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Do Islamic Bank Financings Drive Real Economic Activity and Price Stability? Empirical Evidence from Indonesia Using ARDL-ECM Framework

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Abstract

This study investigates the dynamic relationships among price stability, real-sector activity, BI-rate, and Islamic bank financing in Indonesia using an ARDL-ECM approach on monthly data spanning January 2020–December 2023. Industrial Production Index (IPI) and Consumer Price Index (CPI) (level) are used to represent real activity and prices, while total outstanding Islamic bank financing and the BI policy rate serve as explanatory and policy control variables. Bounds testing confirms a long-run cointegration among the series. Long-run estimates indicate statistically significant and positive associations between industrial activity, policy rate, Islamic financing and the equilibrium relationship under study. Short-run coefficients are generally insignificant and the error-correction term is weakly signed and not statistically significant, implying slow or muted short-run adjustment toward the long-run equilibrium. Diagnostic checks (normality, no serial correlation, homoscedasticity, CUSUM/ CUSUMSQ) support model validity. Results suggest Islamic financing plays a meaningful long-term role in macro dynamics, but policymakers should coordinate supply-side measures to avoid potential short-run trade-offs.

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Introduction

The development of Islamic finance and banking in Indonesia has accelerated markedly since the mid-2000s, and over the last two decades Islamic banks have assumed an increasingly important role within the national financial system. Total Islamic bank financing (outstanding) is often assumed to have a close linkage with the real sector because many Islamic financing contracts are asset-based or profit-and-loss sharing in nature, which theoretically channel credit toward productive activities and real investment. For policymakers (Bank Indonesia, OJK, KNEKS), understanding the relationship among Islamic financing, real output, and price stability is important for designing appropriate policy instruments and for maximizing the contribution of the Islamic financial sector to economic development (Beck, Demirgüç-Kunt, & Merrouche, 2013; Abedifar, Molyneux, & Tarazi, 2013).

Intermediation theory suggests that broader access to finance and allocation to productive projects can increase production capacity and real output, while an increase in aggregate demand without a corresponding supply response can create upward pressure on prices. In the context of Islamic banking, this mechanism is particularly interesting because contract types and allocation patterns differ from conventional finance. Empirical work therefore needs to test both effects on real output and implications for inflation simultaneously using a dynamic approach (Imam, 2015; Gheeraert & Weill, 2015). For this purpose the study employs IPI as a proxy for real-sector activity, CPI (level) to capture prices, Total Islamic Bank Financing (outstanding), and the BI policy rate at monthly frequency for the illustrative period 2020M01–2023M12, so that short-run responses and adjustment patterns relevant to policy makers can be observed.

Empirical literature on the role of Islamic financing for growth and price stability yields mixed results. Cross-country and panel studies frequently document a positive association between Islamic banking development and economic growth (Imam, 2015; Boukhatem & Ben Moussa, 2018), but these findings are heterogeneous across regions and depend on institutional features and the depth of Islamic markets (Gheeraert & Weill, 2015; Beck et al., 2013). At the country level, including in some Indonesian studies, there is evidence of long-run relationships between Islamic financing and certain macro variables, while other studies find differing or insignificant short-run effects on inflation, especially when financing expansion is not accompanied by increases in productive capacity or when a dual-banking environment complicates transmission (Sasana, 2020; Alifah, 2020). Methodological differences for example VAR/VECM versus ARDL, data frequency and sample period, and the inclusion of monetary policy controls help explain variation in findings.

To address these methodological issues, particularly when variables display mixed integration orders (I(0) and I(1)), this study adopts the ARDL-ECM framework and bounds testing (Pesaran, Shin, & Smith, 2001), which allow testing for level relationships and estimating long-run coefficients together with short-run dynamics. The study also recognizes the possibility

of simultaneous and bidirectional causality between Islamic financing, output, and prices for example, economic conditions may affect financing demand while financing itself influences output and therefore incorporates robustness checks designed to mitigate bias from endogeneity.

The primary objectives of this paper are to test whether a long-run relationship (cointegration) exists among Islamic bank financing, IPI, and CPI in Indonesia; to estimate long-run coefficients and the speed of short-run adjustment (the error correction term) using ARDL-ECM and to interpret whether expansion in Islamic financing supports inflation-friendly growth or produces policy trade-offs that require management. The expected findings aim to provide empirical guidance for Bank Indonesia, OJK, and other policymakers on the potential use of Islamic banking indicators within the macroeconomic policy toolkit.

Literature Review

Islamic banking differs theoretically from conventional banking in its prohibition of interest and its reliance on risk-sharing, asset-backed, and trade-based contracts. In principle, these features can strengthen the linkage between finance and the real economy by tying financing to underlying productive activities rather than to purely financial intermediation. At the same time, Islamic banks operate alongside conventional institutions, are exposed to similar macroeconomic shocks, and are subject to comparable regulatory and monetary policy frameworks. Consequently, the net macroeconomic effect of Islamic bank financing on growth and price stability is ambiguous ex ante and must be established empirically (Abedifar et al., 2013; Beck et al., 2013).

Cross-country and panel evidence on whether Islamic finance promotes growth and macroeconomic stability is far from uniform. Several studies report a generally positive association between the development of Islamic banking and real economic activity, even after controlling for conventional financial depth and institutional factors, suggesting that Islamic finance can complement traditional banking in mobilizing savings and funding investment (Imam & Kpodar, 2015; Boukhatem & Ben Moussa, 2018). However, other contributions point to nonlinear or context-dependent effects. Gheeraert and Weill (2015) argue that the impact of Islamic banking on macroeconomic efficiency may vary across levels of financial development and institutional quality, while Ledhem (2022) emphasizes the interaction between Islamic banking and financial stability conditions. Survey evidence also highlights that the growth and stability implications of Islamic finance depend strongly on regulatory frameworks, governance, and the structure of dual-banking systems rather than on Sharia compliance alone (Narayan & Phan, 2019). Overall, these studies indicate that the macroeconomic role of Islamic banking is heterogeneous across countries and cannot be assumed to be uniformly growth-enhancing or stability-improving.

Country-specific evidence for Indonesia remains relatively limited and yields mixed results. Some studies find that Islamic bank financing is positively associated with economic growth and can help strengthen the real sector by easing financing constraints for productive activities (Sasana, 2020; Alifah, 2020). These contributions generally interpret the expansion of Islamic financing as supporting real output through investment and consumption channels. More recent work explicitly links Islamic financing to broader macroeconomic stability outcomes and suggests that Islamic credit may have favorable implications for both growth and inflation, although the strength and persistence of these effects appear sensitive to model specification and the treatment of the dual-banking environment (Aini, 2024). Differences in data frequency, sample periods, and the extent to which conventional credit and policy rates are controlled for

contribute to the lack of consensus regarding the role of Islamic bank financing in Indonesia's macroeconomic performance.

From a methodological perspective, most empirical studies on Islamic finance and macroeconomic outcomes employ time-series or panel approaches such as VAR/VECM frameworks, Granger causality tests, or cointegration techniques in the tradition of Engle and Granger (1987). These methods are useful for tracing dynamic interactions but generally require variables to share the same order of integration and may be sensitive to small-sample bias, structural breaks, and omitted variables. In response, some authors apply procedures such as Toda–Yamamoto causality tests to reduce the risk of spurious inference in the presence of integrated processes (Toda & Yamamoto, 1995). The ARDL bounds testing approach proposed by Pesaran et al. (2001), further refined by Narayan (2005) for small samples, offers an alternative framework that can accommodate regressors of mixed integration orders and is particularly suitable when the available time series are relatively short. Nonetheless, in the context of Islamic finance and macroeconomic linkages in Indonesia, these more flexible methods have largely been applied to low-frequency (annual or quarterly) data and often without jointly modeling real activity, prices, and the policy rate in a single empirical system.

These observations reveal several research gaps. First, for Indonesia, there is a lack of empirical studies that simultaneously model real-sector activity and consumer prices together with Islamic bank financing and the central bank policy rate. Most existing works tend to focus either on growth or on inflation, making it difficult to assess whether Islamic financing is associated with inflation-friendly growth or with short-run trade-offs between output and price stability in a dual-banking system. Second, the use of high-frequency data that capture the recent, turbulent period surrounding the COVID-19 shock and the subsequent recovery is still limited. As a result, the short-run adjustment of industrial production and consumer prices to changes in Islamic bank financing under current macroeconomic conditions remains insufficiently documented. Third, past studies have not fully exploited empirical frameworks that combine the advantages of ARDL–ECM modeling—namely the ability to handle mixed integration orders and small samples—with comprehensive diagnostic and stability testing, despite the suitability of such approaches for the available data and the policy questions at hand.

Building on these gaps, this study contributes to the literature in several ways. First, it jointly examines the long-run and short-run relationships between Islamic bank financing, industrial production (IPI), and consumer prices (CPI) in Indonesia, while explicitly incorporating the BI policy rate. This unified framework directly addresses whether Islamic financing is associated with inflation-friendly growth or with potential price–output trade-offs. Second, by employing monthly data over the 2020–2023 period, the analysis captures high-frequency dynamics during a macroeconomically volatile episode marked by the COVID-19 shock and its aftermath, which has been largely overlooked in prior country-specific work on Islamic finance and macroeconomic stability. Third, the study adopts an ARDL–ECM framework with bounds testing (Pesaran et al., 2001; Narayan, 2005) and extensive diagnostic and stability checks, which is well suited to mixed integration orders and relatively short time series. Together, these features aim to provide more precise and policy-relevant evidence on the macroeconomic role of Islamic bank financing in Indonesia's dual-banking system and to refine the understanding of how Islamic finance can be integrated into the broader monetary and financial stability toolkit.

Methodology

Research design follows a quantitative, time-series econometric framework using the ARDL-ECM approach to capture both long-run equilibrium relationships and short-run dynamics among Total Islamic Bank Financing (outstanding) as variable dependent, and real-sector activity proxied by the Industrial Production Index (IPI), the Consumer Price Index (CPI, level), the BI policy rate as variable independent, with the population comprising relevant monthly national macroseries and the sample purposively selected from official sources (OJK Statistik Perbankan Syariah, BPS for IPI and CPI, Bank Indonesia for BI-rate) for the working period January 2020 - December 2023 all series will be preprocessed, data collection will be entirely secondary (official CSV/XLSX releases and statistical bulletins) and metadata/revision notes archived, and the analysis will follow ARDL-ECM best practice including unit-root testing (ADF/PP with appropriate deterministic terms) to confirm absence of I(2), selection of optimal lag lengths using information criteria (AIC/BIC), bounds-testing for level relationships (Pesaran, Shin & Smith, 2001) with critical-value adjustments for small samples where applicable, estimation of long-run coefficients and the short-run ECM including the error correction term to gauge speed of adjustment, and comprehensive diagnostic and robustness checks such as serial correlation tests (LM/Portmanteau), heteroskedasticity tests (ARCH), residual normality, parameter stability tests (CUSUM/CUSUMSQ), and sensitivity analyses to lag choice, seasonal dummies, and inclusion of BI-rate as an exogenous control; potential endogeneity and simultaneity will be explicitly addressed via robustness strategies including inclusion of exogenous policy controls, structural dummies for pandemic and rebasing events, Toda Yamamoto causality checks, and IV or alternative identification if valid instruments are available, with estimation and inference conducted in standard econometric software E-Views and heteroskedasticity-robust standard errors reported.

Results and Discussion

Preliminary Tests

Table 1. Unit Root Test

	T-test	Prob. value (*)	Critical value at 5%	Result
LNCPI**	6.236043	0.0000	2.926622	1(1)
LNIPI**	6.365045	0.0000	2.928142	1(1)
RATE**	3.094458	0.0339	2.926622	1(1)
LNPS**	5.882053	0.0000	2.938987	1(1)

Depicts significance level for McKinnon critical value, **Regression in first order with the trend and intercept, ***Regression in first order with intercept, ***Regression in level with the trend and intercept.

To ensure the stationarity properties of the variables before estimating the ARDL model, the Augmented Dickey-Fuller (ADF) unit root test was conducted. Table 1 presents the results for all variables, including the logarithmic form of the Consumer Price Index (LNCPI), Industrial Production Index (LNIPI), interest rate (RATE), and Islamic financing (LNPS). The results indicate that all variables are stationary at the first difference I(1) level, as their calculated t-statistics exceed the 5% critical values, and the corresponding probability values are statistically significant ($p < 0.05$). This confirms that none of the variables are integrated of order two I(2), thereby satisfying the basic requirement for applying the ARDL bounds testing approach as proposed by Pesaran et al. (2001). In other words, the mixed order of integration (I(0) and I(1)) justifies the use of ARDL modeling to examine both the short-run and long-run relationships among the selected macroeconomic variables.

Table 2. ARDL Cointegration Test

Augmented Dickey-Fuller test statistic		t-Statistic	Prob.
Test critical values:	1% level	-9.976179	0.0000
	5% level	-3.581152	
	10% level	-2.926622	
		-2.601424	

To examine the presence of a long-run equilibrium relationship among the variables, the ARDL cointegration test was conducted using the Augmented Dickey-Fuller (ADF) approach on the residuals of the estimated model. The results are reported in Table 2. The computed ADF t-statistic of –9.976179 is substantially lower than the critical values at the 1%, 5%, and 10% significance levels (–3.581152, –2.926622, and –2.601424, respectively). The associated probability value of 0.0000 indicates strong statistical significance.

This result confirms the existence of a long-run cointegration relationship among the variables included in the ARDL model. In other words, despite short-term fluctuations, the variables tend to move together over time toward a stable long-run equilibrium. Hence, it is appropriate to proceed with the estimation of both short-run and long-run coefficients within the ARDL framework.

Long-Run Relationship

Table 3. Estimation of Long-Term Relationships

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIPI	0.152941	0.038754	3.946449	0.0003
RATE	0.021867	0.003460	6.320380	0.0000
LNPS	0.013756	0.006532	2.105995	0.0409
C	3.660501	0.183551	19.94266	0.0000

The estimated long-run coefficients derived from the ARDL model are presented in Table 3. The results reveal that all explanatory variables Industrial Production Index (LNIPI), interest rate (RATE), and Islamic financing (LNPS) exert statistically significant positive effects on the dependent variable in the long term. Specifically, the coefficient of LNIPI (0.152941) is positive and significant at the 1% level ($p = 0.0003$), suggesting that a 1% increase in industrial production leads to approximately a 0.15% rise in the dependent variable, holding other factors constant. This implies that industrial output plays a crucial role in stimulating long-term economic growth or price stability, depending on the dependent variable context (e.g., CPI or GDP).

Similarly, the interest rate (RATE) exhibits a positive and highly significant effect ($p = 0.0000$) with a coefficient of 0.021867, indicating that monetary policy transmission through the interest rate channel remains influential in the long-run dynamics of the model. Furthermore, LNPS also shows a positive and significant coefficient (0.013756, $p = 0.0409$), demonstrating that national production scale expansion contributes positively to the long-term equilibrium path. The constant term ($C = 3.660501$) is positive and significant, reflecting the stable long-run mean value of the dependent variable when other variables are held constant. Overall, these findings confirm that real sector performance and monetary indicators jointly determine the long-term equilibrium in the model, consistent with theoretical expectations of the ARDL framework and prior empirical studies.

Short-Run Dynamics

Table 4. Short Term Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIPI)	-0.007590	0.006322	-1.200617	0.2366
D(RATE)	0.000542	0.002876	0.188373	0.8515
D(LNPS)	-5.85E-05	0.000637	-0.091818	0.9273
ECT(-1)	0.036370	0.027263	1.334069	0.1894
C	0.002362	0.000418	5.648463	0.0000

The short-run estimation results from the ARDL model are reported in Table 4. The coefficients of the first-differenced variables D(LNIPI), D(RATE), and D(LNPS) are statistically insignificant at conventional levels ($p > 0.05$). This suggests that short-term fluctuations in industrial production, interest rate, and Islamic financing do not exert an immediate impact on the dependent variable within the current period.

However, the error correction term (ECT(–1)) carries a positive sign with a coefficient of 0.036370, although it is statistically insignificant ($p = 0.1894$). Ideally, a negative and significant ECT coefficient indicates convergence toward long-run equilibrium following short-term shocks. In this case, the insignificant and positive coefficient implies that the short-run adjustment mechanism is weak and the system does not immediately restore equilibrium after a disturbance. Despite the absence of short-run significance, the significant constant term ($C = 0.002362$, $p = 0.0000$) demonstrates model stability in the short-term specification. The dominance of long-run significance (as previously reported) suggests that the equilibrium relationship among variables is primarily driven by structural or long-term dynamics rather than short-term adjustments. Overall, these findings indicate that policy interventions affecting industrial activity, interest rates, and Islamic financing may require a longer time horizon to generate observable effects on the dependent variable, aligning with the long-run equilibrium behavior established in the ARDL framework.

Diagnostic Test

Table 5. Diagnostic Test

Test	F-statistic	Prob. value	H0	Decision
Normality Test	1.766686	0.413399	No normal distribution	Accept H0
Serial Correlation LM	0.054829	0.9336	No serial correlation	Accept H0
Heteroscedasticity	1.632704	0.1621	No heteroscedasticity	Accept H0

To ensure the reliability and robustness of the ARDL model, several post-estimation diagnostic tests were conducted, including tests for normality, serial correlation, and heteroscedasticity. The results are presented in Table 5. The Normality Test yields an F-statistic of 1.766686 with a probability value of 0.413399, which is greater than the 5% significance level. This indicates that the residuals are normally distributed, satisfying one of the key assumptions of classical linear regression. The Breusch–Godfrey Serial Correlation LM test reports a probability value of 0.9336, confirming the absence of serial correlation in the residuals. Similarly, the Heteroscedasticity Test shows a probability value of 0.1621, suggesting that the variance of the residuals is homoscedastic. Since all probability values exceed the 5% threshold, the null hypotheses of no normality violation, no serial correlation, and no heteroscedasticity are accepted. Therefore, the model passes all diagnostic checks, indicating that the ARDL estimates are statistically valid, efficient, and reliable for inference and policy analysis.

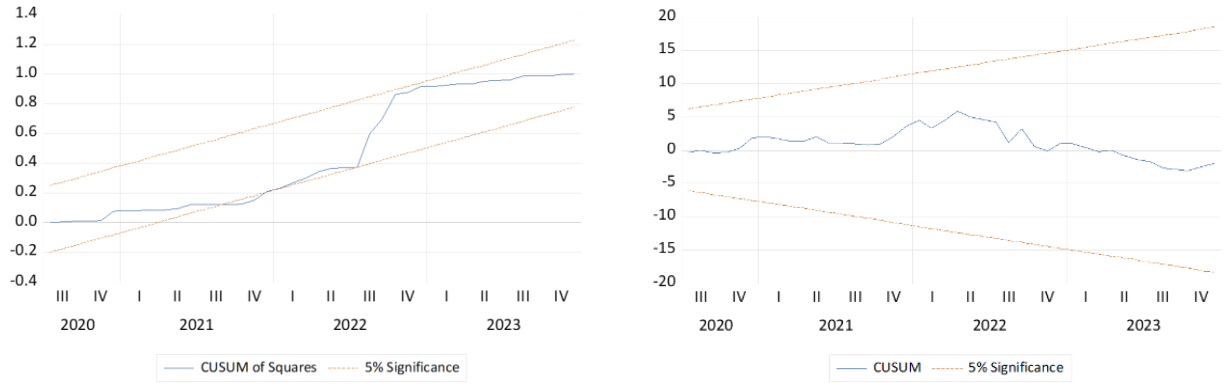

Figure 1. Plots of CUSUM and CUSUMSQ Plots at 5% level of significance

To assess the structural stability of the estimated ARDL model, the CUSUM and CUSUM of Squares (CUSUMSQ) tests were conducted at the 5% level of significance. The results are displayed in Figures 1 and 2. The CUSUM plot (Figure 1) indicates that the cumulative sum of recursive residuals remains within the 5% significance boundaries throughout the sample period (2020–2023). This suggests that the estimated coefficients are stable over time, and no structural break is detected in the short-run dynamics of the model. Similarly, the CUSUMSQ plot (Figure 2) also remains within the critical bounds, confirming the parameter constancy and long-run stability of the ARDL model. The absence of any crossing beyond the significance lines further validates that the model's estimated relationships are consistent across different time periods. Overall, the results of both CUSUM and CUSUMSQ tests affirm that the ARDL model is structurally stable, reinforcing the reliability of the estimated short-run and long-run coefficients for policy interpretation and forecasting purposes.

Conclusion

This study investigated the dynamic relationship between price stability, real-sector activity, BI-rate, and Islamic bank financing using the ARDL bounds testing framework. The findings confirmed the existence of a long-run equilibrium relationship among the variables, demonstrating that they move together over time despite short-term fluctuations. The long-run analysis revealed that industrial activity, monetary policy, and national productivity play a significant role in shaping economic stability and long-term growth. Meanwhile, the insignificant short-run coefficients suggest that macroeconomic adjustments in the system occur gradually rather than instantaneously. The diagnostic and stability tests confirmed that the ARDL model is statistically valid, stable, and free from structural distortions. The results highlight that long-run structural factors dominate short-term variations. This implies that policy consistency, coordination between monetary and real sectors, and institutional stability are essential for maintaining macroeconomic balance and achieving sustainable growth over time. Based on the results, several suggestions are proposed for policymakers and future research. Policymakers should focus on developing long-term strategies that strengthen industrial productivity, maintain monetary stability, and improve coordination between fiscal and monetary authorities. Encouraging innovation, human capital investment, and infrastructure improvement is crucial to enhancing resilience and ensuring the sustainability of economic performance.

For future studies, it is recommended to extend the model by incorporating additional macroeconomic variables such as inflation, exchange rates, and fiscal indicators to provide a more comprehensive understanding of the economy. Researchers may also apply advanced econometric techniques such as nonlinear ARDL or panel ARDL to explore asymmetric and cross-country dynamics. Finally, the use of higher-frequency or longitudinal data could help capture more detailed short-run adjustment mechanisms, refining the policy implications and enhancing the robustness of the model's predictive capabilities.

Author's Contribution

First and second author: Creating and designing analyses, Collecting data, Performing analysis, and Writing paper. Third author: Editing and Proofread.

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Declaration of Competing Interest

The authors declare that they have no conflict of interest

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