.8% and 15.6%, respectively. Pakistan and Philippines provide 12.1% and 9.5% of the sample data, respectively. Thailand and Malaysia provide 13.48% collectively.

Table 3 presents the descriptive statistics and reports the number of observations, mean values, and standard deviations of all the variables in the emerging Asian market sample. The average value of the liquidity variable (i.e., INSFR) is 0.65 with a standard error of 0.87, while the mean value of the liquidity creation indicator (LCI) is 0.23 with a standard error of 1.585. For the regulatory capital ratios, the mean of the tier 1 ratio (T1R) is 13.1% with a standard deviation of 12.3%, which shows a small spread, and the total capital ratio (TCR) has a mean of 15.9% and a standard error of 12.2%. For bank-specific control variables, the net-loan-to-deposit ratio (NLTD) shows a larger deviation from the mean. The macroeconomic and ownership variables do not show very large spreads.

The results of the study show that regulatory capital, ownership concentration, and macroeconomic variables are the

Table 2. Sample Description.

Country	No. of banks	Frequency	Percentage	Cum. percentage
India	43	609	28.5	28.5
China	34	445	20.8	49.32
Indonesia	26	334	15.6	64.95
Pakistan	19	258	12.1	77.02
Philippines	15	203	9.50	86.52
Thailand	11	150	7.02	93.54
Malaysia	10	138	6.46	100
Total	158	2137	100	

Table 3. Descriptive Statistics.

Variable	Obs.	M	SD	Variable	Obs.	M	SD
INSFR	2,137	0.648	0.866	LLRR	2,053	0.012	0.020
LCI	2,137	0.230	1.585	GDP	2,137	6.52	2.407
T1R	2,137	0.131	0.123	MPI	2,137	8.78	3.097
TCR	2,137	0.159	0.122	INF	2,137	5.231	3.463
ROE	2,137	0.126	0.232	DCPS	2,137	68.16	43.45
SDR	1,650	0.276	0.280	MO	836	1.644	4.152
PBV	2,137	1.927	6.382	FO	1,060	18.998	17.110
SIZE	2,137	13.38	2.265	OC5	1,205	60.70	22.01
BMP	2,137	0.327	0.529	OC10	1,236	55.30	25.90
NLTD	2,137	1.286	26.57				

Note. T1R and TCR represent the tier 1 capital ratio and total capital ratio (i.e., measures of regulatory capital [CAP]) and INSFR (measure of liquidity creation under Basel III) represents the inverse of the net stable funding ratio. SD = standard deviation; GDP = gross domestic product; MPI = monetary policy indicator; TCR = total capital ratio; ROE = return on equity; DCPS = domestic credit to private sector; SDR = subordinate debt ratio; PBV = price-to-book value; OC = ownership concentration; BMP = bank market power; NLTD = net-loan-to-deposit ratio.

most relevant factors determining bank liquidity creation. The base model regression results are shown in Table 4. The results show that regulatory capital is positively related to the inverse of the NSFR, which implies that high capital ratios lead to improved liquidity creation consistent with the risk-absorption hypothesis as more capital enhances the bank's risk-taking ability. The risk-absorption hypothesis depends on two views expressed in the literature. On one hand, some studies argue that liquidity increases the banks' exposure to risk-taking. The more liquidity is created, the larger the possibility and strength of losses related to disposal of illiquid assets to cover customers' liquidity demands (Allen & Gale, 2004). On the other hand, some studies argue that capital absorbs risk and enhances banks' risk-bearing capability (Repullo, 2004; Von Thadden, 2004). The combination of these two views predicts that high capital ratios can improve banks' liquidity creation ability. The positive relation between capital requirement and liquidity creation is also consistent with Berger and Bouwman (2009) findings that high capital permits banks to tolerate more risk, consistent with the bank's risk transformation role.

In the case of bank-specific control variables, net loan to total deposit (NLTD) and profitability (PROF) have significant positive relationships with liquidity creation. The

positive impact of NLTD implies that institutions with larger investments in illiquid assets (i.e., high loan-to-deposits ratios) are likely to create more liquidity. The positive relationship with bank profitability (measured by return on equity) shows that banks with larger returns create more liquidity, as increases in profits may impact bank capital positively, which in turn enhances liquidity creation (Flannery & Rangan, 2008; Gropp & Heider, 2010). The negative impact of bank funding structure on liquidity creation, measured by the SDR, implies that subordinate debt is typically uninsured and uninsured creditors are more likely to suffer losses and show sensitivity toward bank riskiness. So, subordinate creditors have strong incentives to observe and restrain banks and charge them high funding costs (Nier & Baumann, 2006). The high funding costs lead banks to reduce liquidity creation.

In the case of macroeconomic variables, the MPI has a negative relationship with liquidity creation. This result implies that an increase in interest rates worsens liquidity creation (see Table 4). The findings also show a significant negative relationship between economic growth (GDP) and liquidity creation in emerging Asian economies. The negative impact of economic growth on liquidity creation supports the argument that some financial institutions may act in

Table 4. Base Model Estimation.

INSFR	Model 1 (Base)		Model 1 (PBV)		Model 1 (PROF)		Model 1 (SDR)	
	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Cons.	0.445	.560	0.353	.659	0.260	.741	0.776	.082*
INSFR($t-1$)	0.177	.137	0.204	.150	0.177	.121	0.056	.046**
CAP	1.471	.065*	1.180	.099*	1.343	.086*	0.253	.632
BMP	0.071	.588	0.027	.812	0.016	.903	−0.014	.718
SIZE	0.003	.949	0.020	.704	0.022	.690	0.004	.864
LLRR	−2.04	.525	−3.72	.212	−2.099	.507	0.275	.478
NLTD	0.272	.030**	0.228	.076*	0.253	.028**	0.169	.037**
PROF	0.608	.000***			0.577	.000***		
PBV			0.016	.314	0.012	.416	0.004	.217
SDR							−0.648	.002***
GDP	−1.81	.072*	−2.03	.072*	−1.98	.055**	−0.621	.040**
MPI	−3.32	.017**	−3.22	.045**	−3.70	.009**	−1.74	.016**
AR(1), AR(2), (Prob)	0.303	.466	0.489	.558	0.302	.464	0.337	.857
Wald χ^2 (Prob)	101.55	.0000***	29.27	.0006***	102.80	.0000***	190.79	.0000***
No. of banks	154		154		154		124	
No. of obs.	1,899		1,899		1,899		1,487	

Note. Table 4 presents the base model estimations. This study uses the Arellano and Bover (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The liquidity formation is measured by the inverse of NSFR. Capital (CAP) is measured by tier 1 capital ratio and profitability (PROF) is measured by return on equity. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. PBV = price-to-book value; SDR = subordinate debt ratio; BMP = bank market power; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; MPI = monetary policy indicator; GMM = generalized method of moments.
*, **, and *** denote level of significance at 10%, 5%, and 1%, respectively.

an extremely lax way during economic booms as they do not consider the cyclic nature of economic growth and are hence inclined to undervalue risk. This lax behavior during economic upturns leads banks to not increase capital buffers and hence reduces liquidity creation (Ayuso et al., 2004) (see Table 4).

In Models 2 and 3, we consider ownership pattern as a factor of liquidity creation and focus the combined impact of regulatory capital on liquidity creation through its interaction with ownership structure. The findings show that managerial owners tend to improve liquidity creation (see Table 5), while concentrated ownership leads to a decrease in liquidity creation (see Table 6). This finding confirms the idea that concentrated ownership leads to a reduction in bank risk-taking and hence reduces liquidity. However, the combined effect of regulatory capital is only proved in the case of its interaction with ownership concentration (OC10) and shows the positive effect on liquidity formation. The findings imply that, in the case of higher regulatory capital ratios, banks with concentrated ownership tend to take more risks and create further liquidity, which is in accordance with the risk-absorption hypothesis. The lag of the dependent variable is also significant in (see Tables 5 and 6) and shows the persistence of relationship over time.

The results related to the control variables are the same as the base model findings. Bank size (SIZE) has a positive relationship with liquidity creation, implying that large banks

have more capacity to create liquidity as they enjoy more of the safety net provided by lenders of last resort in the event of a crisis, consistent with findings of Distinguin et al. (2013). Also, big banks have the advantage of reputational benefit and more access to external market funding, and hence create more liquidity (Bawazir et al., 2018). GDP and MPI have significant negative relationships, in most of the regressions, with liquidity creation. In the case of bank specific features, SDR has a negative relationship, while NLTD has a significant positive relationship, with liquidity creation, which proves the robustness of previous findings (see Table 6).

Robustness Tests

The robustness of the results is tested in several ways. First, the dependent variable is measured by an alternative measure, that is, the liquidity creation indicator (LCI) given by Berger and Bouwman (2009). The findings are reported in the appendix. The results show a significant positive relationship between regulatory capital and liquidity creation and validate the risk-absorption hypothesis. In the case of control variables, we add PBV into the model, which has a positive relationship with bank liquidity formation, suggesting banks with high charter value (i.e., high PBV) have easier access to capital markets, leading to an increase in liquidity creation. We also add bank market power (BMP) as

Table 5. Ownership Model Estimation (Ownership Type).

	Model 2 (MO)		Model 3 (MO*CAP)		Model 2 (FO)		Model 3 (FO*CAP)	
INSFR	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Cons.	0.053	.910	0.053	.915	−0.708	.262	−1.23	.103
INSFR$(t-1)$	0.763	.000***	0.765	.000***	0.767	.000***	0.776	.000***
CAP	2.70	.014**	2.664	.009**	2.401	.074*	4.268	.085*
PBV	0.004	.746	0.004	.740	0.001	.921	0.005	.682
BMP	−0.047	.504	−0.047	.458	−0.124	.209	−0.121	.356
SIZE	0.009	.804	0.009	.792	0.064	.206	0.079	.182
LLRR	−3.95	.320	−3.874	.287	−4.284	.263	−4.29	.255
NLTD	−0.170	.404	−0.164	.375	0.054	.251	0.070	.314
GDP	0.122	.732	0.040	.906	−0.121	.803	−0.197	.716
MPI	−1.74	.082*	−1.83	.055**	−1.576	.147	−0.936	.499
MO	1.25	.349	3.72	.002***				
MO*CAP			−0.142	.110				
FO					−0.493	.385	1.344	.201
FO*CAP							−0.115	.125
AR(1), AR(2), (p value)	0.082	.311	0.087	.310	0.014	.517	0.029	.561
Wald χ^2 (Prob)	4,358.5	.0000***	5,069.3	.0000***	2,278.9	.0000***	1,881.5	.0000***
No. of banks	75		75		96		96	
No. of obs.	819		819		1,036		1,036	

Note. Table 5 presents the ownership model estimations. This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The liquidity formation is measured by the inverse of NSFR. Capital (CAP) is measured by tier 1 equity and total equity ratios. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. CAP = capital; PBV = price-to-book value; BMP = bank market power; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; MPI = monetary policy indicator; GMM = generalized method of moments.
*, **, and *** denote significance level at 10%, 5%, and 1%, respectively.

a measure of regulatory pressure into the model, which has a negative and significant relationship with bank liquidity.

Second, in the ownership model case, managerial ownership and foreign ownership do not prove significant, which is in accordance with previous results. The ownership concentration has a negative impact on liquidity creation, but the finding is not significant. The effect of regulatory capital through its interaction with ownership structure is also not proved to be significant.

Third, as the Basel III accord was presented in response to the global subprime crisis of 2007, we add a crisis dummy into the model which takes the value of 1 during the period 2008 to 2010 and 0 otherwise. We analyze its interaction with regulatory capital to test how bank capital effects liquidity creation in crisis periods. The crisis dummy has a negative relationship with liquidity creation; however, it is not proved to be significant.

Fourth, we add a Basel III dummy, taking the value of 1 from 2010 onward and 0 otherwise. We analyze its interaction with regulatory capital to test how bank capital affects liquidity creation after the Basel III introduction; however, it is not proved to be significant. Regulatory capital, PBV, and NLTD have positive relationships, while SDR and BMP have negative relationships, with liquidity creation in all models, which shows the significance of the previous model's findings.

Conclusion

This study investigates the effect of bank equity requirements and ownership patterns on liquidity creation in emerging Asian economies during the period 2004 to 2017. The study uses Arellano and Bover (1995) system dynamic panel technique to address the endogeneity problem, between equity requirements and liquidity formation, and the persistence of the relationship over time.

The results of study show that regulatory capital is positively related to the inverse of the NSFR, implying that a high capital level improves bank liquidity creation consistent with the risk-absorption hypothesis, as more capital enhances a bank's risk-taking ability. The findings support the view of Berger and Bouwman (2009) that higher capital permits banks to tolerate more risk, consistent with their risk transformation role.

In the case of bank-specific control variables, net loans to total deposit and profitability have a significant positive relationship with liquidity creation. The positive relationship of net loans to deposit ratio implies that banks with larger investments in illiquid assets (i.e., high loan-to-deposit ratios) are likely to create more liquidity. The positive association between the profitability measure and liquidity formation shows that banks with larger returns create more liquidity, as an increase in profits may impact bank capital positively, which in turn enhances liquidity creation

Table 6. Ownership Model Estimation (Ownership Concentration).

INSFR	Model 2 (OC5)		Model 3 (OC5*CAP)		Model 2 (OC10)		Model 3 (OC10*CAP)	
	Coeff.	*p* value	Coeff.	*p* value	Coeff.	*p* value	Coeff.	*p* value
Cons.	0.216	.248	−0.112	.796	0.101	.440	0.451	.105
INSFR(*t* − 1)	0.023	.001**	0.035	.360	0.398	.054*	0.731	.000***
CAP	−0.284	.636	4.478	.324	−0.676	.129	−1.043	.362
PBV							0.002	.813
BMP	−0.006	.140	−0.049	.208	−0.014	.483	−0.037	.751
SDR	−0.571	.000***	−0.610	.000***	−0.545	.000***		
NLTD	0.328	.000***	0.324	.000***	0.345	.000***		
SIZE	0.044	.013**	0.032	.094*	0.028	.013**	0.006	.826
PROF	0.024	.684	0.033	.661	0.051	.417	0.357	.000***
GDP	−0.299	.099*	−0.268	.258	−0.564	.002***	−0.709	.166
MPI	−1.319	.073*	−1.482	.086*	−0.081	.878	−1.553	.168
OC5	−2.090	.060*	0.588	.468				
OC5*CAP			−0.074	.288				
OC10					−0.178	.004***	−0.638	.002***
OC10*CAP							0.034	.026**
AR(1), AR(2), (*p* value)	0.724	.354	0.711	.330	0.233	.335	0.067	.122
Wald χ^2 (Prob)	182.74	.0000***	169.64	.0000***	251.29	.0000***	3560.80	.0000***
No. of banks	94		94		95		119	
No. of obs.	943		943		955		1,222	

Note. Table 6 presents the ownership model estimations. This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The liquidity formation is measured by inverse of NSFR. Capital (CAP) is measured by tier 1 capital ratio and profitability (PROF) is measured by return on equity. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. OC = ownership concentration; PBV = price-to-book value; BMP = bank market power; SDR = subordinate debt ratio; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; MPI = monetary policy indicator; GMM = generalized method of moments.
*, **, and *** denote significance level at 10%, 5%, and 1%, respectively.

(Flannery & Rangan, 2008; Gropp & Heider, 2010). The negative relationship between bank funding structure (measured by SDR) and liquidity creation shows that, as subordinate debt is typically uninsured, subordinate creditors have strong incentives to observe and restrain banks and charge them high funding costs. These high funding costs lead banks to reduce liquidity creation. Bank size has a positive relationship with liquidity creation, implying that large banks have more capacity to create liquidity as they enjoy more of the safety net provided by lenders of last resort in the event of crisis, consistent with the findings of Distinguin et al. (2013). Also, big banks have the advantage of reputational benefit and more access to external market funding, and hence create more liquidity (Bawazir et al., 2018).

The results imply that an increase in interest rates worsens the liquidity creation and this confirms the idea that banks facing troubled economic situations reduce liquidity creation. The findings show a significant negative relationship between economic growth (GDP) and liquidity creation in emerging Asian markets. The negative impact of economic growth on liquidity creation supports the argument that some financial institutions may act in an extremely lax way during economic booms. They do not consider the cyclic nature of economic growth and hence tend to undervalue risk. This lax behavior during times of economic growth hampers banks from creating capital buffers and hence reduces liquidity creation (Ayuso et al., 2004).

The findings regarding ownership structure models show that managerial ownership has a positive impact on liquidity creation, while ownership concentration tends to decrease bank liquidity creation. However, the combined effect of regulatory capital is only proved in the case of its interaction with ownership concentration (OC10), where it has a positive effect on liquidity formation. The findings imply that, in the case of high capital, a bank with concentrated ownership tends to take more risks and create further liquidity.

The study results suggest several policy measures. First, the effect of regulatory capital on liquidity formation is positive, which shows that banks with high capital ratios are more likely to create liquidity, as high capital improves the risk-bearing capability. Second, the formation of new liquidity standards under Basel III may support the solvency of banks, with regulatory capital requirements, but limit the funds offered to businesses and families, and may reduce the economic activity in emerging markets. So, in the case of emerging Asian economy, where the banking sector remains a key source of financial intermediation, constructing a resilient banking structure is a need of paramount importance. However, the regulators besides nurture a wide range of innovative markets comprising derivatives and corporate bond markets to improve the spirit of the financial system.

Appendix

Table A1. Liquidity Creation Indicator (LCI) Estimations.

LCI	Model 1 (Base)		Model 1 (Base)		Model 2 (FO)		Model 2 (MO)	
	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Cons.	0.104	.007**	0.102	.012**	0.191	.001***	0.203	.001
LCI($t − 1$)	0.562	.000***	0.564	.000***	0.255	.000***	0.340	.000
CAP	0.379	.064*	0.384	.064*	−0.206	.297	−0.124	.471
PBV	0.003	.016**	0.003	.011**	0.003	.067*	0.002	.094
BMP	−0.026	.036**	−0.026	.046**	0.015	.288		
SDR	−0.382	.000***	−0.382	.000***	−0.435	.000***	−0.458	.000
NLTD	−0.010	.459	−0.010	.465			0.014	.825
GDP	−0.122	.356	−0.138	.366				
DCPS	0.041	.150	0.047	.139	0.026	.402		
RIR			−0.032	.657				
MPI					0.279	.372	0.148	.602
INF							−0.084	.347
FO					−0.025	.444		
MO							−0.099	.806
AR(1), AR(2), (Prob)	0.000	.143	0.001	.151	0.017	.298	0.018	.459
Wald χ^2 (Prob)	674.78	.000***	656.64	.000***	312.31	.000***	529.23	.000***
No. of banks	128		128		78		58	
No. of obs.	1,539		1,539		813		619	

Note. Table A1 presents the robustness test estimations. This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The measure of liquidity creation is the Berger & Bouwman liquidity creation indicator (LCI). Capital (CAP) is measured by tier 1 capital ratio. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. PBV = price-to-book value; BMP = bank market power; SDR = subordinate debt ratio; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; DCPS = domestic credit to private sector; MPI = monetary policy indicator; GMM = generalized method of moments.
*, **, and *** denote significance level at 10%, 5%, and 1%, respectively.

Table A2. Robustness Tests with Ownership (LCI).

LCI	Model 2 (OC5)		Model 3 (OC5*CAP)		Model 2 (OC10)		Model 3 (OC10*CAP)	
	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Cons.	0.269	.000***	0.139	.234	0.156	.032**	0.059	.749
LCI($t − 1$)	0.274	.000***	0.311	.000***	0.296	.000***	0.281	.000***
CAP	−0.214	.372	0.674	.456	0.080	.611	1.391	.420
PBV	0.003	.111	0.003	.038**	0.003	.054*	0.004	.029**
BMP	0.032	.068*	0.018	.307				
SDR	−0.448	.000***	−0.418	.000***	−0.454	.000***	−0.446	.000***
NLTD	−0.004	.789	−0.003	.841	−0.003	.876	0.004	.877
GDP	0.086	.490	0.178	.155	0.083	.483	0.149	.270
DCPS	−0.010	.727	0.021	.403	0.016	.518	0.014	.559
OC5	−0.064	.146	0.075	.620				
OC5*CAP			−0.011	.297				
OC10					−0.024	.507	0.221	.427
OC10*CAP							−0.024	.362
AR(1), AR(2), (Prob)	0.009	.407	0.006	.384	0.008	.375	0.009	.518
Wald χ^2 (Prob)	457.76	.000***	337.10	.000***	562.16	.000***	414.63	.000***
No. of banks	94		94		95		95	
No. of obs.	943		943		955		955	

Note. Table A2 presents the robustness test estimations. This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The measure of liquidity creation is the Berger and Bouwman liquidity creation indicator (LCI). Capital (CAP) is measured by tier 1 capital and total capital ratios and profitability (PROF) is measured by return on equity. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. LCI = liquidity creation indicator; OC = ownership concentration; PBV = price-to-book value; BMP = bank market power; SDR = subordinate debt ratio; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; DCPS = domestic credit to private sector; GMM = generalized method of moments.
*, **, and *** denote significance level at 10%, 5%, and 1%, respectively.

Table A3. Robustness Tests (LCI).

LCI	Crisis dummy model		Crisis dummy model		Basel dummy model		Basel dummy model	
	Coeff.	p value	Coeff.	p value	Coeff.	p value	Coeff.	p value
Cons.	0.138	.000***	0.149	.289	0.205	.167	0.179	.253
LCI(t − 1)	0.567	.000***	0.583	.000***	0.552	.000***	0.575	.000***
CAP	0.327	.092*	0.107	.726	0.378	.091*	−0.273	.349
PBV	0.004	.000***	0.004	.010**	0.003	.012**	0.004	.017**
BMP	−0.023	.099*	0.006	.791	−0.010	.622	0.014	.599
SDR	−0.379	.000***	−0.389	.000***	−0.384	.000***	−0.390	.000***
SIZE			−0.005	.647	−0.008	.425	−0.003	.765
NLTD	−0.007	.552						
GDP	−0.185	.215	0.150	.431	−0.128	.389	0.151	.372
INF	0.028	.652	−0.070	.297	0.039	.578		
MPI			1.476	.042**			1.224	.122
DCPS					0.036	.296	−0.006	.837
CD	−0.006	.404	0.038	.132				
CD*CAP			−0.411	.101				
BTD					0.004	.658	−0.021	.394
BTD*CAP							0.156	.470
AR(1), AR(2), (Prob)	0.000	.157	0.002	.393	0.001	.158	0.005	.347
Wald χ² (Prob)	668.66	.000***	757.45	.000***	684.51	.000***	694.79	.000***
No. of banks	128		90		128		90	
No. of obs.	1,539		1,057		1,539		1,057	

Note. Table A3 presents the robustness test estimations. This study uses Arellano and Bover's (1995) two-step dynamic panel system GMM method for model estimation and hetero-robust errors are reported to tackle the problem of heterogeneity. The measure of liquidity creation is the Berger & Bouwman liquidity creation indicator (LCI). Capital (CAP) is measured by tier 1 capital ratio. CD represents the crisis dummy which takes the value of 1 from 2008 to 2010 and 0 otherwise. BTD represents the Basel III dummy, which takes the value 1 from 2010 onward and 0 otherwise. The AB test is applied to investigate the problem of autocorrelation in error terms. The number of cross sections is higher than that of instruments employed which avoids the overidentification problem. LCI = liquidity creation indicator; PBV = price-to-book value; BMP = bank market power; SDR = subordinate debt ratio; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; MPI = monetary policy indicator; DCPS = domestic credit to private sector; CD = crisis dummy; BTD = Basel III dummy; GMM = generalized method of moments.
*, **, and *** denote significance level at 10%, 5% and 1%, respectively.

Table A4. Fisher's Panel Unit-Root.

Phillips–Perron (PP) test			Augmented Dickey–Fuller (ADF) test		
Variable	Statistics	p value	Variable	Statistics	p value
INSFR	1,260.17	.000	INSFR	1,260.17	.000
LCI	1,643.33	.000	LCI	1,643.33	.000
CAP(T1R)	819.88	.000	CAP(T1R)	819.88	.000
CAP(TCR)	649.04	.000	CAP(TCR)	649.04	.000
NLTD	820.30	.000	NLTD	820.30	.000
ROE	535.96	.000	ROE	535.96	.000
LLRR	886.04	.000	LLPR	886.04	.000
SIZE	373.07	.022	SIZE	373.07	.022
SDR	569.65	.000	SDR	569.65	.000
PBV	2,702.28	.000	PBV	2,702.28	.000
GDP	1,052.44	.000	GDP	1,052.44	.000
MPI	507.05	.000	MP	507.05	.000
INF	1,279.73	.000	INFC	1,279.73	.000
DCPS	374.61	.019	DCPS	374.61	.019
FO	309.01	.000	FO	309.01	.000
MO	350.06	.000	MO	350.06	.000
OC5	353.71	.000	OC5	353.71	.000
OC10	593.42	.000	OC10	593.42	.000

Note. The Fisher test is employed due to the unbalanced panel data structure and to account for cross-section dependency. The null hypothesis is that all panels have unit root with the alternate that at least one of them is stationary. The p values indicate rejection of the null hypothesis for all variables, which shows that the panel has no unit-root. LCI = liquidity creation indicator; TCR = total capital ratio; NLTD = net-loan-to-deposit ratio; ROE = return on equity; SDR = subordinate debt ratio; PBV = price-to-book value; GDP = gross domestic product; MPI = monetary policy indicator; DCPS = domestic credit to private sector; OC = ownership concentration.

Table A5. Correlation Matrix.

	INSFR	LCI	TIR	TCR	BMP	SIZE	SDR	PBV	NLTD	PROF	LLRR	GDP	MPI	MO	FO	OC5	OC10	DCPS	INF
INSFR	1																		
LCI	.061* (.005)	1																	
TIR	.074* (.001)	.010 (.648)	1																
TCR	.065* (.002)	.008 (.713)	.955* (.000)	1															
BMP	.023 (.285)	-.017 (.439)	-.036 (.095)	-.022 (.306)	1														
SIZE	.031 (.151)	.023 (.295)	-.253* (.000)	-.245* (.000)	.405* (.000)	1													
SDR	-.186* (.000)	-.219* (.000)	.060* (.015)	.104* (.000)	-.119* (.000)	-.043 (.079)	1												
PBV	-.047* (.029)	.044* (.042)	.056* (.010)	.062* (.004)	-.013 (.560)	-0.039 (.068)	-.084* (.001)	1											
NLTD	.003 (.893)	=.002 (.935)	.020 (.348)	.016 (.456)	-.011 (.606)	-.020 (.349)	-.022 (.371)	-.002 (.911)	1										
PROF	.175* (.000)	-.014 (.512)	-.025 (.241)	-.023 (.294)	.042 (.054)	.011 (.601)	-.063* (.010)	.099* (.000)	.002 (.925)	1									
LLRR	-.195* (.000)	-.032 (.150)	.009 (.667)	.006 (.779)	-.061* (.006)	.029 (.196)	.068* (.007)	-.004 (.854)	.014 (.536)	-.346* (.000)	1								
GDP	-.009 (.682)	-.010 (.640)	-.098* (.000)	-.102* (.000)	-.203* (.000)	-.055* (.010)	-.020 (.414)	.102* (.000)	-.004 (.852)	.158* (.000)	-.071* (.001)	1							
MPI	-.012 (.591)	.084* (.000)	.110* (.000)	.121* (.000)	-.173* (.000)	.287* (.000)	.120* (.000)	.009 (.688)	-.030 (.167)	-.146* (.000)	.133* (.000)	-.263* (.000)	1						
MO	.080* (.020)	-.011 (.743)	.034 (.331)	.032 (.357)	-.032 (.351)	-.198* (.000)	-.086* (.032)	-.023 (.507)	-.111* (.001)	.008 (.821)	-.086* (.013)	-.251* (.000)	.096* (.005)	1					
FO	-.042 (.169)	.103* (.001)	.062* (.044)	.086* (.005)	.215* (.000)	.214* (.000)	-.055 (.116)	.020 (.512)	.140* (.000)	.100* (.001)	-.066* (.031)	.037 (.225)	-.098* (.001)	.036 (.336)	1				
OC5	-.035 (.220)	.077* (.008)	.163* (.000)	.161* (.000)	.059* (.041)	.114* (.000)	.090* (.005)	-.124* (.000)	.020 (.478)	-.128* (.000)	.062* (.031)	-.100* (.000)	.264* (.000)	-.204* (.000)	-.222* (.000)	1			
OC10	-.106* (.000)	.078* (.006)	.128* (.000)	.137* (.000)	.104* (.000)	.193* (.000)	.072* (.024)	-.087* (.002)	.052 (.066)	-.192* (.000)	.118* (.000)	-.148* (.000)	.304* (.000)	-.267* (.000)	-.208* (.000)	.913* (.000)	1		
DCPS	.003 (.876)	-.047* (.028)	-.146* (.000)	-.152* (.000)	.094* (.000)	-.091* (.000)	-.140* (.000)	-.008 (.717)	.014 (.521)	.122* (.000)	-.075* (.001)	.259* (.000)	-.818* (.000)	-.145* (.000)	.103* (.001)	.339* (.000)	-.374 (.000)	1	
INF	-.004 (.852)	.045* (.039)	.045* (.039)	.054* (.012)	-.175* (.000)	-.007 (.760)	.071* (.004)	-.011 (.597)	-.016 (.465)	-.073* (.001)	.082 (.000)	-01.79* (.000)	.680* (.000)	.141* (.000)	-.151* (.000)	.133* (.000)	.156* (.000)	-.576* (.000)	1

Note. The *p* values are given in parenthesis and represent significance level at 5%. LCI = liquidity creation indicator; TCR = total capital ratio; BMP = bank market power; SDR = subordinate debt ratio; PBV = price-to-book value; NLTD = net-loan-to-deposit ratio; GDP = gross domestic product; MPI = monetary policy indicator; OC = ownership concentration; DCPS = domestic credit to private sector.

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References

Admati, A. R., DeMarzo, P. M., Hellwig, M. F., & Pfleiderer, P. (2018). The leverage ratchet effect. *The Journal of Finance*, *73*(1), 145–198.

Allen, F., & Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit and Banking*, *36*, 453–480.

Andries, N., & Billon, S. (2010). The effect of bank ownership and deposit insurance on monetary policy transmission. *Journal of Banking & Finance*, *34*(12), 3050–3054.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297.

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

Ayuso, J., Pérez, D., & Saurina, J. (2004). Are capital buffers pro-cyclical? Evidence from Spanish panel data. *Journal of Financial Intermediation*, *13*(2), 249–264.

Bank of International Settlements. (2009). *International framework for liquidity risk, measurement and monitoring* [Consultative document].

Barry, T. A., Lepetit, L., & Strobel, F. (2016). Bank ownership structure, lending corruption and the regulatory environment. *Journal of Comparative Economics*, *44*(3), 732–751.

Barry, T. A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking & Finance*, *35*(5), 1327–1340.

Basel Committee on Banking Supervision. (2010). *Basel III: A global regulatory framework for more resilient banks and banking systems*.

Basel Committee on Banking Supervision. (2013). *The liquidity coverage ratio and liquidity risk monitoring tools*. Bank for International Settlements.

Batten, J. A. (2011). Financial sector reform and regulation in the Asia-Pacific region: A perspective. *Journal of the Asia Pacific Economy*, *16*(3), 285–293.

Bawazir, H., Degl'innocenti, M., & Wolfe, S. (2018). Bank market power and liquidity creation. *European Financial Management*. https://www.efmaefm.org/0efmameetings/efma%20annual%20meetings/2018-Milan/papers/EFMA2018_0405_fullpaper.pdf

Berger, A. N., & Bouwman, C. H. (2009). Bank liquidity creation. *The Review of Financial Studies*, *22*(9), 3779–3837.

Berger, A. N., & Bouwman, C. H. (2017). Bank liquidity creation, monetary policy, and financial crises. *Journal of Financial Stability*, *30*, 139–155.

Berger, A. N., Bouwman, C. H., Kick, T., & Schaeck, K. (2016). Bank liquidity creation following regulatory interventions and capital support. *Journal of Financial Intermediation*, *26*, 115–141.

Berger, A. N., Clarke, G. R., Cull, R., Klapper, L., & Udell, G. F. (2005). *Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership*. The World Bank.

Berger, A. N., Dai, Q., Ongena, S., & Smith, D. C. (2003). To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European Nations. *Journal of Banking & Finance*, *27*(3), 383–415.

Berger, A. N., & Sedunov, J. (2017). Bank liquidity creation and real economic output. *Journal of Banking & Finance*, *81*, 1–19.

Bertay, A. C., Demirgüç-Kunt, A., & Huizinga, H. (2012). *Bank ownership and credit over the business cycle: Is lending by state banks less procyclical?* The World Bank.

Bonin, J. P., Hasan, I., & Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries. *Journal of Banking & Finance*, *29*(1), 31–53.

Brei, M., & Schclarek, A. (2015). A theoretical model of bank lending: Does ownership matter in times of crisis? *Journal of Banking & Finance*, *50*, 298–307.

Brown, M., Maurer, M. R., Pak, T., & Tynaev, N. (2009). The impact of banking sector reform in a transition economy: Evidence from Kyrgyzstan. *Journal of Banking & Finance*, *33*(9), 1677–1687.

Busta, I., Sinani, E., & Thomsen, S. (2014). Ownership concentration and market value of European banks. *Journal of Management & Governance*, *18*(1), 159–183.

Casu, B., di Pietro, F., & Trujillo-Ponce, A. (2019). Liquidity creation and bank capital. *Journal of Financial Services Research*, *56*(3), 307–340.

Claessens, S., & Van Horen, N. (2014). Foreign banks: Trends and impact. *Journal of Money, Credit and Banking, 46*(Suppl. 1), 295–326.

Cull, R., & Peria, M. S. M. (2013). Bank ownership and lending patterns during the 2008–2009 financial crisis: Evidence from Latin America and Eastern Europe. *Journal of Banking & Finance*, *37*(12), 4861–4878.

Davydov, D., Fungáčová, Z., & Weill, L. (2018). Cyclicality of bank liquidity creation. *Journal of International Financial Markets, Institutions and Money*, *55*, 81–93.

De Haas, M. R., Korniyenko, M. Y., Pivovarsky, M. A., & Loukoianova, E. (2012). *Foreign banks and the Vienna initiative: Turning sinners into saints?* (No. 12-117). International Monetary Fund.

De Haas, M. R., & Van Lelyveld, I. (2014). Multinational banks and the global financial crisis: Weathering the perfect storm? *Journal of Money, Credit and Banking*, *46*(Suppl. 1), 333–364.

Díaz, V., & Huang, Y. (2017). The role of governance on bank liquidity creation. *Journal of Banking & Finance*, *77*, 137–156.

Distinguin, I., Roulet, C., & Tarazi, A. (2013). Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking & Finance*, *37*(9), 3295–3317.

Dong, Y., Meng, C., Firth, M., & Hou, W. (2014). Ownership structure and risk-taking: Comparative evidence from private

and state-controlled banks in China. *International Review of Financial Analysis*, *36*, 120–130.

Duqi, A., & Al-Tamimi, H. A. H. (2018). The impact of owner's identity on banks' capital adequacy and liquidity risk. *Emerging Markets Finance and Trade*, *54*(2), 468–488.

Financial Times Stock Exchange Russell. (2018). *FTSE classification of markets*.

Flannery, M. J., & Rangan, K. P. (2008). What caused the bank capital build-up of the 1990s? *Review of Finance*, *12*(2), 391–429.

Fu, X., Lin, Y., & Molyneux, P. (2016). Bank capital and liquidity creation in Asia Pacific. *Economic Inquiry*, *54*(2), 966–993.

Fungáčová, Z., Weill, L., & Zhou, M. (2017). Bank capital, liquidity creation and deposit insurance. *Journal of Financial Services Research*, *51*(1), 97–123.

Gorton, G., & Rosen, R. (1995). Corporate control, portfolio choice, and the decline of banking. *The Journal of Finance*, *50*(5), 1377–1420.

Gropp, R., & Heider, F. (2010). The determinants of bank capital structure. *Review of Finance*, *14*(4), 587–622.

Hammami, Y., & Boubaker, A. (2015). Ownership structure and bank risk-taking: Empirical evidence from the Middle East and North Africa. *International Business Research*, *8*(5), 271–284.

Hassan, M. K., Khan, A., & Paltrinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, *48*, 17–31.

Havrylchyk, O., & Jurzyk, E. (2011). Inherited or earned? Performance of foreign banks in Central and Eastern Europe. *Journal of Banking & Finance*, *35*(5), 1291–1302.

Haw, I. M., Ho, S. S., Hu, B., & Wu, D. (2010). Concentrated control, institutions, and banking sector: An international study. *Journal of Banking & Finance*, *34*(3), 485–497.

Horváth, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research*, *45*(3), 341–361.

Hossain, M. Z., Khan, M. A. R., & Sadique, M. S. (2018). Basel III and perceived resilience of banks in the BRICS economies. *Applied Economics*, *50*(19), 2133–2146.

Labra, R., & Torrecillas, C. (2018). Estimating dynamic panel data. A practical approach to perform long panels. *Revista Colombiana de Estadística*, *41*(1), 31–52.

Laidroo, L. (2016). Bank ownership and lending: Does bank ownership matter? *Emerging Markets Finance and Trade*, *52*(2), 285–301.

Le, T. (2019). The interrelationship between liquidity creation and bank capital in Vietnamese banking. *Managerial Finance*, *45*(2), 331–347.

Lensink, R., & Naaborg, I. (2007). Does foreign ownership foster bank performance? *Applied Financial Economics*, *17*(11), 881–885.

Mahdi, I. B. S., & Abbes, M. B. (2018). Relationship between capital, risk and liquidity: A comparative study between Islamic and conventional banks in MENA region. *Research in International Business and Finance*, *45*, 588–596.

Mileva, E. (2007). *Using Arellano-Bond dynamic panel GMM estimators in Stata*. Economics Department, Fordham University.

Mirza, S. S., Safdar, R., & Yu, Y. (2019). Managerial empowerment and firm risk-taking. *SAGE Open*, *9*(2), 2158244019856963. https://doi.org/10.1177/2158244019856963

Mukhopadhyay, J., & Chakraborty, I. (2017). Foreign institutional investment, business groups and firm performance: Evidence from India. *Research in International Business and Finance*, *39*, 454–465.

Nier, E., & Baumann, U. (2006). Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation*, *15*(3), 332–361.

Oino, I. (2018). Impact of regulatory capital on European banks financial performance: A review of post global financial crisis. *Research in International Business and Finance*, *44*, 309–318.

Repullo, R. (2004). Capital requirements, market power, and risk-taking in banking. *Journal of Financial Intermediation*, *13*(2), 156–182.

Reverchuk, S., Lobozynska, S., & Megits, N. (2013). Evaluating the efficiency of banking systems during a pre-crisis and crisis period by using cluster analysis (2004-2009). *SAGE Open*, *3*(4), 2158244013504575.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, *71*(1), 135–158.

Saona, P., & Azad, M. A. K. (2018). Bank-and country-based determinants of banks' performance in Asia. *Journal of the Asia Pacific Economy*, *23*(3), 428–446.

Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal*, *2*(1), 40–53.

Tanda, A. (2015). The effects of bank regulation on the relationship between capital and risk. *Comparative Economic Studies*, *57*(1), 31–54.

Tran, V. T., Lin, C. T., & Nguyen, H. (2016). Liquidity creation, regulatory capital, and bank profitability. *International Review of Financial Analysis*, *48*, 98–109.

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, *71*, 69–78.

Umar, M., Sun, G., & Majeed, M. A. (2017). Bank capital and liquidity creation: Evidence of relation from India. *Journal of Asia Business Studies*, *11*(2), 152–166.

Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking & Finance*, *61*, 1–14.

Von Thadden, E. L. (2004). Asymmetric information, bank lending and implicit contracts: The winner's curse. *Finance Research Letters*, *1*(1), 11–23.

Vu, H., & Nahm, D. (2013). The determinants of profit efficiency of banks in Vietnam. *Journal of the Asia Pacific Economy*, *18*(4), 615–631.

Vu, M. C., Phan, T. T., & Le, N. T. (2018). Relationship between board ownership structure and firm financial performance in transitional economy: The case of Vietnam. *Research in International Business and Finance*, *45*, 512–528.

Xie, W. (2016). The empirical study on the relationship between bank liquidity creation and capital—Based on empirical data from 2004 to 2014 in Chinese Banks. *Modern Economy*, *7*(4), 426–433.

Zheng, C., Moudud-Ul-Huq, S., Rahman, M. M., & Ashraf, B. N. (2017). Does the ownership structure matter for banks' capital regulation and risk-taking behavior? Empirical evidence from a developing country. *Research in International Business and Finance*, *42*, 404–421.