FEDERAL FUNDS RATE SPILLOVER EFFECT ON EMERGING MARKET BANKING LIQUIDITY AND CAPITAL – EVIDENCE FROM INDONESIA

Wahyu Fahrul Ridho[1]

Universitas Pembangunan Nasional "Veteran" Jawa Timur[1]

Correspondence email: wahyu.ridho.adbis@upnjatim.ac.id1

ABSTRACT

This paper examines the spillover effect of the fed fund rate (FFR) on emerging banking liquidity and capital in emerging markets, especially in Indonesia, using the Structural Equation Model (SEM). Data were collected from the Indonesia Central Bank and Financial Services Authority. Our model reveals a significant indirect negative relationship between FFR, banking liquidity, and capital. This relationship was examined both directly and indirectly using the model. While the FFR influence was robust, the impact on liquidity and capital was translated through the local bank rates. It is found that rising interest rates would still result in tighter liquidity to some extent. FFR also impacts capital decisions because the rising interest rate might incentivize managers to borrow from a lower market environment. Thus, observing the indirect relationship, the impact of the FFR depends on the local central bank monetary policy transmission to mitigate the spillover effect resulting from developed economy monetary policy.

Keywords: Fed Fund Rate, Spillover Effect, Emerging Market, Banking Liquidity

A. INTRODUCTION

Historical precedents illustrate that despite the severe detrimental impact of the global financial crisis on the financial system, it also heralded a period of rapid economic and financial expansion. The global pandemic 2020 wrought havoc on the economy, notably affecting the financial sector, particularly the banking industry (KPMG, 2020). This disruption in economic activity engendered a slump in demand within the lending market, thereby eliciting a monetary policy reaction from central banks characterized by interest rate reductions aimed at stimulating market activity (Benchimol et al., 2021).

In the context of monetary policy signaling, the United States has consistently emerged as the most awaited actor in comparison to central banks of other countries. This is attributable

to the intertwined nature of contemporary financial and economic systems worldwide, which invariably generate knock-on effects in other nations (Martinez-Jaramillo et al., 2019). Long-standing research has identified a link between monetary policy and capital movement across economies. For instance, hawkish stances adopted by the United States central bank (The Fed) have traditionally led to capital migration from emerging to advanced economies, motivated by the prospect of increasing asset yields at lower risk (Olaberría, 2015).

While the originating country of monetary policy signaling does experience its impact, emerging markets are equally, if not more, affected, often detrimentally. This cross-country policy impact, the spillover effect, can pose significant threats to economic recovery efforts in emerging economies such as Indonesia (Tillmann et al., 2019). Capital and liquidity, particularly in the banking industry, emerged as pivotal factors for economic growth during and after the pandemic.

In reaction to the COVID-19 pandemic, worldwide central banks and treasuries initiated emergency lending and additional financial support measures for businesses. Governments commenced direct business loans independently and with the traditional banking sector. Indonesia's Central Bank (BI) and Financial Services Authority (OJK) adopted a similar approach. Indonesia's banking sector showcased resilience during the pandemic through COVID-19 responsive policies such as monetary policy easing, credit relief programs, and stringent regulation of minimum reserve requirements (Ekarina & Fedrichson, 2021).

Despite the ample liquidity resulting from policy mix and market dynamics, the lending market exhibited stagnation for the banking sector in the pandemic's initial stages. Small and medium-sized businesses and companies in sectors disproportionately affected by the crisis, such as cargo and passenger airlines, were prioritized for funding (Daniel, 2021). Although banking liquidity demonstrated robustness during the pandemic, the impending rise in interest rates in the face of global uncertainty and the COVID-19 scarring effect inflating US inflation to unsustainable levels remained a concern. Central banks worldwide have begun employing tighter monetary policy to counteract inflation as a potential spillover effect, especially in emerging economies.

While the monetary policy spillover effect poses a significant concern, limited studies examine the impact of the federal fund rate (FFR), the Fed's primary monetary policy instrument, and its implications for liquidity and ratios within the banking sector of emerging

markets. The banking landscape of emerging markets differs from that of developed economies, with the former's financial systems heavily reliant on banks compared to the latter, where financial intermediaries' roles are more diversified (Demirgüç-Kunt & Huizinga, 2000). Therefore, US monetary policy's effect on emerging markets' banking sector warrants further exploration. As the US and UK plunged into recession in 2022, emerging markets must anticipate its spillover effect. This study intends to augment the existing body of knowledge regarding liquidity and capital in the banking sector of emerging markets, specifically on the FFR movement, with a particular focus on Indonesia. In the face of the 2022 recession in developed economies such as the US and UK, it is incumbent upon emerging markets to anticipate and mitigate the potential repercussions of such financial fluctuations. This research aims to deliver novel insights and recommendations by examining the implications of the Federal Reserve's primary monetary policy instrument, the federal funds rate (FFR), on the liquidity and capital ratios of the banking sector in emerging markets.

This study's significance is underlined by the distinctiveness of the banking environment in emerging markets, which is characteristically more reliant on banks, as opposed to developed economies where financial intermediaries play a more diverse role (Demirgüç-Kunt & Huizinga, 2000). Thus, US monetary policy's impact on these emerging markets' banking sectors calls for detailed investigation and analysis.

By focusing on Indonesia as a representative case study, this research will shed light on the dynamic interplay between international monetary policy shifts and local banking liquidity and capital ratios in emerging markets. It is anticipated that the findings of this research will contribute valuable insights to the academic discourse on global economic dynamics and offer practical guidance for policymakers and stakeholders in the banking sector of emerging economies.

B. LITERATURE REVIEW

Spillover Effect of Monetary Policy in Emerging Markets

The spillover effects of monetary policy in major advanced economies, especially from the United States to emerging market economies, are a topic of intense discussion in international and national policy circles. There are a plethora of studies that examine the significant influence US monetary policy has on the emerging market. Wongswan (2009)

discovers that unanticipated changes in the monetary policy rate may impact 15 worldwide stock market indexes. Additionally, Brusa et al. (2020) offer proof in favor of the dominant position of US monetary policy. Dahlhaus et al. (2020) examine an increase in US monetary policy expectations while the policy's unchanged rate significantly increases portfolio flows to an emerging market. Chen (2014) found that while the spillover effect stems more from structural factors such as the use of the new instrument and asset purchase, the traditional signaling channel of monetary policy continues to play a leading role in transmitting shocks impacting the longer-term bond yield. Aside from the balance sheet impact, advanced economies' monetary policies are still significant in the interest rate changes in emerging markets (Tillmann et al., 2019). The spillover effect of monetary policy in advanced economies in the lending market was more severe in the emerging economies, which tend to have a more severe health crisis during a pandemic (Çolak & Öztekin, 2021).

Banking Liquidity and Capital

Since the global financial crisis began in September 2008, a significant number of research on the liquidity risk of the banking system has been released. While Aiyar(2011), Beirne et al.(2013), Cornett et al. (2011), Ivashina et al. (2010), and Männasoo et al. (2009) examined the consequences and risk developments during the global crisis, Covitz et al. (2009) and Eichengreen et al. (2012) noticed the causes remaining at the crisis's roots. In 2008, the developed market liquidity risk increased dramatically, and through contagion, this had severe effects on emerging market economies.

In times of financial crisis worldwide, cross-border financial groups enable imbalances to move quickly between nations. Evidence for this can be found in Cetorelli and Goldberg(2012), Detragiache and Gupta (2006), De Haas and Van Lelyveld (2010), and Pokutta and Schmaltz (2011). However, Dinger (2009) stressed the stability of international banks' presence in emerging markets. Banks serve as a source of liquidity for both borrowers and depositors. Chang and Lin (2006), Gatev et al. (2009), and King (2010) highlighted the connections between lending and funding and concentrated on the liquidity risk arising from both activities. According to Gatev et al. (2009), performing both functions by the same financial institution is more effective from the liquidity management perspective than separating lending from financing in specialized financial organizations. Belke et al.(2010), who emphasize the connections with asset markets, and Skeie(2008), who noted that liquidity

crises do not always result from balance sheet maturity mismatches in banks, further research on banking system liquidity. Banks must continuously tweak and improve their liquidity cushion.

Capital has been long studied mainly in the context of capital structure. However, few studies look at the factors that affect banks' capital structures because this study is often done for non-financial companies (Harun et al., 2020). Banks, which are thought to be highly leveraged, should be able to decide how much capital is necessary to cover unexpected losses resulting from their everyday activities, especially regarding developed countries' monetary policies. From the country's perspective, this capital structure was of significant concern due to its potential systemic effect, as emerging economies' financial systems tend to rely heavily on banks rather than financial intermediaries (Demirgüç-Kunt & Huizinga, 2000). Bank capital sensitivity to interest rate was also studied. However, the scope is only for local central bank rates impact. Studies by Ahmad et al. (2008) and Abbas et al. (2020) examine that local central bank interest rates in emerging markets determine bank capital. The reverse is also true, that bank capital influences monetary policy so that weakening the ability to generate profit for capital could lead to restrictive lending policies, thus reducing the impact of accommodative monetary policy (Bundesbank, 2018). It could be generalized that the relationship of bank capital was influenced by interest rate, but the evidence is still few.

C. RESEARCH METHOD

This study used an explanatory design, also known as a "causal research design," as its methodology. In these investigations, the researcher is challenged by "cause-and-effect" issues, separating such causes as the researcher's primary duty.

Data for this study was sourced from secondary databases maintained by the Financial Services Authority of Indonesia (OJK) and the Central Bank of Indonesia. The data encompasses five years, running from January 2017 to June 2022. The dataset includes several financial indicators, such as the Federal Fund Rate, BI 7-day Repo Rate, Liquidity Coverage Ratio (LCR), Liquid Assets, and Capital Adequacy Ratio (CAR). These indicators were chosen for their relevance to the study's objectives and the availability of consistent data throughout the sample period to mitigate the risk of biased outcomes. The population represented by this data includes banks under the OJK and Central Bank purview, sourced from monthly banking

statistics, effectively capturing a comprehensive snapshot of Indonesia's financial landscape over the selected timeframe.

The theoretical model (original model) includes an exogenous latent variable and three endogenous latent variables. The exogenous latent variable is the Federal Funds Rate. The model employs three endogenous latent variables: BI rate, liquidity, and capital, as shown in Figure 1. While the BI rate counts as an endogenous variable, the BI rate is used more as a mediator variable to affect the dependent variable. At the same time, the independent variable also points directly to the dependent variables. Intervening variables reveal a genuine relationship between in-between and dependent constructs (Hair Jr et al., 2017).
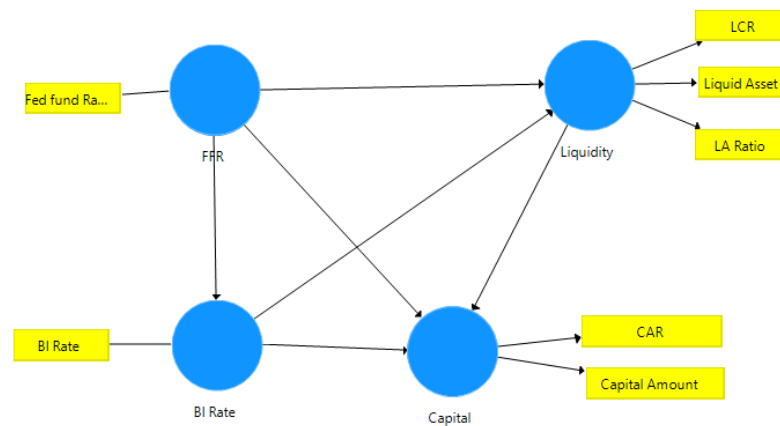

Figure 1. Variable Construct

Sources: Previous research is processed, 2023

Table 1 Measurement Variable

Latent Variables	Observed Variables	Indicator
Federal Fund Rate	Federal Fund Rate	Secondary Data
BI Rate	BI 7-Day Repo Rate	Secondary Data
Liquidity	LCR	High Quality Liquid Asset (HQLA)/Net
	Liquid Asset	Cash Outflow 30 days
		Amount of Liquid Asset
	Liquid Asset Ratio	Liquid Asset/Total Asset
Capital	Capital Amount	Capital Amount
	CAR	Capital Amount/Risk Weighted Asset

Sources: Previous research is processed, 2023

SEMs provide flexibility for testing such models by enabling the use of multiple predictors and criterion variables, the construction of latent (unobservable) variables, modeling measurement errors for observed variables, and testing mediation and moderation relationships

in a single model (Bentler & Huang, 2014; Bisbe & Malagueño, 2015; Hair et al., 2012; Nitzl, 2016). SEM covers all reflected indicators in a single construct. The two types of SEM employed in research are partial least squares structural equation modeling (PLS-SEM) and covariance-based structural equation modeling (CB-SEM). Compared to CB-SEM, PLS-SEM has seen a rise in utilization due to theoretical and methodological concerns (Hair et al., 2012; Ringle, 2015). PLS-SEM effectively explains variance that predicts construct relationships (Kumar & Sujit, 2018).

This approach emphasizes maximizing the explained variance of endogenous latent variables rather than reproducing the theoretical covariance matrix. The PLS-SEM methodology comes in handy when dealing with highly complex data. This methodology estimates latent variables through composites, which are exact linear combinations of the indicators given to the latent variables (Nitzl, 2016).

Internal consistency reliability is typically assessed using "Cronbach's alpha," but this method yields conservative results in PLS-SEM. Hair et al. (2017) claim that earlier literature has recommended using composite reliability as an alternative. Considering this context, Table 2 in the study presents the composite dependability. In exploratory research, the acceptable range for composite reliability values is 0.60 to 0.70, and in more advanced stages of study 0.70 to 0.90. The composite reliability score of all the latent constructs is in the range of 0.9, as shown in Table 2, confirming the reliability of the latent variables. The latent variables are kept in the model since the average variance extracted (AVE) value is more significant than 0.5, and the construct-qualified composite reliability test both passes. Once more, Table 2 displays the indicator reliability, essentially the loading squares. Every indicator's reliability value is significantly higher than the lowest permissible level of 0.4 and nearly at the desired level of 0.8 to 0.9.

It is essential to confirm the conceptual validity of each variable AVE. Convergent validity is proven if all AVEs are higher than the cutoff 0.5. All AVEs in Table 2 are more than 0.5, confirming the convergent validity. Numerous methods are used to estimate the Path coefficient of the measurement model to guarantee the stability of the link between the latent variables. According to Kock (2015), reported by Kumar and Sujit (2018), this stable method directly applies exponential smoothing algorithms to produce estimates of the true standard errors compatible with those derived from bootstrapping.

Table 2. Construct Reliability and Validity

Latent Variables	Indicators	Loadings	(STDEV)	T-Stats	P-Values	Composite Reliability	AVE
Federal Fund Rate	Federal Fund Rate	1.000	0.000	-	-	1.000	1.000
BI Rate	BI 7 DRR	1.000	0.000	-	-	1.000	1.000
Liquidity	LCR	0.881	0.275	218.828	0.000	0.957	0.882
	Liquid Asset	0.968	0.290	164.323	0.000	-	-
	Liquid Asset Ratio	0.966	0.438	26.041	0.000	-	-
Capital	Capital Amount	0.945	0.399	60.717	0.000	0.939	0.884
	CAR	0.935	0.280	86.329	0.000	-	-

Sources: Data Processing Result SMART-PLS, 2023

D. RESULTS AND DISCUSSION

The core focus of this section is an in-depth examination of the variables as laid out in Figure 1 and Table 3. Our methodology utilized bootstrapping to establish the structural path significance, shedding light on the complex interplay between the Federal Fund Rate (FFR) and other critical economic indicators—specifically, liquidity and capital within the financial market. Bootstrapping was chosen given the complexities and potential skewness often inherent in financial market variables. We chose bootstrapping because of its robustness to non-normal data. This method allows us to make inferences that are less sensitive to the normality assumption, thereby enhancing the reliability of our findings.

We observed that FFR displayed a statistically significant negative relationship with liquidity and capital, confirmed by the robustness of our statistical tests. To quantify, the coefficient for the FFR's relationship to liquidity stands at -0.815, underscored by a p-value of less than 0.05, which lends credence to the statistical significance of this negative relationship. Similarly, the relationship between FFR and capital is also marked by a significant coefficient of -0.453, further supported by a p-value below 0.05. What these quantitative findings suggest is twofold. First, a rise in the Federal Fund Rate correlates with a detrimental effect on liquidity, signaling potential challenges in cash flows and asset conversions in the financial markets. Second, a similar negative impact extends to capital, implying that financial institutions may face increasing pressure to maintain optimal capital ratios as FFR increases.

Table 3. Bootstrapping Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
BI Rate -> Capital	-0.295	-0.301	0.165	1.786	0.075*
BI Rate -> Liquidity	-0.459	-0.461	0.084	5.490	0.000
FFR -> BI Rate	0.719	0.714	0.068	10.560	0.000
FFR -> Capital	-0.453	-0.449	0.075	6.026	0.000
FFR -> Liquidity	-0.815	-0.813	0.038	21.487	0.000
Liquidity -> Capital	1.236	1.247	0.095	13.007	0.000

Sources: Data Processing Result SMART-PLS, 2023

This analytical narrative does not merely present data points but delves deeper into the implications of these relationships. The significance of the FFR's impact on liquidity and capital is not to be understated, as it directly correlates with the broader economic health. For example, reduced liquidity could hamper the market's ability to respond to sudden financial exigencies effectively (Hameed et al., 2010). Similarly, declining capital levels might indicate increased systemic risks and vulnerability to market shocks (Brownlees & Engle, 2011).

Our investigation reveals a compelling connection between the Federal Fund Rate (FFR) and the BI Rate, as demonstrated by a statistically significant positive coefficient of 0.719. This is further buttressed by a p-value that falls well below the conventional threshold of 0.05, cementing the statistical legitimacy of our findings. The alignment of our results with pre-existing empirical literature is noteworthy. Particularly, our observations are congruent with the studies conducted by Siahaan (2015) and Andrian (2013), who affirm the influence of FFR on BI rates. This mutual validation provides a foundation for analyzing the larger monetary policy framework.

The BI rate is not an isolated economic variable but a critical tool in the Inflation Targeting Framework (ITF), as Juhro and Njindan Iyke (2009) posited. Within this framework, movements in the BI rate are intrinsically linked to inflationary conditions. Mukhlis (2020) amplifies this point by identifying a strong relationship between FFR and the Consumer Price Index—a key component in calculating inflation. This means that FFR indirectly wields influence over the BI rate through its impact on inflation, reaffirming the role of ITF as the architectural backbone of monetary policy decisions.

The significance of FFR as a deciding variable for BI rate movements is not limited to isolated economies but is a phenomenon observed broadly in emerging markets. Edwards

(2010) corroborates this by highlighting the potent transmission of FFR movements to interest rates in emerging markets, particularly Latin America and Asia.

Our data reveals a pivotal relationship between the Federal Fund Rate (FFR) and the BI rate regarding impacting liquidity within the banking sector. This finding aligns seamlessly with Al-Harbi's (2017) and Umar (2016) research, both of whom confirm the significant role of interest rates and monetary policy on banking liquidity, particularly in emerging markets.

The nuanced implications of rising interest rates warrant further discussion. A surge in interest rates can trigger a chain of behaviors within the banking sector, where banks may increase lending activities to maximize profits. While this may lead to short-term profitability, it also poses a significant risk of diminished liquidity. When seen through the lens of macroeconomic factors, credit demand becomes more susceptible to interest rate variations, especially within socio-economic demographics characterized by a lower economic status, as posited by Dehejia et al. (2012).

Moving to the aspect of capital, our analysis shows that a significant negative relationship exists between FFR and capital, backed by a p-value of less than 0.05. This robust statistical result corroborates Harun et al. (2020) assertion that interest rates are a primary determinant in a bank's capital structure decision-making. Banks tend to close liquidity gaps by borrowing in environments with lower interest rates.

Interestingly, this behavior is not uniform across all emerging markets. Ahmad et al. (2008) report that smaller banks in emerging markets, often subjected to more stringent capital requirements, are relatively impervious to interest rate changes. This finding nuances our understanding of the elasticity of capital structures about interest rates, reminding us that a one-size-fits-all interpretation is hardly adequate.

Finally, our study confirms a statistically significant positive relationship between liquidity and capital, substantiated by a p-value below 0.05. This aligns with the findings of Ahmad (2008) and Abbas et al. (2020), who establish that bank liquidity can indeed affect bank capital in Asian and other emerging economies. Additionally, Ahmad (2008) elucidates that the size of the bank further complicates this relationship; larger banks generally have greater flexibility in their capital ratios and, therefore, can afford to be less liquid than their smaller counterparts.

E. CONCLUSION

This study concludes that the spillover effect significantly impacts the banking capital and liquidity in emerging markets, especially Indonesia, through intervening variable BI rates. The study result was consistent with prior studies regarding the relationship between the fed fund rate and the local rate to bank liquidity and capital. However, there are exceptions regarding another variable. A more significant proportion of smaller banks could lead to different results as smaller banks tend to behave differently regarding capital structure allocation and sensitivity to fed fund rate movement. The result suggests that an increase in the Fed Fund Rate leads to an increase in the BI rate as in Indonesia, and most emerging markets adopt flexible inflation targetting frameworks. Therefore lowering liquidity and capital in the long run. It could be assumed that the spillover effect heavily depended on the local rate transmission to accommodate Fed Fund Rate movement in emerging markets. To curb the spillover effect of FFR, monetary policy must be robust and supported by the country's strong economic fundamentals.

Despite the study's methodological rigor, several limitations warrant attention. The research relies solely on secondary data from OJK and the Indonesia Central Bank from 2017 to June 2022, potentially limiting granularity and scope. Additionally, focusing on indicators available throughout this period may lead to omitted variable bias. The study employs an explanatory design and PLS-SEM, which, while robust, could oversimplify complex financial relationships and prioritize explained variance over model fit. Using the BI rate as the single mediator and composite reliability as a measure of internal consistency may also affect the study's comprehensiveness and reliability.

The limitations identified herein present significant avenues for future research. Future studies could aim to include real-time or more granular data, possibly from primary sources, to capture nuanced trends. Alternative research designs and statistical methods might provide a fuller understanding of the complexities inherent in the financial indicators studied. Adding more mediator and control variables could further isolate the impact of federal funds rates on the endogenous variables of BI rate, liquidity, and capital. In addition, addressing these areas could provide a more comprehensive, accurate, and generalizable understanding of the phenomena under investigation.

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