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Article

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INTERBANK RATE AND MONETARY POLICY: INSIGHTS FROM DUAL BANKING SYSTEMS OF DEVELOPING COUNTRIES

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ABSTRACT

Purpose — An in-depth understanding of the credit channel of monetary policy (MP) is crucial because interbank rates influence bank funding choices. This study examines the relative roles of dual banking systems, comprising Islamic banks (IBs) and conventional banks (CBs), in transmitting the effects of monetary tightening in the developing economies of Pakistan and Malaysia. It also analyses bank credit expansion across different bank sizes and liquidity positions.

Design/Methodology/Approach — The sample used for empirical analysis includes five fully operational IBs, six Islamic branches of CBs and 17 CBs in Pakistan, as well as 11 IBs and 10 CBs in Malaysia. The study employs the robust two-step System Generalised Method of Moments (GMM) estimator on an unbalanced annual bank-level panel dataset covering the period 2007–2022.

Findings — The results validate the existence of a credit channel in the two countries examined by demonstrating that both types of banks considerably reduced their funding during tight MP periods. Additionally, the data showed that compared to CBs, IBs were less affected by tight MP policies. Furthermore, the data reveals that larger liquid amounts react less to changes in MP tightening.

Originality/Value — Transmission mechanisms have drawn attention in the wake of the global financial crisis of 2007–08, particularly regarding the effectiveness of banks' credit channels. However, the literature is still lacking information about the role of IBs in the monetary policy transmission mechanism (MPTM).

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Research Limitations/Implications — This study focuses solely on banking institutions; however, considering other financial institutions could provide a more comprehensive picture of the existing research phenomena.
Practical Implications — The findings suggest that MP authorities should consider the type of banking, bank size, and liquidity position when devising MP instruments to effectively manage credit supply in dual-banking economies.
Keywords — Banks' liquidity; Banks' size; Conventional banks; Interbank Rate; Islamic banks; Monetary policy tightening; Monetary policy transmission mechanism
Article Classification — Research paper

INTRODUCTION

Monetary policy (MP) is the central bank's primary tool for achieving economic growth, stable prices, full employment, and exchange rate stability. The traditional view of money supply positions it as a bridge between the MP framework and the total output of the economy, and argues that it is the primary tool for achieving these goals. Conventional models link money supply to its influence on interest rates, aggregate output, and other economic factors, supported by empirical evidence (Friedman & Schwartz, 1963; King & Plosser, 1984; Sims, 1992; Muduli & Behera, 2023; Kim *et al.*, 2024; Dieng & Sene, 2024). Banks play an essential role in the monetary policy transmission mechanism (MPTM) (Kashyap & Stein, 1994; Bernanke & Gertler, 1995; Bianchi & Bigio, 2022). Three primary factors determine banks' efficiency in the MPTM process: (1) reliance on deposits; (2) sensitivity of MP shocks to credit expansion; and (3) dependence of investors and consumers on bank borrowing.

In the MPTM, the traditional interest rate channel, exchange rate channel, asset price channel, and credit channel transmit policy stances to the real economy, subject to the nature of the economy (Yemba *et al.*, 2020; Ghauri *et al.*, 2022; Naqvi & Pungaliya, 2023). Legal and financial structures such as the size of financial institutions, growth of money and stock markets, exchange rate regime, liquidity of real assets, comparative environment among financial institutions, and effectiveness of the economic system, influence these channels, varying from nation to nation and responding differently. The global financial crisis of 2007–08 sparked discussions about the presence of MPTM credit channels in different economies (Rashid *et al.*, 2020). The credit channel highlights the role of banks in the MPTM, operating through 'the bank lending channel' and 'the balance sheet channel' (also referred to as the net worth channel) (Bernanke & Gertler, 1995; Rashid *et al.*, 2020). These two MPTM channels arise because of information asymmetries in the credit market. Mishkin (1996) is perhaps the first to explain how asymmetric information creates agency problems in financial markets.

After the comprehensive review of the empirical literature that has been carried out in the recent past, many researchers have highlighted the importance of MPTM through the credit channel (Bernanke, 1993; Kashyap & Stein, 1994; Bernanke & Gertler, 1995; Cecchetti, 1995; Aysun & Hepp, 2013; Janjua *et al.*, 2014; Evans *et al.*, 2015; Anwar & Nguyend, 2018; Jiménez *et al.*, 2020; Ghauri *et al.*, 2022; Kabir *et al.*, 2022; Muduli & Behera, 2023; Kim *et al.*, 2024). The focus has traditionally been on conventional banks (CBs). However, after the 2008 financial crisis, attention has shifted to Islamic banks (IBs), which exhibited increased profitability and efficiency compared to their conventional counterparts. Researchers and policymakers are now integrating IBs into the MPTM framework (Hasan & Dridi, 2010; Said, 2012; Zaheer *et al.*, 2013; Tabash & Dhankar, 2014; Olson & Zoubi, 2017; Miah & Uddin, 2017; Rashid *et al.*, 2017; Caporale & Helmi, 2018; Asmild *et al.*, 2019; Rashid *et al.*, 2020; Shah & Rashid, 2020). Furthermore, the interest of Rashid and Shah (2019), Ben Amar (2022), Boukhatem and Djelassi (2022), and Kabir *et al.* (2022) in examining the role of IBs in the MPTM also stems from the notion that interest-free IBs and interest-based CBs operate in the same monetary environment.

Currently, many Muslim-majority countries such as Pakistan, Malaysia, Bahrain, the Kingdom of Saudi Arabia (KSA), Qatar, Indonesia, the United Arab Emirates (UAE), Tunisia, and Turkey, have a dual banking structure, with both CBs and IBs operating in the same monetary environment. Despite different philosophical and theoretical foundations, both systems are

somehow related (Chong & Liu, 2009). MP changes transmit their effect to the real sector through both CBs and IBs. However, the response of IBs is quite different from that of CBs due to their asset-based nature (Shah *et al.*, 2018; Nosheen & Rashid, 2019; Kabir *et al.*, 2022). Similarly, Islamic banking systems have different fundamental characteristics that distinguish them from their conventional counterparts: interest-free activities, risk sharing, PLS-based financing, and asset-based business transactions (Chaudary & Mirakhor, 1997; Shah & Rashid, 2020; Ben Amar, 2022). Furthermore, IBs are also considered morally responsible to follow the principle of no-exploitation (*ribā*-free) and involvement in real business activities (*gharar*-free) that provide benefits to the public and strengthen real economic activities in the society (Siddique, 2017; Shah *et al.*, 2021). These unique characteristics of IBs are expected to play different roles in the MPTM process.

Indeed, many researchers differentiate IBs from CBs by considering the theoretical perspective and the unique contractual characteristics of Islamic financial institutions (IFIs); however, the operation of IBs in the same monetary environment motivated many researchers to investigate the impact of MP shocks on IBs (Hardianto, 2004; Kaleem & Isa, 2006; Sukmana & Kassim, 2010; Zulkhibri & Sukmana, 2017; Ibrahim, 2017; Hamza & Saadaoui, 2018; Rafay & Farid, 2019; Kabir *et al.*, 2022). These studies utilised aggregate-level data. Specific and detailed bank-level data were collected to analyse the response of MP shocks to IBs and CBs, which would be most substantial for understanding the MP means (monetary policy framework) and its ends (monetary policy objectives). This would also assist in selecting the most effective MP instruments to achieve desired monetary objectives. Considering the importance of these phenomena in the MPTM, many studies have been conducted in the past to provide significant evidence for the presence of credit channels in the context of CBs (Kashyap & Stein, 1994; Schmitz, 2004; Hasin & Majid, 2012; Janjua *et al.*, 2014; Wang *et al.*, 2022; Bianchi & Bigio, 2022; Muduli & Behera, 2023). However, this study contributes to the literature on the MPTM in various ways.

First, it considers both banking systems, i.e., CBs versus IBs to examine the credit channel of the MPTM using bank-level data of the most important countries with dual banking systems, mainly Pakistan and Malaysia. It is noted that the majority of previous studies have addressed this issue by considering only CBs (Kashyap & Stein, 1994; Janjua *et al.*, 2014; Bianchi & Bigio, 2022; Muduli & Behera, 2023; Dang & Nguyen, 2024). Second, unlike previous studies (e.g., Kaleem & Isa, 2006; Sukmana & Kassim, 2010; Zaheer *et al.*, 2013; Ibrahim, 2017; Hamza & Saadaoui, 2018; Rafay & Farid, 2019; Kabir *et al.*, 2022), this study provides an in-depth analysis of the topic by examining the liquidity and size positions of both CBs and IBs. Third, these empirical analyses permit a comparison of the effect of MP shocks on the credit supply of banks across different types, notably conventional versus Islamic banks, banks with different liquidity positions, i.e., less liquid versus more liquid, and finally, banks of different sizes, i.e., small versus large banks.

The rest of the paper is arranged as follows: in the second section the empirical literature on MPTM is reviewed. The third section elaborates on the data and empirical framework of the study. The fourth section presents the empirical findings. Finally, conclusions and policy recommendations are summarised in the last section of the paper.

REVIEW OF EMPIRICAL LITERATURE

The effectiveness of MP instruments primarily depends on the MPTM process, as it provides a link between MP instruments (e.g., interest rate and money supply) and macroeconomic indicators (e.g., real output, price level, employment level, exchange rate, and wages). Several channels through which the MPTM works have been identified theoretically and empirically. Keynes (1936) explored the idea of a transmission mechanism theoretically. In 'The General Theory of Employment, Interest and Money', Keynes (1936) described the role of the interest rate channel in MPTM. Bernanke and Blinder (1988) reviewed the New Keynesian framework and introduced the credit channel into the traditional IS-LM framework (investment-saving (IS) and liquidity preference-money supply (LM)). They defined how banks play a role in transmitting MP through the credit channel. Therefore, the credit channel is also considered an extension of the interest rate channel. Similarly, Obstfeld and Rogoff (1995) introduced a new dimension by exploring the effectiveness of the exchange rate channel, underscoring the importance of external factors in MP implementation.

After the financial crisis of 2007–2008, the credit channel of MP gained prominence, drawing considerable attention from researchers and policymakers. This elucidates how the MP influences the real economy through bank credit supply. Bernanke and Blinder (1988) pioneered the theoretical and empirical understanding of banks' role in the MPTM. Subsequent studies, such as Bernanke and Blinder (1988), Kashyap and Stein (1995), Kashyap and Stein (2000), and Kishan and Opiela (2000), confirmed the existence of a bank lending channel in the United States (US). Kashyap and Stein (1995) compared the behaviour of large and small-sized banks during contractionary times, revealing that small-sized banks reduced financing compared with large banks in response to MP tightening. Similarly, Cecchetti (1999), Ehrmann and Smets (2003), Jiménez *et al.* (2012), Santis and Surico (2013), Evgenidis and Salachas (2019), and Muduli and Behera (2023) provided significant evidence on the presence of the credit channel of MPTM in European countries. Furthermore, Bernanke *et al.* (1991), Gertler and Gilchrist (1993), Wong (2000), Carrera (2011), Aysun and Hepp (2013), Evans *et al.* (2015), Auclert (2017), Erdogdu (2017), Anwar and Nguyend (2018), Jermann (2019), Morales *et al.* (2021), Wang *et al.* (2022), Bianchi and Bigio (2022), and Muduli and Behera (2023) found significant evidence of the bank lending channel in MPTM.

An important and renowned set of authors and researchers have made pioneering contributions to the literature and discussed the presence of the credit channel in developed countries. In recent times, Caballero and Krishnamurthy (2004), Pandit *et al.* (2006), Bhaumik *et al.* (2011), Abdul Karim *et al.* (2011), Montes and Machado (2013), Hussain (2014), Janjua *et al.* (2014), Ekimova *et al.* (2017), Olmo *et al.* (2018), Farajnezhad *et al.* (2019), Mercan and Canbay (2020), Ghauri *et al.* (2022), Wang *et al.* (2022), Elsayed *et al.* (2023) and Dieng & Sene (2024) have extended the debate within the context of developing economies. Abdul Karim *et al.* (2011) and Bianchi and Bigio (2022) explained the significance of liquidity in influencing bank credit supply.

While much of the literature focuses on CBs when discussing the credit channel of the MPTM, the growth of IBs has led to an emerging body of literature highlighting their role. Caporale *et al.* (2020) examined the bank lending channel of the MPTM from 1994 to 2015 in Malaysia, where both CBs and IBs operate under the same monetary environment. They found

that IBs were less responsive to MP shocks than CBs. Similarly, Akhatova *et al.* (2016) evaluated the credit channel of MPTM in a dual banking system noting a significant response to MP shocks by both CBs and IBs. They further explained that the response of IBs is quite immediate compared to that of their conventional counterparts.

Halim and Masih (2017) worked from the same perspective on how Islamic financing behaves in correlation with changes in macroeconomic variables. The data period in this study was from 2010 to 2014 and explored the results using autoregressive distributed lag (ARDL) methodology. This study highlights the fact that interest rates have a significant negative influence on Islamic bank financing. The study further demonstrates that policymakers can stabilise the market by controlling the interest rate and considering the role of IBs in the MPTM. Furthermore, Rafay and Farid (2019) used the time-series technique in Pakistan and examined the MPTM through the balance sheet items of IBs, that is, bank deposits and bank financing. They found that IBs play an integral role in transmitting the impact of MP to the real sector. Furthermore, Amar (2019) attempted to investigate the MPTM in Saudi Arabia using data over a period of 25 years. This study provides ample evidence that both CBs and IBs are sensitive to MP shocks. However, owing to the large size of IBs in Saudi Arabia, the sensitivity of non-oil economic activity to Islamic bank financing appears to be relatively less volatile compared to its sensitivity to conventional bank credit. Similarly, Caporale *et al.* (2020) examined the MPTM in Malaysia during the period 1994-2015. The study concludes that both CBs and IBs are significantly influenced by MP shocks, but IBs are less reactive owing to their fundamental nature. They also found that Islamic financing increased during low-growth regimes compared to high-growth periods.

Most recently, Radwan and Drissi (2020) worked in the same domain and analysed the importance of MPTM and tested its validity in a dual banking system. They also examined the resilience of both banking systems to MP shocks by incorporating bank-specific characteristics such as liquidity and bank structure into the model. Using a robust econometric technique, they confirmed the presence of a credit channel in the MPTM. They nullified the scepticism that IBs are not sensitive to MP shocks by finding empirical evidence that IBs are more sensitive to MP shocks than CBs. Other researchers (e.g., Hamza & Saadaoui, 2018; Rafay & Farid, 2019; Rashid *et al.*, 2020; Ben Amar, 2022; Boukhatem & Djelassi, 2022; Kabir *et al.*, 2022; Badar, 2024) considered the distinguishing role of IBs in the MPTM during MP shocks.

Despite a vast literature on the role of banks in MPTM, there is limited understanding of the behaviour of IBs during periods of monetary tightening. Similarly, the same phenomenon has not been fully explored by considering bank size and liquidity by comparing the credit supply of IBs versus CBs. This study intends to observe the impact of interbank rate as a measure of MP on the credit supply decisions of IBs and CBs in the developing economies of Pakistan and Malaysia.

DATA AND METHODOLOGY

Data and Econometric Model

The empirical analysis is based on a sample of five full-fledged IBs, six Islamic branches of CBs and 17 CBs for Pakistan, and 11 IBs and 10 CBs for Malaysia, applying a robust two-step System Generalised Method of Moments (GMM) estimator to an unbalanced annual bank-level panel dataset covering the period 2007–2022. The dataset was collected from the

financial statements of banks, central banks, and other sources, as mentioned in **Table 1**. The basic framework is built by following Svensson (2016), Ibrahim (2017), Olmo *et al.* (2018), Gourio *et al.* (2018), and Caporale *et al.* (2020), as follows:

$$Y_t = (X_t, Z_t, M_t) \quad (1)$$

where Y_t indicates bank credit supply as a dependent factor, X is a vector of observable bank characteristics, Z is a vector of macroeconomic conditions, and M is a vector of MP measures. The baseline regression model is written as:

$$Y_{it} = \alpha_i + \sum_{j=1}^{8} \theta_j X_{it} + \sum_{k=1}^{2} \beta_k Z_{it} + \sum_{l=1}^{2} \rho_l M_{it} + \varepsilon_{it} \quad (2)$$

The preceding model was augmented by incorporating the CBs' and IBs' dummies into this specification. Specifically, both dummies interact with the MP indicators to observe the differential responses of CBs and IBs. Thus, the second baseline augmented model has the following form:

$$Y_{it} = \alpha_i + \sum_{j=1}^{8} \theta_j X_{it} + \sum_{k=1}^{2} \beta_k Z_{it} + \sum_{l=1}^{2} \rho_l M_{it} + \sum_{m=1}^{2} \gamma_m M_{it} \times D_i^{IB} \sum_{n=1}^{2} \emptyset_n M_{it} \times D_i^{CB} + \varepsilon_{it} \quad (3)$$

In both specifications, Y_{it} is the dependent variable, whereas Z, M, and X are vectors of the independent variables. In both models, *i* symbolises the dimension of banks and *t* denotes time. α_i is the intercept. The error term is denoted by ε_{it}. β, θ, ρ, γ and $\emptyset$ are vectors of coefficients in both linear regression equations. Interaction terms are introduced in the augmented regression model (2), where $(M_t \times D_i^{IB})$ and $(M_t \times D_i^{CB})$ are interaction terms for CBs and IBs, respectively. Specifically, D_i^{IB}=1 for the i^{th} IB in period *t* if MP impacts them, and is equal to zero otherwise. Similarly, D_i^{CB}=1 for the i^{th} CB if MP impacts them, and is equal to zero otherwise. If γ_i is greater than $\emptyset_i$, it implies there is greater influence of MP actions in IBs, and vice versa.

Further, this study introduces the interaction terms between the dummy of IBs (CBs) and MP indicators based on size (small and large) and liquidity position (less or more) in the augmented regression model (4), as follows:

$$Y_{it} = \alpha_i + \sum_{j=1}^{8} \theta_j X_{it} + \sum_{k=1}^{2} \beta_k Z_{it} + \sum_{m=1}^{2} \gamma_m M_{it} \times D_i^{SIB} + \sum_{n=1}^{2} \varnothing_n M_{it} \times D_i^{SCB} + \sum_{m=1}^{2} \mu_m M_{it} \times D_i^{LIB} + \sum_{n=1}^{2} \sigma_n M_{it} \times D_i^{LCB} + \sum_{m=1}^{2} \tau_m M_{it} \times D_i^{Less.IB} + \sum_{n=1}^{2} \rho_n M_{it} \times D_i^{Less.CB} + \sum_{m=1}^{2} \varphi_m M_{it} \times D_i^{More.IB} + \sum_{n=1}^{2} \omega_n M_{it} \times D_i^{More.CB} + \varepsilon_{it} \quad (4)$$

In the augmented regression model (4), the interaction of the dummy of small IBs with the MP indicator is denoted by $M_{it} \times D_i^{SIB}$, the interaction of the dummy of small CBs with MP indicator is denoted by $M_{it} \times D_i^{SCB}$, the interaction of the dummy of large IBs with MP indicator is denoted by $M_{it} \times D_i^{LIB}$, and the interaction of the dummy of large CBs with MP indicator is denoted by $M_{it} \times D_i^{LCB}$. Considering the liquidity status of the assets, the interaction terms for the respective conditions and IBs, i.e., $M_{it} \times D_i^{Less.IB}$, $M_{it} \times D_i^{Less.CB}$, $M_{it} \times D_i^{More.IB}$, and $M_{it} \times D_i^{More.CB}$ are added to model (4). **Table 1** provides a detailed description of all variables and their sources for both bank types.

Estimation Strategy

The GMM estimation method suggested by Arellano and Bover (1995) and Blundell and Bond (1998) adds the lagged values of the explained factor as instruments to explain the endogeneity problem. Both System GMM and first-differenced GMM have received greater attention in the past literature. However, the first-differenced GMM method is not effective because of its small sample size (Levine *et al.*, 2000). Furthermore, Bond (2002) finds that if the estimators are biased because of nonstationary data, the system GMM can provide higher accuracy in the estimation outcomes because a higher number of instruments are used, and it associates the regression in the levels with regressions in the first differences. Furthermore, it is comparatively better because when the time series has a random-walk process, the instruments are efficient predictors of endogenous factors in the level regression (Blundell & Bond, 1998). Therefore, the following system GMM model was used:

$$Y_{it} = \alpha_i + \mu Y_{i,t-1} + \sum_{j=1}^{8} \theta_j X_{it} + \sum_{k=1}^{2} \beta_k Z_{it} + \sum_{l=1}^{2} \rho_l M_{it} + \sum_{m=1}^{2} \gamma_m M_{it} \times D_i^{IB} + \sum_{n=1}^{2} \varnothing_n M_{it} \times D_i^{CB} + \epsilon_{it} \quad (5)$$

$$\epsilon_{it} = \mathrm{v}_{it} + \mathrm{e}_{it} \quad (6)$$

Table 1: Variables' Definition and Data Sources

	Variables	Description	Sources
Dependent Variable	**C**redit **S**upply in CBs	Total assets (in CBs)	Financial Statements of Banks
	Credit **S**upply in IBs	Ratio of financing to total assets (in IBs)	Financial Statements of Banks
MP Measurement Indicators	Interbank Offered Rate of Interest	Interest rate offered by interbank as an instrument of monetary policy mechanism to affect bank loans	SBP and BNM
Bank-Specific Variables	Bank size	Log(total asset)	Financial Statements of Banks
	Liquidity	(Cash + Cash equivalent/Total assets) x 100	Financial Statements of Banks
	Capital	(Total shareholder equity/Total assets) x 100	Financial Statements of Banks
	Coverage ratio	(EBIT/Interest Expense) x 100	Financial Statements of Banks
	Credit risk	(Classified loans/Total loans) x 100	Financial Statements of Banks
	Profitability	(Profit after tax/Total assets) x 100	Financial Statements of Banks
	Debt to equity ratio	Total liabilities/Stockholders' equity	Financial Statements of Banks
Macroeconomic Conditions	GDP Growth	$\frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100$	SBP and BNM
	Inflation	As reported by BNM for Malaysia and SBP for Pakistan	SBP and BNM

Note: SBP = State Bank of Pakistan; BNM = Bank Negara Malaysia; Source: Authors' own

In this specification, Y_{it} indicates the credit supply of Malaysia and Pakistan at time *t*. αi is the constant term and $Y_{i,t-1}$ is the lag value of credit supplies in both countries. X_{it}, Z_{it}, M_{it} and the interaction terms are the explanatory variables, and the residual term is E_{it}. Moreover, e_{it} and v_{it} are the idiosyncratic errors and the specific unobserved growth factors, respectively. In this model, it is assumed that $E(v_{it}v_{is}) = 0$ for i = 1, …, n and t ≠ s and $E(Y_{it}, v_{it}) = 0$ for i = 1, …, n and t = 2, …, T. Finally, the use of system GMM estimation improves the accuracy of the model along with reducing the small sample bias.

EMPIRICAL RESULTS

Empirical Outcomes of the First Baseline Regression

In this specification, a negative association was estimated between the interbank rate and bank loan supply in both models after controlling for all other variables.

The nexus of MP measures and credit supply is statistically significant and negative, supporting the centric view of MP in both countries. This outcome aligns with the centric opinions of MP (Kashyab & Stein, 1994). Similarly, these results are supported by Sharpe (1995), Hasin and Majid (2012), Janjua *et al.* (2014), Wang *et al.* (2022), and Muduli and Behera (2023).

Bank credit supply has a positive and significant association with first-lagged credit supply in both countries, controlling for other factors. This implies that banks holding more credit supply in the previous year wish to supply more credit in the current day. Among the outcomes, bank

credit supply rose significantly with increasing bank size. This result is supported by Schmitz (2004), Köhler *et al.* (2006), Alper *et al.* (2012), Rashid and Shah (2019), and Bianchi and Bigio (2022) but contradicts Pruteanu (2004) and Janjua *et al.* (2014). However, Pruteanu (2004) estimated a negative relationship between these two variables during tight MP and a positive relationship during easy MP.

The impact of bank liquidity on credit supply is positive and highly significant in both countries, explaining why liquid banks offer more credit to industries and firms. This result is supported by Schmitz (2004) and Hasin and Majid (2012) while it is totally different from Alper *et al.* (2012) and Olmo *et al.* (2018). A positive and significant influence of bank capital on credit supply was measured in both countries. This outcome is supported by Labonne and Lamé (2014), Moussa and Chedia (2016), Gambacorta and Shin (2018), and Bianchi and Bigio (2022). This implies that capitalised financial institutions can absorb MP shocks, as projected by monetarists. However, this contradicts Berrospide and Edge (2010), Janjua *et al.* (2014) and Wang *et al.* (2022) because some banks are not fully capitalised in the given sample.

The nexus of the coverage ratio with credit supply is highly significant and positive in Pakistan, indicating that a high coverage ratio in banks has increased their credit supply. This result is consistent with Kaleem and Isa (2006), Alaro and Hakeem (2011), and Abedin and Dawan (2016). However, this is in contrast to Alper *et al.* (2012) and Janjua *et al.* (2014) because the coverage ratio reveals the immediate effect of tight MP on the financial ranking of banks. In the case of Malaysia, this relationship is significantly negative as supported by Alper *et al.* (2012) and Janjua *et al.* (2014).

The credit risk estimate is significantly negative in both countries, showing that higher credit risk makes banks more sensible in lending. This conclusion is supported by Pruteanu (2004) and Pouvelle (2012). However, this finding contradicts Foos *et al.* (2010) and Skała (2012) because newly emerging firms diversify their portfolios to face the rising risk problem that mostly emerges from repayment problems. Another reason for this nexus is that banks charge suitable risk premiums on credit supply from new customers because of their low quality compared to current customers. Thus, a rising credit risk does not prevent a decrease in credit supply in competitive markets.

Bank profitability has a significantly positive association with credit supply. This outcome coincides with the findings of Abedin and Dawan (2016), Bech and Malkhozov (2016), Wang *et al.* (2022) and Muduli and Behera (2023). The reason is that, according to the financial approach, profitable banks issue more credit to industries. Similarly, firm profitability is an important instrument in attaining shareholder confidence. Moreover, Abedin and Dawan (2016) reported that easy MP increases bank profitability. As a result, savers may save their deposits, with banks expecting higher profits in the future owing to the progressive banking mechanism. Furthermore, banks having positive financial positions can tackle the shocks of monetary contraction by resorting to internal funds.

The estimate of the debt-to-equity ratio is significantly positive in both countries, showing that, as the debt-to-equity ratio grows, financial institutions issue more credit to the market because they are now more capable of issuing credit. The similar outcome is measured by Janjua *et al.* (2014). However, Pouvelle (2012) estimates a negative relationship between these two variables, explaining why a higher leverage ratio results in a reduction in bank solvency. Moreover, their

administration works to restore their profits and wealth through a higher leverage ratio rather than supplying more credit to industries (Naqvi & Pungaliya, 2023).

Among the macroeconomic settings, the estimates of GPD growth and the inflation rate are significantly positive for both countries, implying that investment financing by banks largely increases during periods of high economic growth. During such periods, banks may suffer less financially and may expand their investments. Moreover, investment projects may yield comparatively higher returns, encouraging banks to increase their credit supply. This outcome is supported by Pruteanu-Podpiera (2007), Alper *et al.* (2012), Imran and Nishat (2013), Gourio *et al.* (2018), Aikman *et al.* (2020) and Naqvi and Pungaliya (2023) because higher economic growth also means higher domestic income, which enables consumers to increase their savings in banks, ultimately allowing them to enhance their credit supply to the economy. This conclusion contradicts Touny (2014), Janjua *et al.* (2014) and Dang & Nguyen (2024) because business firms may reduce their investments over a period of higher growth and borrow from sources other than banks for their productive activities.

Impact of Tight Monetary Policy on the Credit Supply of Islamic versus Conventional Banks

The baseline regression model is stretched by adding the dummies of the Islamic banking sector and conventional banking sector based on bank size and liquidity position for Pakistan and Malaysia, respectively, in equation 4. The regression outcomes of this extended model are underlined in **Table 3**, and the empirical outcomes and diagnostic investigation are shown in Panels A and B of **Table 3** for these two countries, respectively. Panel A presents the interaction terms of IBs and CBs, with the MP measures as dummies. The coefficients of the interaction terms are negative and highly significant for countries that demonstrate the central role of both types of banks in the credit supply through MP. However, this negative impact is stronger for CBs in these two countries. Although the tight MP has reduced the credit supply for both banks, this policy has less effect on IBs in achieving the two governments' respective macroeconomic goals through the credit channel. The current empirical results imply that MPTM through credit channels should be revised for IBs. The same finding occurs when dummies for IBs and CBs are used to denote bank size and liquidity positions for both countries.

Another reason for the lower response of IBs to tight MP is that the financing practices in Islamic banking are entirely interest free. Therefore, they were not defined in response to interest rates. Rather, they are impacted by other financing practices, such as the profit-and-loss-sharing and zakat-to-stock ratios, according to the type of contract. In practice, these are sale-based, partnership-based, and lease-based financing agreements of IBs with customers. Therefore, IBs are less responsive to changes in MPs. Moreover, diverse contractual types of Islamic banking need to be distinguished by the regulatory frameworks of concerned central banks. These countries should note that when Islamic banking has a distinctive vital role in credit supply, and its prescribed features are unavoidably different, it must be entertained as an emerging industry, particularly from the MP perspective. This will only be possible with complete government support and an encouraging environment. Similar outcomes are also presented by Stepanchuk and Tsyrennikov (2015), Akhatova *et al.* (2016), Anwar and Nguyend (2018), Rashid *et al.* (2019), Jiménez *et al*. (2020), Kabir *et al.* (2022), Boukhatem and Djelassi (2022), and Kim *et al.* (2024)

without the dummies of IBs and CBs on bases of banks' size and liquidity position.

Theoretically, Islamic finance is a risk-sharing and asset-based arrangement, whereas CBs work as financial intermediaries in major loan agreements with the transfer of risk. These features assist IBs in settling their depository investment accounts using the *muḍārabah* contract, in which risk transfer from depositors to IBs does not hold (Sukmana & Kasim, 2010; Rashid & Shah, 2019; Boukhatem & Djelassi, 2022; Kabir *et al.*, 2022). Moreover, the practical structure of Islamic banking in Pakistan has been expanding. The market share of Islamic banking was 19.6 per cent and deposits were 22.5 per cent by September 2023, and the annual asset growth rate in Islamic banking was 21.9 per cent (State Bank of Pakistan, 2023). For Malaysia, the share of Islamic financing rose to 42 per cent of domestic banking system loans, from 41 per cent at end-2022, as banks continued to champion an 'Islamic First' strategy (FitchRatings, 2024). These growth figures of both countries require a device with distinct MP mechanisms for credit control and strength of the economy.

In both models of Panel A for Pakistan and Malaysia, the estimated coefficients are approximately similar in significance, as shown in **Table 3**; however, they are slightly different in magnitude for both countries. Although the presence of COVID-19 during 2019-2021 has caused a decline in bank size, bank capital, coverage ratio, credit risk, bank profitability, debt-to-equity ratio, and GDP, and a rise in banks' liquidity, interest rate, and inflation rates in both countries, the signs of the estimated coefficients remained the same while their magnitudes changed slightly. Interestingly, the estimates for IBs changed less than their counterparts.

After estimating the models for both countries, there is strong evidence of the existence of MP credit channels through Pakistan and Malaysian banks. However, Malaysia's evidence is relatively stronger. Similarly, the results indicate that CBs respond better to MP tightening than IBs. The results from the extended models show that large and more liquid banks of both types respond less to MP tightening than their small and less liquid counterparts in both countries. The relatively low response of larger and more liquid banks and the low response of overall IBs to the tightening of MP may make it difficult for the central banks to attain the anticipated objectives of MP. Therefore, it is critical to take into account the size and liquidity status of banks' assets. Innovative MP instruments should consider the unique characteristics of IBs when managing the MPTM through the credit channel.

In Panel B of **Tables 2** and **3**, the diagnostic tests confirm the underlined instruments' robustness. The insignificant J-test statistics cannot reject the null hypothesis. Finally, a diagnostic test confirmed the validity of the instruments used in the baseline models. Therefore, the instruments used in this empirical analysis were orthogonal to the residuals. Similarly, there were no autocorrelation problems in the residuals of the baseline models.

CONCLUSION AND POLICY IMPLICATIONS

The role of banks in MPTM has recently received special attention from researchers and policymakers in different economies. In fact, there is some research on how MP affects MPTM in CBs' credit supply channels. However, knowledge on how IBs behave during monetary tightening remains limited. Similarly, the same phenomenon has not been fully explored by considering bank size and liquidity when comparing the credit supply of IBs versus CBs. This study examines the impact of interbank rate as a measure of MP on the credit supply decisions of IBs and CBs in

developing economies such as Pakistan and Malaysia.

After estimating the models for both countries, there is strong evidence of the existence of MP credit channels through banks. However, relatively strong evidence is noted in Malaysia. Similarly, the results indicate that CBs respond more to MP tightening than IBs. The results from the extended models indicate that large and more liquid banks of both types of banks respond less to MP tightening than their small and less liquid counterparts in both countries. The relatively low response of larger and more liquid banks and the low response of IBs overall to the tightening of MP may make it difficult for central banks to attain the anticipated MP objectives.

Based on the empirical results and after estimating the four models separately for both countries, there are several policy implications for MP authorities in dual-banking countries. First, their central banks should manage the interest rate to control credit supply through CBs and IBs because there is strong evidence of a bank-centric view in Pakistan and Malaysia. Second, the findings suggest a strong need to consider the distinguishing features of IBs when managing the credit channel of the MPTM. Third, for an effective MP, it is important to consider the size and liquidity stocks of both types of banks. The lack of suitable MP instruments may lead to high intermediation costs, limited government control, unstable credit markets, price instability, and inflationary pressure.

Finally, this study suggests that authorities in Pakistan and other dual-banking economies can generally benefit from Malaysia's successful experience while designing Islamic financial products and devising monetary instruments to achieve higher economic growth and price stability. However, there is a vital need for a sound Sharīʿah appraisal of Islamic MP instruments based on ambiguous contracts such as *bayʿ al-ʿīnah*, currency *salam*, commodity *murābaḥah*, and others, especially in the Islamic financial market of Malaysia. Further research is necessary to generalise the scope of these instruments in line with guidelines set by international Islamic finance bodies such as the Islamic Financial Services Board (IFSB) and the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI).

Table 2: Impact of Interbank Offered Rate on the Credit of Banks						
			Model 1: Pakistan		**Model 2: Malaysia**	
			Coefficient	**S.E**	**Coefficient**	**S.E**
Panel A. Estimation Results	**Bank-Specific Variables**	Lagged Credit Supply	0.623***	0.115	0.673***	0.101
		Banks size	0.0692**	0.037	0.0109**	0.012
		Banks Liquidity	0.622***	0.032	0.218***	0.013
		Banks Capital	0.0321**	0.011	0.765***	0.106
		Coverage ratio	0.0691**	0.041	-0.089**	0.114
		Credit risk	-0.532***	0.110	-0.072***	0.008
		Banks Profitability	0.062***	0.010	0.137***	0.005
		Debt to equity ratio	0.034**	0.004	0.067***	0.021
	Policy Variables	IR. Pak	-0.073**	0.0272		
		IR. Mal			-0.136***	0.003
	Macroeconomic Variables	GDP Growth	0.089 ***	0.026	0.019*	0.019
		Inflation	0.021***	0.004	0.017***	0.003
		Constants	0.427***	0.052	0.671***	0.062
Panel B. Diagnostic Tests		Observations	272		261	
		Banks	27		21	
		No. of Instruments	42		38	
		AR (2)	1.35		1.41	
		p-value	0.149		0.176	
		J- statistic	18.46		14.57	
		p-value	0.931		0.923	

Notes: The *J*-statistics test observes overidentified restrictions to ensure the validity of the instruments and distributed as chi-squared under the null of instrument validity and the Arellano-Bond AR (2) test is to observe the second-order serial correlation in the residuals. The instruments are the two to two lags [lag (2 2)] for model 1 in the case of Pakistan and the three to four lags [lag (3 4)] for model 4 in the case of Malaysia.
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own

Table 3: Impact of Interbank Offered Rate on the Credit of Islamic versus Conventional Banks						
			Model 3: Pakistan		**Model 4: Malaysia**	
			Estimates	**S.E**	**Estimates**	**S.E**
Panel A. Estimation Results	**Bank-Specific Variables**	Lagged Credit Supply	0.763***	0.061	0.632***	0.020
		Banks size	0.012**	0.012	0.034***	0.010
		Banks Liquidity	0.515**	0.193	0.393***	0.059
		Banks Capital	0.159***	0.019	0.0191**	0.016
		Coverage ratio	0.0117**	0.017	-0.049***	0.014
		Credit risk	-0.0617***	0.019	-0.088***	0.012
		Banks Profitability	0.032***	0.011	0.017**	0.017
		Debt to equity ratio	0.043**	0.021	-0.043*	0.0410
	Policy Variables	IRPak $\times D^{IBs}$	-0.023***	0.005		
		IRPak $\times D^{CBs}$	-0.0413***	0.011		
		IRPak $\times D^{SIBs}$	-0.017***	0.004		
		IRPak $\times D^{SCBs}$	-0.033***	0.013		
		IRPak $\times D^{L\ IBs}$	-0.022**	0.012		
		IRPak $\times D^{LCBs}$	-0.037***	0.007		
		IRPak $\times D^{LessIBs}$	-0.016***	0.009		
		IRPak $\times D^{LessCBs}$	-0.0291***	0.013		
		IRPak $\times D^{More\ IBs}$	-0.011***	0.016		
		IRPak $\times D^{MoreCBs}$	-0.034***	0.002		
		IRMal $\times D^{IBs}$			-0.0584***	0.007
		IRMal $\times D^{CBs}$			-0.087***	0.011
		IRMal $\times D^{SIBs}$			-0.056***	0.005
		IRMal $\times D^{SCBs}$			-0.061**	0.039
		IRMal $\times D^{LIBs}$			-0.019***	0.006
		IRMal $\times D^{LCBs}$			-0.057***	0.003
		IRMal $\times D^{LessIBs}$			-0.036***	0.006
		IRMal $\times D^{LessCBs}$			-0.047***	0.010
		IRMal $\times D^{MoreIBs}$			-0.021***	0.003
		IRMal $\times D^{MoreCBs}$			-0.052***	0.002
	Macroeconomic Variables	GDP Growth	0.056 **	0.035	0.017**	0.017
		Inflation	0.014**	0.016	0.037***	0.009
		Constants	0.237**	0.076	0.367**	0.081
Panel B. Diagnostic Tests		Observations	272		261	
		Banks	27		21	
		No. of Instruments	48		42	
		AR (2)	1.13		0.23	
		p-value	0.303		0.804	
		J- statistic	13.24		15.48	
		p-value	0.792		0.892	

Note: The instruments are the two to third lags [lag (2 3)] for Model 3 for Pakistan and the two to three lags [lag (2 3)] for Model 4 for Malaysia. *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own

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DECLARATION

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Data will be made available on request.

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