Monetary Policy, Bank Liquidity Creation, and Economic Growth: Evidence from a Structural VAR Analysis

1. Introduction:

Banks are financial intermediaries who receive deposits and issue loans from agents which fuels economic activity, stimulus and growth. Beyond their traditional intermediation role, banks also perform the vital function of liquidity creation where they transform illiquid assets into liquid liabilities that can be easily withdrawn by depositors. Liquidity creation can occur either by On the Balance Sheet where loans are funded by deposits or Off the Balance Sheet where banks extend credit lines, offer guarantees or commitments to future payments. In conjunction, these financing activities expand the money supply and facilitate credit to households and firms. However, excessive liquidity creation may lead to financial crises, especially from off balance sheet activities which may amplify risk-taking and financial instability as banks may be hesitant to revoke credit commitments due to reputational damage or impact on future business relations Berger and Bouwman (2017). Consequently, understanding how monetary policy affects both on- and off- balance sheet liquidity creation is essential for assessing how central banks influence credit controls, financial stability, and ultimately, economic growth. This report investigates whether there is a link between monetary policy, liquidity creation and economic growth.

Previous studies have examined this interaction between monetary policy and liquidity creation, Berger and Bouwman (2017) examined five financial crises and concluded that high liquidity creation relative to the trend could lead to financial crises, ceteris paribus, suggesting that high liquidity creation - particularly Off the Balance Sheet liquidity creation - may be an indicator for a crisis. This literature

continues by stating that they found that there is no evidence that monetary policy had changed banks behaviour during financial crises or normal times.

Caglayan et al (2025) expand upon this literature by analysing whether monetary policy influences bank liquidity creation when the financial environment changes between economic boom and crises periods. They show that the transmission of policy to liquidity creation is asymmetric: expansionary policy boosts liquidity when it is scarce but curbs it when liquidity is abundant. Consistent with Berger and Bouwman (2017), they find that Off the Balance Sheet liquidity creation is especially sensitive to policy actions before crises. These findings reinforce the view that monetary policy's effectiveness depends on the financial environment and that excessive liquidity creation can both promote and threaten economic growth.

Building on these insights, this study examines the link between monetary policy, liquidity creation, and economic growth in the United States using quarterly data from 1988 to 2016. It differs from previous work by employing a structural VAR model with exogenous monetary-policy shocks developed by Bauer and Swanson (2023), which remove information effects that may bias conventional estimates. In contrast to earlier identification approaches, these shocks isolate unexpected policy changes, providing a cleaner view of how monetary policy transmits through the banking sector. The analysis also considers the credit-growth mechanism emphasised by Gordon and Ordoñez (2020), whereby credit expansions can raise productivity and investment, encouraging further bank lending. This approach offers new evidence on how policy-driven liquidity creation influences both financial stability and real economic activity.

2. Literature review:

Monetary policy mainly affects the economy by influencing borrowing costs and the availability of credit. When the central bank raises rates, loans become more expensive, and investment tends to fall; lower rates have the opposite effect. Gertler and Karadi (2015) show that an unexpected policy tightening widens credit spreads and reduces industrial production, confirming that interest-rate fluctuations influence both credit conditions and economic activity. Their work represents the standard bank-lending channel through which monetary policy shapes economic growth and provides the background for newer studies that examine the banking sector's wider role in creating liquidity.

Building on this framework, Berger and Bouwman (2017) argue that banks affect the economy not only through lending but also by creating liquidity. Using data on U.S. banks across five financial crises, they measure total, on-balance-sheet, and off-balance-sheet liquidity creation. They find that periods of unusually high liquidity creation, particularly from off-balance-sheet activities such as loan commitments and guarantees, often precede financial crises. When they include monetary policy variables, tighter monetary policy slightly lowers liquidity creation for smaller banks in normal periods but has negligible effect during crises. These results suggest that the central bank's control over liquidity creation is limited, especially when market conditions are stressed.

Caglayan et al. (2025) expand this analysis by studying how the relationship between monetary policy and liquidity creation changes across financial regimes. Using a Markov-switching model that separates boom and crisis states, they find that

the transmission of policy is asymmetric: expansionary policy raises liquidity when it is scarce, typically during downturns, but reduces it when liquidity is already plentiful. Off-balance-sheet liquidity reacts most strongly before crises, indicating that these commitments can amplify financial cycles. Their findings show that the effectiveness of monetary policy depends on the financial environment rather than being constant over time.

While much of the literature emphasises liquidity creation as a channel through which monetary policy influences financial stability, Gordon (2020) highlights its connection with real economic performance. His analysis of credit booms shows that rapid credit expansion often coincides with temporary short-term gains in productivity and investment, which stimulate economic growth but may also increase future financial fragility. This finding suggests that liquidity creation and credit availability can initially enhance output by supporting productive investment, yet excessive expansion can undermine stability over time. Incorporating this credit-growth mechanism provides an additional link between monetary policy, liquidity creation, and broader measures of economic growth.

In contrast, Berger and Sedunov (2017) show that it also supports economic performance. They find that greater liquidity creation is associated with stronger GDP growth and lower unemployment, suggesting that liquidity provision benefits the wider economy. Taken together with Berger and Bouwman (2017), this evidence implies that policymakers face a trade-off: encouraging liquidity creation can stimulate growth but excessive expansion may increase systemic risk.

Although existing studies link monetary policy and liquidity creation, they face challenges in identifying true policy shocks. Measured policy variables often include information that markets anticipate, which can bias results. Bauer and Swanson (2023) tackle this problem by developing high-frequency policy shocks that are orthogonal to market expectations and therefore capture only unexpected policy changes. Building on their approach, the present study uses a structural VAR with Bauer–Swanson shocks to reassess how monetary policy affects both bank liquidity creation and economic growth in the United States. This method offers a clearer view of how unexpected policy actions influence the banking sector and the broader economy. Following the insights from the literature, the next section outlines the empirical strategy used to test these relationships, describing the data, model specification, and identification approach employed in this study.

3. Econometric Methodology and Issues:

Adding onto the literature, this section discusses the econometric framework used to test the dynamic relationship between monetary policy, liquidity creation and economic growth. A central econometric issue in estimating the effects of monetary policy on liquidity creation is the problem of identification. In a standard reduced form VAR, each equation is estimated using OLS and the residuals are generally correlated across equations. The residuals are mixtures of the underlying structural shocks, so they cannot be directly interpreted as monetary policy innovations. Structural VARs (SVARs) address this problem by imposing additional restrictions that allow us to recover economically meaningful shocks and trace out their dynamic effects through impulse response functions.

Consider y_t to be a vector containing real GDP, bank liquidity creation and the monetary policy shock. The reduced form VAR of order p model can be written as:

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t, \quad (1)$$

where u_t are reduced-form innovations with covariance matrix Σ_u. The corresponding structural VAR assumes

$$B y_t = C_1 y_{t-1} + \cdots + C_p y_{t-p} + \varepsilon_t, \quad (2)$$

where ε_t are orthogonal structural shocks with identity covariance matrix. The relationship $u_t = B^{-1}\varepsilon_t$ shows that identifying the structural shocks ε_t requires recovering the matrix B, which is not uniquely determined by Σ_u alone. This is the classical identification problem: without additional economic or statistical restrictions, the impact of monetary policy shock on output and liquidity creation cannot be determined uniquely.

Beyond this general identification issue, monetary policy faces an additional obstacle known as the perfect foresight problem. As introduced by Ramey (2016), households, firms and financial markets are forward looking and are often anticipating changes in the monetary policy before they are implemented. In this scenario, movements in interest rates or other policy tools partly reflect expected future policy and the central bank's private information about the economic outlook. If such variables are used directly as policy shocks in a VAR, the estimated innovations will combine true policy surprises with information about future output and inflation. This may result in biased and counterintuitive impulse responses.

The literature has proposed several strategies to deal with this foresight problem. Early SVAR studies typically relied on Cholesky decompositions (short-run recursive restrictions) assuming that policy reacts contemporaneously to output and prices but that real variables do not respond within that period. More recent work employs high-frequency identification, using changes in futures rates or asset prices in narrow time windows around policy announcements to proxy for unexpected monetary surprises.

Recent research shows that even high-frequency monetary policy surprises can fail to satisfy the exogeneity conditions required for use in SVARs. Bauer and Swanson (2023) demonstrate that conventional surprises derived from future rates are often correlated with macroeconomic news and anticipations, implying that they embed both policy and information shocks. In their theoretical framework, the raw high-frequency surprise may be correlated with variables capturing the state of the economy, so using it directly as an external instrument can violate the standard

orthogonality conditions. To address this, they propose orthogonalising the monetary policy surprises with respect to a set of macroeconomic and financial variables.

The original high-frequency shocks are aggregated to quarterly frequency and provided as three alternative series in the dataset: swanmean, swansam and swanlast, which correspond to the average, sum, and last monthly value within each quarter. These series are treated as exogenous structural innovations because the orthogonalisation step removes any systematic correlation with information about future macroeconomic conditions. By including these shocks directly in the VAR as an exogenous regressor or as the identified monetary policy equation, the model resolves the perfect foresight problem highlighted by Ramey (2016) and improves the credibility of the estimated impulse responses of liquidity creation and real GDP growth.

Overall, this project addresses two key identification challenges. Firstly, the SVAR framework separates reduced-form innovations from structural shocks, allowing a causal interpretation of the monetary policy changes. Secondly, by adopting orthogonalised Bauer–Swanson shocks rather than interest-rate changes, the analysis mitigates the bias arising from anticipated policy and information effects. The next section builds on this identification strategy to present the data, specify the VAR model in detail, and examine how exogenous monetary policy shocks affect bank liquidity creation and economic growth.

4. Data and Empirical Discussion:

Building on the econometric framework and identification strategy outlined in the previous section, this part of the report presents the data, model specification, and empirical results. The analysis now turns to testing how exogenous monetary-policy shocks influence bank liquidity creation and economic activity in the United States. The section begins by describing the data sources, transformations, and stationarity properties of the variables, then outlines the VAR specification and lag selection. It concludes by presenting the impulse-response functions (IRFs) that trace the dynamic effects of monetary-policy shocks on total, on-balance-sheet, and off-balance-sheet liquidity creation, as well as on real GDP growth.

The empirical analysis uses quarterly U.S. data covering 1988: Q1 to 2016: Q4. The dataset contains variables that measure total liquidity (catfat) which is the sum of the on-balance sheet liquidity (catnonfat) and off-balance sheet liquidity (fat). Additionally, the dataset contains variables for Real GDP in (GDP) as well as (rgdp) which is a revised measure of Real GDP, as well as proxies for productivity in (TFP, LP_NBER and LP_Fred). The monetary-policy variable is represented by the Bauer–Swanson (2023) shock aggregated to quarterly frequency (swanmean, swansam and swanlast), which captures unexpected policy innovations purified from information effects. This report will use swanmean as the monetary shock because it represents the average orthogonalised Bauer–Swanson (2023) monetary-policy shock within each quarter, providing a balanced and exogenous measure of unexpected policy changes suitable for quarterly VAR analysis.

All liquidity creation and output variables were converted by taking the natural logarithm to reduce scale differences and stabilise variance. The series were then transformed into quarter-on-quarter growth rates by taking first differences of the logs. Log-differences are used to obtain approximate growth rates (expressed in decimals rather than percentages).

Augmented Dickey–Fuller (ADF) tests were conducted to verify the time-series properties of the data. The results indicate that the log-level series for total, on-balance-sheet, and off-balance-sheet liquidity creation and for real GDP all fail to reject the null of a unit root, implying non-stationarity. By contrast, swanmean, the Bauer–Swanson monetary-policy shock is stationary. However, the ADF test was used to verify the stationarity properties of the differenced logarithmic liquidity creation and output variables and found them to be stationary which makes them suitable for inclusion in a VAR model; this can be visualised in the Figure 1 below.

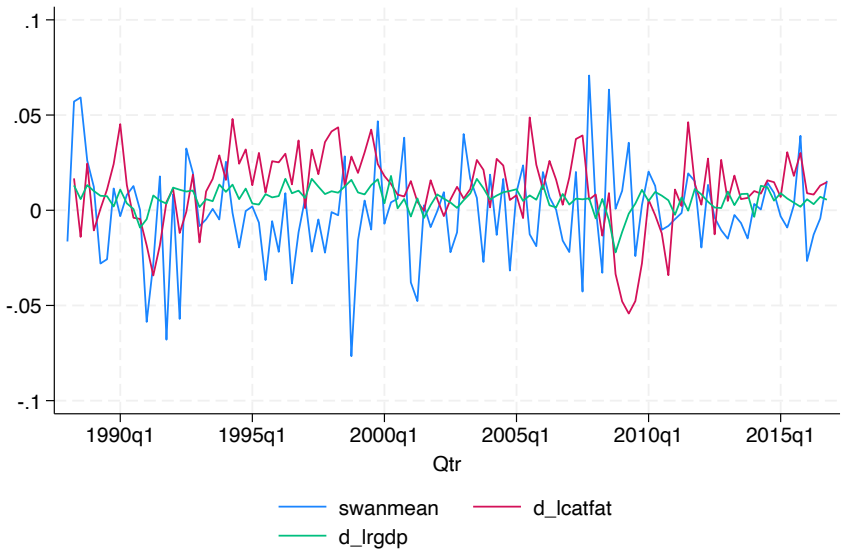

Figure 1: Stationarity for our differenced logged variables.

The empirical model is a three-variable structural VAR (SVAR) designed to study how monetary-policy shocks affect bank liquidity creation and economic activity. The baseline specification includes the Bauer–Swanson (2023) orthogonalised monetary-policy shock (swanmean), total bank liquidity-creation growth (d_lcatfat), and real GDP growth (d_lrgdp). This setup captures the main transmission mechanism in which unexpected changes in monetary policy influence banks' ability to create liquidity and, subsequently, real output.

To explore heterogeneity across liquidity components, two alternative models are estimated in which total liquidity creation is replaced by its on-balance-sheet (d_lcatnonfat) and off-balance-sheet (d_lfat) counterparts. Each model is estimated separately to avoid multicollinearity, as total liquidity creation is approximately the sum of its on- and off-balance-sheet components. This approach allows the responses of different liquidity types to be interpreted clearly.

Lag length is selected using standard information criteria. The Akaike Information Criterion (AIC) favours two lags, whereas the Schwarz–Bayesian Information Criterion (SBIC) indicates one. Given the quarterly frequency of the data and the need to capture medium-term dynamics, a VAR(2) specification is adopted across all models for consistency.

Transitioning to interpreting the results from the structural VAR (SVAR) analysis, focusing on how unexpected monetary-policy shocks affect bank liquidity creation and real economic activity. The impulse-response functions (IRFs) trace the dynamic

adjustment of liquidity creation and output to a contractionary monetary-policy shock, represented by a positive innovation in the Bauer–Swanson (2023) shock series (swanmean). As discussed earlier, the central hypothesis, following Berger and Bouwman (2017), is that tighter monetary conditions reduce banks' liquidity creation, although the strength and persistence of this response depend on the form of liquidity creation and on bank size. In line with the bank-lending and liquidity-creation channels, contractionary policy is expected to restrict banks' ability to transform illiquid assets into liquid liabilities, dampening credit supply and slowing real economic activity.

The baseline VAR includes the Bauer–Swanson (2023) monetary-policy shock (swanmean), total liquidity-creation growth (d_lcatfat), and real GDP growth (d_lrgdp). Consistent with the theoretical prediction, the VAR estimates show negative coefficients on the lagged monetary-policy shock in both the liquidity-creation and output equations, indicating that tighter policy is followed by lower liquidity creation and slower economic growth. The impulse-response analysis uses an 80% confidence interval to balance precision and interpretability. Following a positive and unexpected increase in policy rates representing a contractionary monetary-policy shock, total liquidity creation declines for roughly two quarters, before gradually returning toward baseline. Although this response is weakly significant, as the 80% confidence band encompasses the zero line, its downward trajectory is consistent with the theoretical expectation that tighter monetary policy constrains banks' liquidity provision. Real GDP growth displays a similar pattern: it falls slightly in the first two quarters after the policy shock and then rebounds, with the confidence interval again crossing the baseline.

Hence, while neither response is statistically strong, the direction and timing of both effects are consistent with the predictions of the bank-lending and liquidity-creation channels discussed in the literature. These results are illustrated in Figure 2, which plots the orthogonalised impulse-response functions of total liquidity creation (left panel) and real GDP (right panel) to a contractionary monetary-policy shock, with 80% confidence intervals.

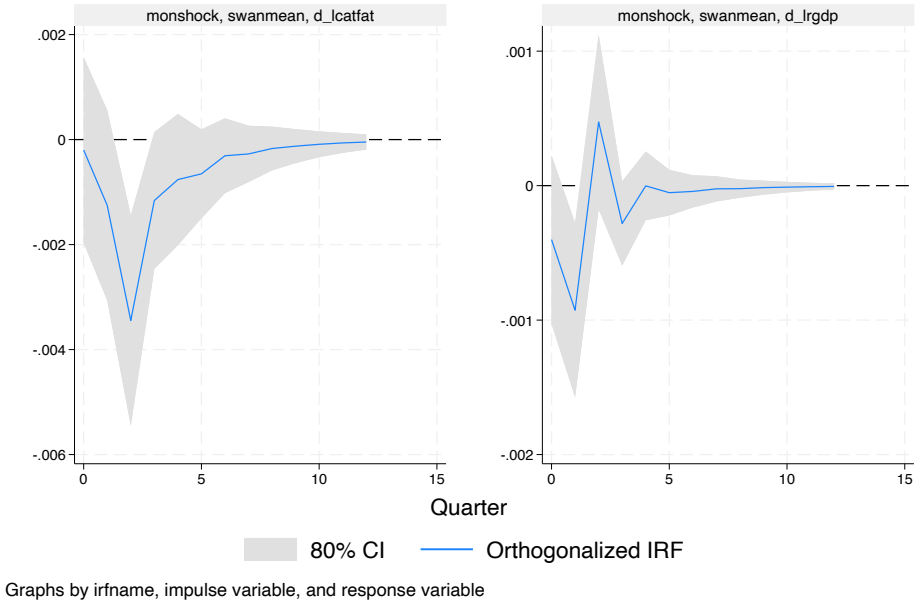

Figure 2: Orthogonalised impulse-response functions of total liquidity creation and real GDP

To explore whether the transmission of monetary policy differs across liquidity types, the VAR was re-estimated using on- and off-balance-sheet liquidity creation. Figure 3 shows that on-balance-sheet liquidity creation (d_lcatnonfat) exhibits only a small and statistically insignificant decline following a contractionary monetary-policy shock. In contrast, off-balance-sheet liquidity creation (d_lfat) falls more sharply within the first two quarters before gradually reverting to baseline, though the 95 % confidence interval overlaps zero depicted in Figure 4. These results indicate that while both forms of liquidity respond in the expected direction, the effect is weak

overall and strongest for off-balance-sheet activities, consistent with Berger and Bouwman (2017) who find that such commitments are more sensitive to monetary tightening.

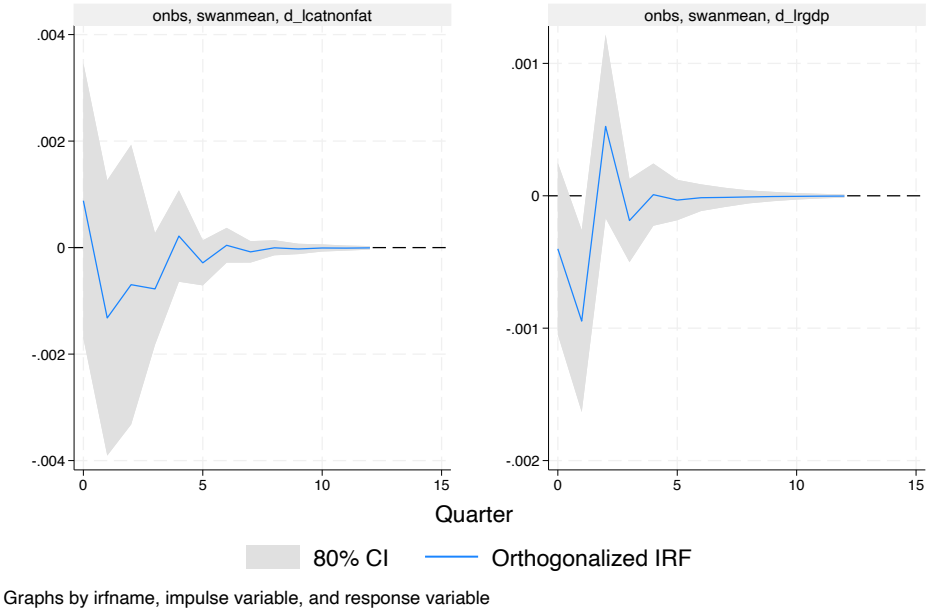

Figure 3: Orthogonalised impulse-response functions of on the balance sheet liquidity creation and real GDP.

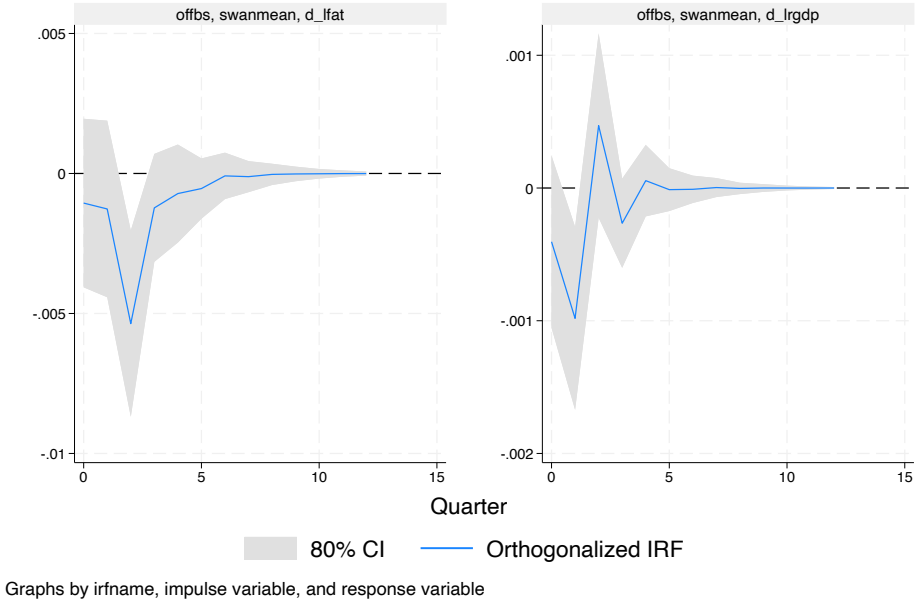

Figure 4: Orthogonalised impulse-response functions of off the balance sheet liquidity creation and real GDP.

The overall results suggest that while contractionary monetary-policy shocks reduce bank liquidity creation and output, these effects are economically small and statistically weak. The finding that off-balance-sheet liquidity reacts more sharply than on-balance-sheet activity supports the view of Berger and Bouwman (2017) that riskier and less collateralised forms of credit are more sensitive to policy tightening. Furthermore, the subdued response of output is consistent with the state-dependent transmission identified by Caglayan et al. (2025), where the impact of monetary policy on liquidity creation is stronger during crises than in normal periods. In line with Gordon (2020), these results also indicate that liquidity and credit expansion can stimulate short-term productivity and investment but may contribute little to sustained growth once monetary policy tightens. Overall, the evidence points to a modest and asymmetric transmission of monetary policy to bank liquidity creation and real activity, reinforcing the importance of financial structure and prevailing economic conditions in determining policy effectiveness.

5. Conclusion:

To conclude, this study examined whether there is a link between monetary policy, bank liquidity creation, and economic growth in the United States using quarterly data from 1988 to 2016. Employing a Structural Vector Autoregression (SVAR) model with orthogonalised Bauer–Swanson (2023) monetary-policy shocks, the analysis aimed to isolate exogenous policy effects and address the identification and foresight problems that typically bias conventional VAR estimates. The results show that a contractionary monetary-policy shock, interpreted as an unexpected increase in policy rates, leads to a short-lived decline in total liquidity creation and a modest fall in real GDP growth, though both responses are statistically weak. When liquidity creation is decomposed, off balance sheet activities respond more sharply than on balance sheet lending, consistent with Berger and Bouwman (2017), who argue that contingent commitments are more sensitive to funding and risk conditions.

The findings therefore provide evidence of a modest and asymmetric transmission mechanism, where monetary-policy tightening reduces banks' liquidity creation and real activity primarily through expectations and balance-sheet channels rather than direct credit constraints. This supports the state-dependent perspective of Caglayan et al. (2025), suggesting that policy effects on liquidity are stronger during periods of financial stress. However, the limited statistical significance also reflects the challenges of identifying policy shocks in small samples and the smoothing of high-frequency information into quarterly data. Overall, the study contributes to the ongoing literature by showing that monetary policy affects liquidity creation and growth, but the strength of this link depends critically on the nature of liquidity creation and the prevailing financial environment.

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