The Effects of Interest Rates on Islamic and Conventional Banks: A Comparative Study of Monetary Policy Transmission Channels

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Abstract

This academic article focuses on analysing the transmission mechanism of monetary policy in a dual banking system composed of Islamic and conventional banks. The main objective is to identify the factors that influence the behavior of banks in response to monetary stimuli and to examine the hypothesis of an asymmetric transmission of monetary policy. To achieve this goal, a methodology based on the Vector Autoregression (VAR) model was used to analyze the relationship between interest rates and macroeconomic variables. The results of this study showed that the transmission of monetary policy is confirmed in a dual banking system through the channel of bank loans and that Islamic banks are more sensitive to changes in interest rates than conventional banks. These findings have important theoretical and methodological implications for understanding the mechanism of monetary policy transmission in a dual banking system and for monetary policy in general.

Keywords: Islamic Finance; Dual banking system; Monetary policy; Banking transmission channel

1. Introduction

A few decades ago, Islamic finance emerged as an innovative financial system integrating an ethical dimension into financial transactions. However, despite its advantages, such as financial transparency, it has not been exempted from challenges and limitations that could question or weaken its success. In summary, as the sole authority responsible for formulating and implementing monetary policy, the central bank must consider the country's overall economic conditions while adapting its framework to incorporate Sharia-compliant monetary policy instruments. This task becomes even more intricate for economies with a dual banking system, like Turkey, Malaysia, Oman, and Indonesia, where the central bank must pursue a monetary policy that pertains to both conventional and Islamic banking systems to effectively impact the broader macroeconomic

landscape. Although interest rate-based monetary policy is deemed crucial for achieving global macroeconomic objectives, the emergence of Islamic banking, which prohibits interest usage, has piqued the interest of policymakers, researchers, and academics, urging them to explore issues related to Islamic finance within the formulation of monetary policy in a dual banking system.

Within this context, this research aims to scrutinize how monetary policy is transmitted within a banking system that combines conventional and Islamic banks, with particular emphasis on the transmission of monetary policy through bank credit. Additionally, the effects of factors like bank liquidity and market structure will be considered to comprehend how banks respond to the transmission of monetary impulses on interest rates, using Indonesia as a case study.

This study addresses an urgent need by examining the intricacies of monetary policy transmission within a mixed banking environment, encompassing the distinctive features of Islamic and conventional banks. It aims to bridge a notable research gap, as existing literature lacks comprehensive exploration. The study strives to assess the effective transmission of monetary policy impulses to interest rates for banks in this context. To achieve this, the study compares the effects of monetary policy shocks—represented by fluctuations in interest rates—on the balance sheets of Islamic and conventional banks. This research introduces a fresh perspective to evaluate the impact of monetary policies in a dual banking system, setting itself apart from predominantly conventional monetary policy-focused literature. The findings from this study will not only enrich the existing literature but also aid in evaluating the stability and viability of Islamic financial instruments for implementing monetary policy.

The subsequent sections of the article are structured as follows: Section 2 delves into a literature analysis concerning monetary policies within a dual banking system alongside the evolution of the Islamic banking sector in Indonesia. Section 3 outlines the methodology employed for this study, utilizing a Vector Autoregression (VAR) model to examine the correlation between interest rates and macroeconomic variables. Empirical findings, presented in Section 4, validate the transmission of monetary policy within a dual banking system through the conduit of bank loans. Furthermore, it is revealed that Islamic banks exhibit greater responsiveness to fluctuations in interest rates compared to their conventional counterparts. The section concludes with a discussion of the study's principal takeaways.

2. Literature review

The coexistence of Islamic and conventional banks in a dual banking system has become common in many countries, particularly in Muslim-majority countries. In this context, the transmission of monetary policy is a crucial subject for the central bank, as it may be affected by differences between Islamic and conventional banks in terms of financing structure, risk management, and other characteristics. In this literature review, we examine several studies investigating the role of monetary policy in dual banking systems and the monetary policy instruments that central banks can use to ensure a smooth transmission of monetary policy across both types of banks.

2.1 Comparative study of Islamic and conventional banking

Islamic and conventional banks diverge in their financial operations and resource management approaches. Conventional banks primarily operate on the interest principle, using interest rates as remuneration for loans and deposits. Conversely, Islamic banks adhere to Sharia principles, avoiding using interest (Riba) and emphasizing risk-sharing and profit-sharing with their clients (Archer et al., 2006). This conceptual difference leads to distinct characteristics in their range of financial products. Conventional banks offer a diverse array of products, including interest-bearing loans, whereas Islamic banks focus on Sharia-compliant products such as Mudarabah (partnership) and Murabaha (profit sale) (Hendar, 2015).

Beyond product offerings, governance and oversight also differ significantly. Conventional banks adhere to traditional financial standards, while Islamic banks are subject to Sharia-specific regulations (Hendar, 2015). Moreover, Islamic banks must establish Sharia advisory committees to ensure the conformity of their operations to ethical and legal Islamic principles (Ibrahim et al., 2008).

These operational disparities are also reflected in how these two types of banks transmit monetary policy from the monetary sphere to the real economy. Conventional banks influence the economy by adjusting interest rates and managing the money supply, whereas Islamic banks, due to their ethics-driven nature, apply financing and investment mechanisms compliant with Sharia principles. This distinction may have implications for the transmission of monetary policies (Kashyap and Stein, 2000).

In summary, Islamic and conventional banks differ in their underlying philosophies, financial approaches, and governance structures. The provided comparative table highlights these differences, showcasing their operational bases, profit and loss

treatments, financial products, attitudes toward interest, social and environmental orientations, regulatory frameworks, and governance.

Table 1: Comparative Operational Analysis: Islamic Banks vs. Conventional Bank

Feature	Islamic Banks	Conventional Banks
Operational Basis	Sharia Compliance	Based on Conventional Financial Norms
Deposit Remuneration	No Interest Rates	Interest Rates Offered on Deposits
Loan Financing	Sharia-Compliant Mechanisms	Loans Granted with Interest
Profit and Loss Sharing	Principle of Sharing with Clients	Clients Don't Share Profits and Losses
Sharia-Compliant Financial Products	Mudarabah, Murabaha, etc.	Loans, Mortgages, Investment Products
Interest (Riba) Prohibition	Strictly Prohibited	Common Use of Interest (Riba)
Governance and Supervision	Sharia Advisory Committees	Compliance with Conventional Financial Regulations
Socially Responsible Investment	Encouraged and Taken into Account	Variable Based on Bank and Choices
Ethical Orientation	Adherence to Islamic Ethical Principles	Variable Based on Bank and Choices

Source: Authors' elaboration

This table provides a general comparison of operational characteristics between Islamic and conventional banks. Details may vary based on jurisdiction, bank policies, and other factors.

2.2 Comparative study of Islamic and conventional banking

On an empirical level, numerous studies have attempted to identify the effects of monetary policy on credit supply. The results of these studies formally underscore that monetary policy has additional effects on the interest rate channel, given that any change in the central bank rate would affect the cost and availability of credit to a greater extent than a simple reduction in the risk-free rate. This is the bank lending channel (Iqbal and Mirakhor, 2007).

In the context of a dual banking system, the sensitivity of financial intermediaries to monetary shocks varies, as revealed by studies conducted in this area. Empirical investigations, such as those initiated by Chapra (1983), demonstrate the role that monetary policy should play in achieving economic and socio-economic well-being within a dual banking system. Moreover, these studies illustrate how such policies can be effective without relying on interest-based tools such as the policy rate and open market operations for government securities with interest (Bikker and Hu, 2002).

Another study by Khan, M. S., & Mirakhor (1989) aimed to analyze the effectiveness of monetary policy transmission in an Islamic financial system by examining the effects of monetary policy on macroeconomic variables. The results concluded that there would be no significant difference in how monetary policy affects economic variables in an Islamic banking system (Hendar, 2015).

The question of asymmetry in the transmission of monetary policy between Islamic and conventional banks in Indonesia has attracted the interest of numerous researchers in recent years. Hanifa and Fahrurrozi (2018) examined the role of Islamic banks in the transmission of monetary policy within the Indonesian context. Their study revealed significant differences in the transmission mechanisms between the two types of banks (Ehrmann et al., 2001). Similarly, Mustofa (2017) delved into the monetary transmission mechanism in a dual banking system in Indonesia, emphasizing aspects specific to Islamic banks [42]. In 2016, Damar and Pirmana explored the issue of banking heterogeneity and its impact on monetary policy transmission in Indonesia [26]. The comparative role of conventional and Islamic banks in the monetary transmission mechanism was investigated by Hendar (2015), who highlighted notable differences in transmission channels. Lastly, Hakim (2014) examined monetary policy transmission in a dual banking system in Indonesia, underscoring the importance of considering the specificities of both types of banks in the analysis of monetary transmission (Ferrouhi, 2014).

This significantly impacts the overall efficacy of monetary policy. Awad underscores the significance of crafting Islamic financial instruments that adhere to sharia law principles and can be effectively employed to execute monetary policy within a

dual banking framework. The paper also discusses the challenges and limitations of using these instruments, such as the lack of a well-developed secondary market for Islamic financial products and the potential for increased complexity in monetary policy implementation. Overall, the paper provides valuable insights into the potential role of Islamic financial instruments in promoting a more inclusive and effective monetary policy framework in countries with dual banking systems (Arnould, 2011).

The instruments adopted by the CBS to achieve the objective of price stability include the reserve requirement ratio (SRR), profit margins, profit-sharing ratios, liquidity, and investment windows, as well as open market operations based on various Islamic certificates, such as the Ijarah certificate, the Islamic development certificate, and the short-term Bai Salam (deferred delivery purchase) certificate.

The interest rate is one of monetary policy's most frequently utilized tools. However, Islamic banks adhere to the prohibition of interest, rendering conventional interest rates ineffective for controlling credit demand. Nevertheless, certain empirical studies have revealed that conventional interest rates can impact interest rates on deposits and loans within Islamic banks. In this regard, we can cite the studies carried out by Ariff (2008), Ayesha and Imran (2012), and Aysan et al. (2013), who found that interest rates on deposits in Islamic banks were positively correlated with conventional interest rates, suggesting that Islamic banks can transmit monetary policy effectively. However, Islamic banks are limited in their ability to participate in open market operations because they are prohibited from dealing with financial instruments based on interest. In a study conducted by Abdul-Rahman and Nor (2016), it was found that the effect of open market operations on Islamic banks was weak, suggesting that this instrument may not be as effective in dual banking systems.

Indeed, Islamic and conventional banks have different reactions to the transmission of monetary policy due to their differences in structure and operation. Conventional banks are subject to interest rate requirements to maximize their profits and have interest rates as their primary tool to influence deposits and loans. On the other hand, Islamic banks must adhere to Sharia principles that prohibit interest. Therefore, Islamic banks use financing techniques based on profit and loss-sharing contracts such as Mudaraba, Musharaka, and Murabaha. Consequently, monetary policy can yield distinct outcomes for the two bank categories. Numerous studies have investigated variations in monetary policy transmission between Islamic and conventional banks. This divergence could be attributed to their adoption of financing methodologies grounded in profit and loss-sharing contracts. These contracts entail direct investment in tangible projects instead of extending loans at fixed interest rates. Furthermore, a study conducted by Alam et al. (2016), found that Islamic banks have a lower sensitivity to interest rate fluctuations than conventional banks, as they rely less on funds borrowed from the money market. In another study, Muhammad Farooq Akhtar (2018) demonstrated that Islamic banks were more resilient to economic shocks than conventional banks due to their financing structure and diversified business model [40]. However, it is important to note that the sensitivity of Islamic banks to interest rate fluctuations may vary depending on factors such as the bank's size, capitalisation level, and its exposure to market risks. A study conducted by Basher et al. (2017) demonstrated that Islamic banks are more sensitive to monetary policy than conventional banks in Malaysia, as Islamic banks tend to rely more heavily on higher interest rates to attract deposits, while conventional banks use other instruments to influence deposits and loans. This asymmetry in the transmission of monetary shocks can have important implications for overall monetary policy transmission. For example, Al-Muharrami (2013) demonstrated that Islamic banks are more resilient to monetary shocks than conventional banks due to their different financing and investment structure.

This conclusion is significant as it implies that Islamic banks may play a vital role in financial and economic stability in countries where they are present. Furthermore, some authors have demonstrated that Islamic banks can stabilise the economy during crises (Al-Muharrami, 2013; Basher et al., 2016). The authors employed regression analysis to examine the relationship between economic growth and Islamic banking development. They found that economic growth was positively correlated with the development of Islamic banking in Malaysia. The results suggest that Islamic banking can be an important driver of economic growth, particularly in predominantly Muslim countries.

In essence, disparities in financing structures, investment approaches, and risk-sharing mechanisms between Islamic and conventional banks elucidate the contrasting responses when transmitting monetary shocks from the financial domain to the real economy. Research in this realm has demonstrated that Islamic banks hold the potential to assume a significant role in fostering economic stability, particularly in times of crisis.

Financial and monetary relationships in a dual financial system must be organized and conducted to consider the distinct nature of this finance, especially regarding the transmission of monetary policy. Indeed, the differences between Islamic and conventional banks have significant implications for the transmission of monetary shocks to the real economy (Chapra, 1983). Islamic banks operate based on principles of risk sharing and sharia compliance, which can affect their ability to adjust interest rates in response to changes in monetary policy (Demirgüç-Kunt and Huizinga, 2010). Indeed, due to their adherence to Shariah-compliant risk-sharing principles, Islamic banks may face challenges in adjusting their interest rates in response to changes in monetary policy. Additionally, the financial products offered by Islamic banks may differ from those offered by conventional banks, which could impact the transmission of monetary shocks. Therefore, an adapted approach is needed to ensure effective monetary policy transmission in a dual banking system comprising both Islamic and conventional banks.

In this context, our study aims to empirically explore monetary policy transmission in a dual banking system by analyzing banks' reactions to monetary shocks through the bank lending channel. To do so, we compare the behavior of conventional and Islamic banks concerning the variability of monetary policy to justify the asymmetry of their reactions to monetary shocks. This asymmetry will be examined using autoregressive models, particularly the estimation of VECM models, to analyze the behaviour of Islamic banks and conventional banking groups in response to monetary shocks. This study will thus provide a better understanding of the differences in behavior between Islamic and conventional banks regarding monetary policy transmission in a dual banking system.

3. Methodology

3.1 Data description and collection

The econometric model examined in this study establishes links between selected macroeconomic, financial, and structural variables to evaluate the behavior of Islamic and conventional banks. This comparative analysis aims to identify the factors that influence variations in the money market rates and their impact on borrowing rates for these two types of banks. The interest rate, representing the monetary policy variable, is measured by the overnight interbank rate (ON). The use of this variable for Indonesia is justified by the fact that empirical studies analyzing the transmission of monetary policy in a dual banking system prioritize the interbank market as a proxy for evaluating monetary rates.

The objective variables in this study include balance sheet elements of both Islamic and conventional banks, such as total financing of Islamic banks (CTI) and total borrowing of conventional banks (CTC), as well as total loans of the banking sector (CT). The Consumer Price Index (CPI) and Industrial Production Index (IPI) are objective variables. This analysis aims to understand the impact of these variables on the transmission of monetary policy in a dual banking system, specifically regarding the reactions of Islamic and conventional banks to monetary shocks.

The impact of the banking industry structure on the transmission of monetary policy has often been studied through the effects of monetary shock on interest rates and credit quantity. To measure banking concentration at the national level, the Herfindahl-Hirschman Index (HHI) was selected as the indicator, which is often used to obtain comprehensive information on the market shares of all banks in the sector (Beck and Webb, 2003; Choudhury and Haque, 2018; Demirgüç-Kunt and Huizinga, 1999).

Two different indicators are considered to measure the liquidity of conventional and Islamic banks. To measure the liquidity of conventional banks, the option Asset Liquidity Ratio appears to indicate the liquidity available to meet expected or unexpected cash demands noted (CI). Regarding the liquidity of conventional and Islamic banks, two different indicators are considered. To measure the liquidity of conventional banks, the Asset Liquidity Ratio option appears to indicate the liquidity available to meet expected or unexpected cash demands noted (CI). In the case of Islamic banks, Vazquez and Federico (2015), Ferrouhi (2014), and Saqib (2019) proposed a short-term liquidity measure that can be used for Islamic banks, the Short-Term Funding Ratio (STFR) noted (IL). We constructed a monthly database for the period 2007-2015 from aggregated banking sector data for both Islamic and conventional banks to examine differences in banks' responses to monetary shocks. Data collection on the banking sector, monetary policy guidelines, and macroeconomic variables is based on statistics, annual reports from central banks, and reports from the International Monetary Fund.

3.2 Research design

In econometric modelling, time series analysis relies on two essential conditions to avoid any spurious regression: verifying the normal distribution assumption of the variables and their stationarity. To meet this methodological requirement, the study used the improved Dickey-Fuller test to examine the stationarity of each variable by retaining the t-statistic of the test and its probability. The results indicate that the CPI, IPI, CTC, ITC, CL, IL, ON, and HHI variables are stationary in the first difference, while the CT variable is stationary in the second difference at a threshold of 1%. The Jarque-Bera tests, as well as the Skewness and Kurtosis coefficients, were used to test for the normality of the variables. The normality test results revealed that the normality assumption is invalidated except for the IPI and HHI variables whose coefficient is negative.

The second step is to examine the direction of the time series evolution of variables related to Islamic and conventional banks. This examination involves checking whether the evolution remains stable in the long run. From an empirical standpoint,

cointegration analysis identifies several linear combinations that can be interpreted as possible long-term equilibrium relationships. In other words, cointegration analysis allows for the study of non-stationary time series, but for which a linear combination is stationary. It enables the specification of stable long-term relationships while simultaneously analyzing the short-term dynamics of the variables under consideration.

The lag length of all models is selected based on information criteria such as the Akaike criterion, the Hannan-Quin criterion, the Schwaz criterion, and the prediction error criterion. The test results indicate that the number of lags retained for conventional banks is 3, while the number of lags defined for Indonesian Islamic banks is 2.

4. Model estimation

4.1 Econometric modeling of Indonesian conventional banks

After specifying the different models and the number of cointegration relationships for each, it is time to identify the long-term and short-term relationship between bank rates captured by both the interest rate for conventional banks and the financing rate for Islamic banks and the investment tool. The monetary policy is presented by the monetary rate, balance sheet variables (bank liquidity ratio), and market structure captured by the Herfindahl-Hirschman concentration index. The results of the coefficient estimation are presented in the table below.

Indeed, once the models are specified, it is essential to test the relationships between the variables to analyze their long- and short-term behaviour. The objective is to understand how bank rates are affected by various factors such as monetary policy, bank liquidity, and market structure. To achieve this, we estimated the coefficients of each variable using econometric modeling. The results of this analysis are presented in the table below, where the coefficients of the different variables are shown for each model. These results provide a better understanding of the impact of each factor on bank rates and help identify the long-term and short-term relationships between these variables.

Table 2: Econometric estimation of the model for Indonesian conventional banks

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.049847	0.020049	-2.486278	0.0150
C(2)	-0.040807	0.012220	-3.339524	0.0013
C(3)	0.008835	0.107295	0.082339	0.9346
C(4)	0.219372	0.085442	2.567499	0.0122
C(5)	0.161887	0.082387	1.964967	0.0530
C(6)	0.062091	0.094215	0.659037	0.0118
C(7)	-0.024082	0.091396	-0.263495	0.0229
C(8)	-0.067493	0.089939	-0.750432	0.0453
C(9)	-3.43E-10	5.77E-10	-0.594701	0.5538
C(10)	-3.41E-10	5.83E-10	-0.585271	0.5601
C(11)	-3.01E-10	6.02E-10	-0.500864	0.6179
C(12)	-1.39E-09	6.92E-10	-2.006498	0.0483
C(13)	-1.29E-09	6.77E-10	-1.899078	0.0313
C(14)	-1.42E-09	5.58E-10	-2.543049	0.0130
C(15)	-0.016534	0.007452	-2.218656	0.0294
C(16)	0.041379	0.009980	4.146196	0.0001
C(17)	0.005961	0.010447	0.570620	0.0199
C(18)	-1.81E-05	1.66E-05	-1.090504	0.0288
C(19)	-7.93E-07	1.58E-05	-0.050321	0.0600
C(20)	-3.06E-06	1.09E-05	-0.280795	0.0496
C(21)	-0.002818	0.003114	-0.904901	0.3683

C(22)	0.016977	0.003065	5.538226	0.0000
C(23)	0.007065	0.003202	2.206052	0.0303
C(24)	-0.000185	0.019784	-0.009348	0.9926
C(25)	-0.032166	0.020031	-1.605841	0.1124
C(26)	0.009452	0.019839	0.476453	0.6351
R-squared	**0.049848**	**Mean dependent var**		-0.032308
Adjusted R-squared	0.527041	**S.D. dependent var**		0.154481
S.E. of regression	0.106240	**Akaike info criterion**		-1.433913
Sum squared resid	0.880382	**Schwarz criterion**		-0.772816
Log likelihood	100.5635	**Hannan-Quinn criter.**		-1.166083
Durbin-Watson stat	1.895540			

Source: Authors' elaboration from Eviews

Therefore, the equation that describes the long-term relationship between conventional interest rate and the different variables is as follows:

$$d(ic)=-0.0498466022463*(ic\ (-1)\ +6.61766498395e\text{-}10*ct(-1)\ +1.44665039305e\text{-}09*ctc(-1)+0.101159897974*cl(-1)-0.000255682753494*hhi(-1)-0.0734826422217*ipi(-1) + 0.0697559328772*cpi(-1) - 4.61996297148)\quad (1)$$

4.2 Results' analysis: Illuminating study conclusions for conventional banks

The first comment we can make about this model pertains to its quality and robustness. From a quality perspective, the analysis of these results indicates that the model is statistically robust, as evidenced by an R-squared value exceeding 60%. In other words, the error correction relationships embody the joint combination of the long- and short-term relationships. During these two relationships, the feedback coefficient emerges, equal to -0.049847 in Equation (1) of the model. This value represents the speed of adjustment of the bank interest rate following a monetary shock. The negative feedback strength A = (-0.049847) < 0 also implies that when a variable at time t deviates from the long-term equilibrium, the speed of return after this deviation (shock) is 0.049847. Put simply, if there is a shock to the long-term equilibrium, it would take exactly 20.06 months (1/0.049847) to return to the stable long-term equilibrium situation. It should be noted that this period of deviation from the occurrence of a shock to the return to the stable long-term equilibrium is relatively shorter compared to conventional banks.

As for the short-term dynamics, these are established using the Wald test to verify the existence or absence of a short-term relationship between each variable and IC. According to the displayed table, the conventional interest rate maintains a short-term relationship with variables such as the monetary rate, total conventional credit, liquidity of conventional banks, and the market concentration index. Indeed, the probability of accepting the null hypothesis is 5%.

Table 3: Wald Test Results: Short-Term Relationship between Conventional Interest Rate and Model Variables

The variables	The conventional interest rate of Indonesian banks, denoted as IC	Probability
ON (monetary rate)	There exists a short-term relationship between the variables ON and IC	0.0047
CTC (total conventional credit)	Our analysis shows that there is no short-term relationship between the variables CTC and IC	0.8773
CL (the liquidity of conventional banks)	There exists a short-term relationship between the variables CL and IC	0.0368
HHI (concentration of the banking market)	There exists a short-term relationship between the variables HHI and IC	0.0370
IPI (index of industriel production)	There exists a short-term relationship between the variables IPI and IC	0.0322
CPI (consumer price index)	There exists a short-term relationship between the variables CPC and IC	0.0400

Source: Authors' elaboration from Eviews

4.3 Econometric modeling of Indonesian Islamic banks

The same approach is taken for the Islamic banking sector, where the resulting model is as follows:

Table 4: Econometric estimation of the model for Indonesian Islamic banks

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.056729	0.018885	3.003947	0.0038
C(2)	-0.402408	0.134928	-2.982387	0.0041
C(3)	-0.165656	0.141947	-1.167029	0.2476
C(4)	0.194722	0.467367	0.416636	0.0378
C(5)	0.142824	0.456846	0.312631	0.0255
C(6)	-3.78E-09	2.30E-09	-1.642158	0.1055
C(7)	-5.52E-09	2.14E-09	-2.579125	0.0123
C(8)	4.65E-06	3.10E-06	1.498253	0.0139
C(9)	-3.81E-07	3.34E-06	-0.113800	0.0398
C(10)	-0.033639	0.034826	-0.965922	0.0338
C(11)	0.041521	0.031214	1.330205	0.0188
C(12)	0.004641	0.080976	0.057314	0.9545
C(13)	0.047135	0.085414	0.551840	0.5830
C(14)	-0.010862	0.011330	-0.958737	0.3414
C(15)	0.004507	0.010406	0.433110	0.6664
C(16)	-3.96E-05	6.17E-05	-0.642085	0.0231
C(17)	0.000106	5.92E-05	1.786038	0.0389
C(18)	0.214207	0.106561	2.010182	0.0487

R-squared	0.537998	Mean dependent var		-0.030123
Adjusted R-squared	0.184759	S.D. dependent var		0.456997
S.E. of regression	0.412626	Akaike info criterion		1.260578
Sum squared resid	10.72637	Schwarz criterion		1.792677
Log likelihood	-33.05340	Hannan-Quinn criter.		1.474063
F-statistic	2.066499	Durbin-Watson stat		2.001224
Prob (F-statistic)	0.019718			

Source: Authors' elaboration from Eviews

The equation for the long-term relationship between the Islamic financing rate and the various variables is as follows:

$$d(if) = - 0.056728572466*(if(-1) - 2.68336509844*on(-1) + 5.16459609661e\text{-}10*ct(-1) - 6.48675400879e\text{-}05*itc(-1) + 0.851397675615*il(-1) + 1.18533424525*cpi(-1) - 0.0261077062999*ipi(-1) + 0.0002876567297*hhi(-1) - 5.87431005532)$$ **(2)**

4.4 Results analysis: Illuminating study conclusions for Islamic Banksometric Modeling of Indonesian Islamic Banks

The first observation about this model concerns its quality and robustness. From a quality standpoint, the analysis of the results demonstrates that the model is statistically robust, as evidenced by an R-squared value that exceeds 50%. In other words, the variables in this specification explain 50% of the variation in the endogenous variable.

The error correction relationships embody the joint combination between the long and short-term relationships. In the middle of these two relationships, the coefficient of feedback, which equals (-0.056729) in equation 2 of the model, is established. This value represents the speed of adjustment of the Islamic financing rate following a monetary shock. The negative feedback coefficient A = (-0.056729) indicates that when a variable at time t deviates from the long-term equilibrium, the return speed after this deviation (shock) is 0.056729. In simpler terms, if there is a shock to the long-term equilibrium, it would take 17.62 months (1/0.056729) to return to the equilibrium situation. It should be noted that this deviation period between the occurrence of a shock and the return to the stable long-term equilibrium is relatively shorter compared to conventional banks.

Table 5: Econometric estimation of the model for Indonesian Islamic banks

The variables	IF Islamic financing rate	Probability
ON (monetary rate)	There exists a short-term relationship between the variables ON and IF	0,0218
ITC (total Islamic credits)	There exists a short-term relationship between the variables ITC and IC	0,0330
IL (the liquidity of Islamic banks)	There exists a short-term relationship between the variables IL and IC	0.0226
HHI (concentration of the banking market)	There exists a short-term relationship between the variables HHI and IC	0.0236
IPI (index of industrial production)	Our analysis shows that there is no short-term relationship between the variables IPIC and IC	0.7535
CPI (consumer price index)	Our analysis shows that there is no short-term relationship between the variables CPIC and IC	0.4407

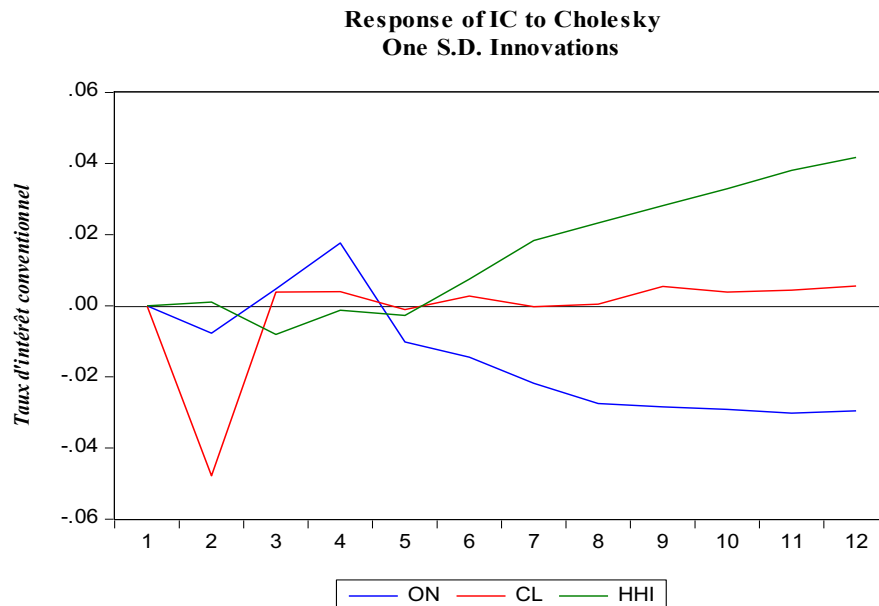*Source: Authors' elaboration from Eviews*

5. Variance decomposition and impulse analysis

As part of our study, it is important to understand the impact of changes in the money market rate on borrowing rates, as this will help explain our model and provide it with predictive power. The most common methodology for analyzing short-term dynamic relationships between the monetary rate and other financial or real variables is to examine the autoregressive vector's dynamic response following a shock simulation. This involves simulating a monetary policy shock on the banking conditions of the countries under study. This simulation compares the impulse response of Islamic and conventional banks following a monetary shock. The values of the impulse response functions provide information on the extent and timing of the transmission of central bank decisions to banks, considering factors that amplify or limit the bank's reaction process following a monetary policy shock. This approach helps to better understand how central bank decisions affect bank lending rates and financing conditions in different economic and financial contexts.

In this study, the impulse response function (IRF) reflects the extent and timing of the responses of the objective variables (IPI, IF, and IC) to a shock in the monetary policy variable (ON). This allows for comparing the extent of the objective variable responses to policy shocks for conventional and Islamic banks. Therefore, it involves simulating a monetary policy shock on banking conditions, whether for Islamic or conventional banks in the Indonesian banking system. To obtain the impulse

response functions, it was necessary to use the error correction of the model already estimated for each bank. The VECM representation of the resulting model is used to calculate the impulse response functions. This approach helps to better understand how monetary policy shocks affect objective variables in the context of Islamic and conventional banks and allows for evaluating the effectiveness of monetary policies in different economic and financial contexts.

Figure 1: Simulation of the Indonesian Banking System Interest Rate Response

Source: Authors' elaboration from Eviews

Islamic banks respond differently to monetary shocks than conventional banks, with a notably cyclical response of their financing interest rates. This relationship can be explained by weaker demand for Islamic loans during periods of high-interest rates, as consumers are reluctant to take out loans at high-interest rates. In the study Bikker and Hu (2002), the authors examined the relationship between Islamic financing interest rates and monetary interest rates using data on Indonesian banks. They found a significant negative correlation between the two, suggesting that Islamic banks lend pro-cyclically. The authors proposed an explanation for this relationship, namely that consumers avoid taking out loans at high-interest rates during periods of high-interest rates, leading to a decrease in demand for Islamic loans and a decrease in Islamic financing interest rates. This study provides empirical evidence for the relationship mentioned in the initial paragraph.

Regarding bank characteristics, namely liquidity and market power, conventional banks increase their interest rates while maintaining stable liquidity positions. On the other hand, for Islamic banks, the level of liquidity appears to be sharply declining, showing a negative correlation with financing rates. In this context, another interesting study is that of Beck et al. (2013), which compared the business models, efficiency, and stability of Islamic and conventional banks. The authors found that Islamic banks tend to be less profitable than conventional banks, but they are also more resilient to economic shocks, which can be attributed to their different financing structures and risk aversion. Furthermore, the authors found that Islamic banks are more efficient in terms of resource utilization, including capital and labour than conventional banks. This study highlights the importance of considering the distinctive characteristics of Islamic banks and their impact on their behaviour and performance compared to conventional banks.

Figure 2: Simulation of the reaction of the credit volume in the Indonesian banking system

Response of CPI to Cholesky
One S.D. Innovations

Response of CPI to Cholesky
One S.D. Innovations
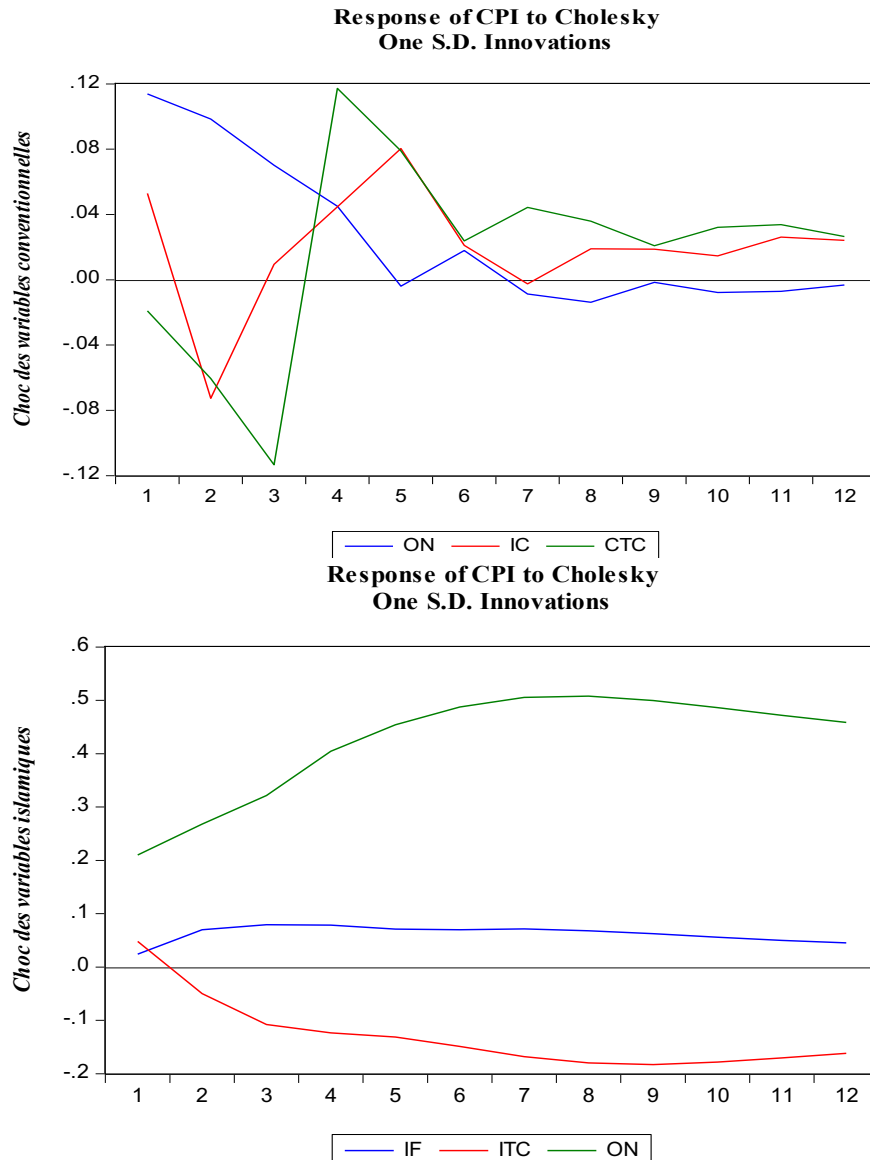
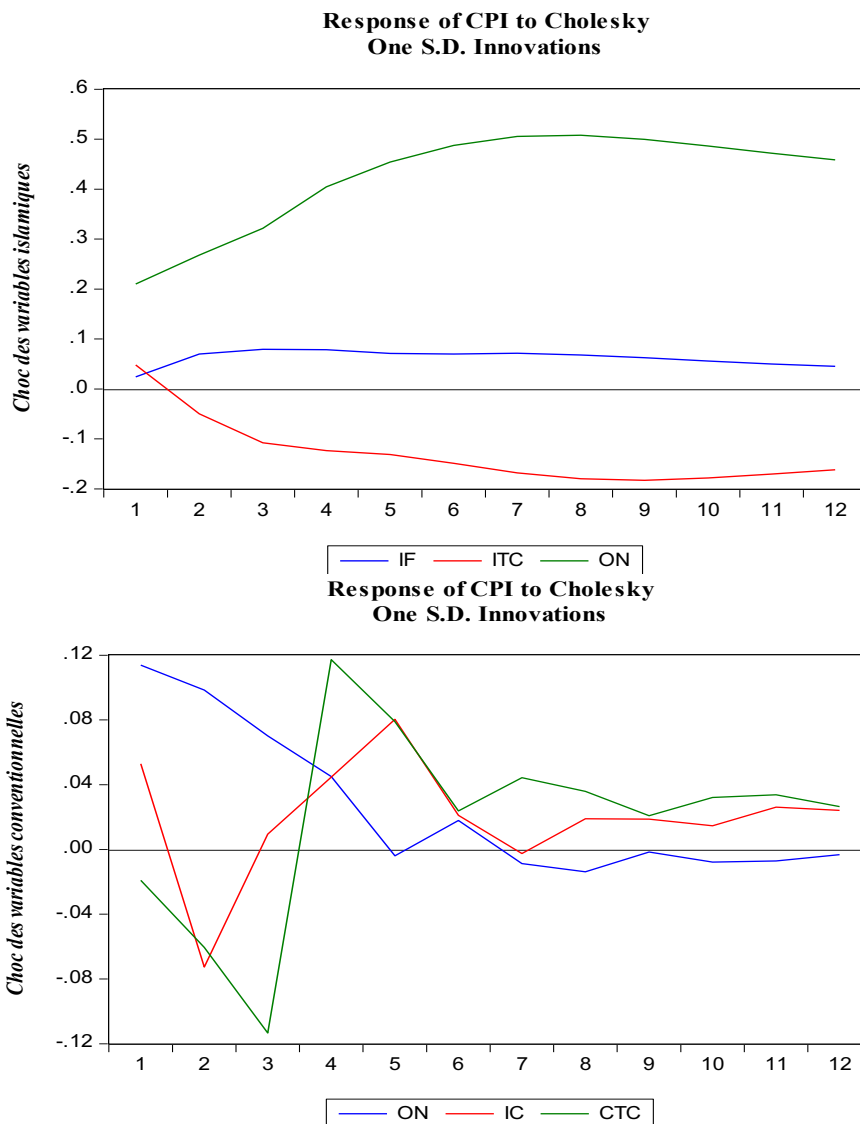*Source: Authors' elaboration from Eviews*

The impulse response function of credit volume reflects the negative response of conventional credit supply to monetary rate shock. However, Islamic financing appears to be more affected by monetary shock, as the decline in credit supply is simultaneous with the shock, whereas, for conventional banks, the impact of the rate shock had a gradual effect on the credit supply. Credit supply also depends on liquidity position and market power, leading to different reactions from banks. In fact, for conventional banks, the interest rate does not immediately affect credit supply until the fifth month following the shock.

The combination of liquidity level with the non-competitive and concentrated nature of the Indonesian banking system largely explains the credit behavior of financial institutions. On the side of Islamic banks, market concentration and low liquidity levels amplify the reaction of credit supply to the monetary rate shock. Furthermore, liquidity and market power are among the structural factors behind this asymmetry in the transmission of monetary policy in a dual banking system.

Several studies have confirmed that monetary policy transmission is asymmetric in banking systems worldwide, particularly in dual banking systems. The results of these studies indicate that market concentration and liquidity level significantly impact the dynamics of credit supply (Flannery and Rangan, 2006; Damar and Pirmana, 2016; Anggraeni and Wardhani, 2019). Indeed,

a study conducted in Indonesia on the reaction of Islamic and conventional banks to rate shocks from the Bank of Indonesia found that Islamic banks are more sensitive to rate shocks than conventional banks, with a greater and more immediate reaction (Ahmad et al., 2020).

Figure 3: Simulation of the response of the Consumer Price Index (Indonesian banking system)

Source: Authors' elaboration from Eviews

Upon examining the industrial production index, it was observed that an increase in the Islamic financing rate during the second month led to a tightening of Islamic credit, resulting in a marked decline in production growth (-1.37%). In comparison, for conventional credit, the impact on production growth was less severe, with a decrease of 0.05% over the same forecast horizon. These results suggest that in the context of monetary policy transmission through the bank lending channel, the prolonged impact of the monetary interest rate, by causing an increase in the Islamic financing rate, generates a contraction of Islamic financing that affects real production, as evidenced by the significant negative response of the industrial production index to Islamic financing. Moreover, the responses of the objective variables to monetary policy shocks are consistent with the predictions of the bank lending channel of the monetary transmission process, such that a restrictive monetary policy limits the banks' ability to provide credit, resulting in a contraction effect on the real economy. Islamic banks, having limited access to other funding sources than deposits, have a more sensitive credit volume to a monetary shock than conventional banks.

Similar studies have been conducted in other countries, confirming the results of this study. For example, a study by Basher et al. (2016) in Kuwait showed that Islamic financing is more sensitive to interest rate shocks than conventional financing. Likewise, a study by Abdul-Majid et al. (2018) in Malaysia showed that Islamic banks are more affected by changes in interest rates than conventional banks. These results reinforce the need to consider the specificities of Islamic banks in implementing monetary policy.

6. Discussion of study findings: Insights and implications

At the level of this analysis, the study focused on the mechanism of monetary policy transmission in a dual banking system, highlighting factors that may impact this transmission process. To achieve this objective, an analytical study was necessary to address the key questions concerning the effectiveness of monetary policy transmission and the potential effect of asymmetry in the transmission process.

Within this analysis, the research focused on the monetary policy transmission mechanism in a dual banking system. To achieve this, the study sought to answer the key questions regarding the effectiveness of monetary policy transmission and the potential impact of asymmetry in this transmission process. An analytical approach was adopted to achieve this objective.

Indeed, the results of the econometric study show that monetary policy is effectively transmitted to bank conditions through the channel of bank lending in the case of a dual banking system composed of both conventional and Islamic banks. These results appear to be consistent with those found by previous empirical studies such as the works of Kutan and Wyzan (2005), Ibrahim et al. (2008), Hakim (2014) and Awad (2015).

Furthermore, the bank credit transmission channel is an important channel through which monetary policy can affect the economy. This channel relies on the impact of the variation in the supply of bank financing on the behavior of economic agents following a monetary shock. It makes sense in an environment where information is asymmetric, and the arbitrage between credit and securities is characterized by imperfect substitutability.

In this context, non-financial agents dependent on bank credit, such as households and new businesses, are directly affected by the rationing (increase) of borrowing opportunities due to an increase (decrease) in refinancing conditions of banks with the central bank. Moreover, when a tightening of monetary policy is initiated, it is observed that loans granted for economic activity decrease due to both price and volume effects. In the former case, banks pass on the increase in their financing costs to their interest rates. This discourages some potential borrowers for whom the cost of capital seems too high. In the latter case, banks prefer to cap loan interest rates at a given level.

Thus, the bank credit transmission channel constitutes an important vector for the transmission of monetary policy in an environment characterized by asymmetric information and imperfect substitutability between credit and securities. Households and businesses dependent on bank credit are particularly sensitive to changes in refinancing conditions of banks with the central bank, which can lead to credit rationing in case of a tightening of monetary policy.

Monetary policy also impacts the behavior of banks in terms of credit distribution, which proves that banking intermediaries play a central role in the transmission of monetary policy since the effects of monetary policy depend on its impact on these banking institutions. The results of this study also support the impact of the market structure of the banking sector on the transmission process of monetary policy to banking conditions for a dual banking system. Indeed, according to the Structure-Conduct-Performance (SCP) model, the degree of competition and concentration in the banking sector affects the behavior of banks in terms of the impact of changes in market interest rates on their lending rates. Banks with a large market power can absorb changes in monetary policy to protect their profitability. Thus, a monetary shock will have less impact on interest rates. This conclusion is consistent with the results found by other empirical studies, such as that of Beck and Webb (2003), concerning the influence of monetary policies and institutional characteristics of a country on life insurance consumption. Cukierman (1996) highlighted the importance of the market structure of the banking sector for the transmission of monetary policy. Demirgüç-Kunt and Huizinga (2010) also found that banks' financing and activity strategies affect their risk and return. Finally, Ehrmann and Fratzscher (2004) analyzed central bank communication during press conferences to explain their monetary policy.

Within this context, the concentration of various banking systems may partially explain the differences in monetary policy transmission modes, particularly in countries with a dual banking system. Furthermore, several studies support these findings, including the research conducted by Ehrmann et al. (2001), Khan and Mirakhor (2010).

Bank liquidity can always be a source of disruption in the transmission of monetary policy. The results indicate that less liquid banks respond more strongly to a monetary shock than those with a very high level of liquidity. In the case of restrictive monetary policy, the most liquid banks can easily respond to loan demands without being forced to tighten their credit supply. The impact of the monetary shock is more significant on the lending function of less liquid banks. In this analysis, Islamic

banks can better transmit monetary shocks to their credit supply due to their lower liquidity than conventional banks. These results are supported by previous empirical studies indicating that the level of bank liquidity alters the transmission of monetary policy, such as Deyoung et al. (2004), Ferrouhi (2014), and Altunbas et al. (2010).

7. Conclusion

In conclusion, Islamic finance has emerged as a relatively new financial system integrating ethical considerations into financial dynamics. Although Islamic finance is more transparent than conventional finance, it is not exempt from flaws and limitations. One of the main challenges of Islamic finance is implementing a monetary policy by Sharia principles, especially in economies that have adopted a dual banking system such as Turkey, Malaysia, and Indonesia. The central bank must conduct monetary policies that influence conventional and Islamic banking systems to effectively impact the overall macroeconomic situation, while remaining faithful to Sharia principles.

Thus, the main objective of this research is to identify and analyze the process of monetary policy transmission via the bank lending channel in a dual banking system. In addition, this research examined key factors that determine the banking sector's resilience to monetary shocks, such as liquidity and the structure of the banking market. These factors are advanced in the literature as potential influences on transmission channels by affecting bank behavior regarding the impact of monetary impulses on their rates. The results also support the contribution of these factors in explaining the difference in reaction of conventional banks versus Islamic banks to a monetary shock, justifying the asymmetry of monetary policy transmission in a dual banking system.

After building a theoretical framework based on the literature review, the empirical study focused on a sample of three countries that adopted a dual banking system from 2007 to 2015. The empirical method used was the vector autoregressive model, particularly estimation with the cointegration model.

According to the results obtained from the empirical study, the transmission of monetary policy is confirmed in the case of a dual banking system via the bank lending channel. The long-term relationship and dynamic adjustment of bank rates following a monetary shock are confirmed. Furthermore, the hypothesis of asymmetry in monetary policy transmission in a dual banking system is confirmed. Islamic banks show a higher degree of sensitivity than conventional banks regarding the impact of monetary rate changes on their rates.

This comparative analysis of the behaviour of Islamic and conventional banks regarding the transmission of monetary impulses through banking conditions offers a more scientific and in-depth perspective on the mechanism of monetary policy transmission in a dual banking system. The main factors influencing bank sensitivity to rate adjustment in response to a monetary shock are also identified.

Considering the growing importance of Islamic finance in the global financial landscape, this research provides valuable insights for policymakers in countries with dual banking systems. They can use these insights to develop more effective monetary policies that promote economic stability and growth while adhering to Sharia principles.

In addition to this study, it is noteworthy to highlight inherent limitations in analyzing the asymmetry of monetary policy transmission between conventional and Islamic banks using vector error correction models (VECM). Firstly, data availability and quality, particularly for Islamic banks, could pose constraints. Additionally, the operational diversity of Islamic banks might introduce some heterogeneity in the findings. Regional and contextual variations and market-specific nuances could restrict the generalizability of outcomes to other contexts. Moreover, the causal relationships and directionalities among variables are not explicitly established by VECM models. Furthermore, the sensitivity of results to model specifications, lag selections, and included variables could impact conclusions. Lastly, the relatively brief study duration might limit the observation of long-term trends. Despite these limitations, this study offers significant insights into how monetary policy is transmitted within these two bank categories.

Furthermore, this study paves the way for several promising avenues for future research. Extending the analysis period could shed light on longer-term trends in monetary policy transmission. Exploring regional variations in transmission mechanisms and incorporating additional economic variables could enhance understanding. Investigating the behavioural aspects of banks' responses, as well as their implications for financial stability, presents valuable opportunities. Comparative studies across different regulatory contexts and the effects of innovation and digitization on transmission are worthy of exploration. Lastly, analyzing how regulatory changes influence transmission dynamics introduces an intriguing realm of investigation. These potential avenues promise deepening insights and contributing to a broader comprehension of monetary policy transmission across banking sectors.

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