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The Impact of Islamic Banking Financing on Economic Growth in Indonesia

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Abstract
The optimization of the financial intermediation function is one of the primary goals of Law Number 4 of 2023. This regulation assigns a role to Islamic banking in carrying out intermediation, including financing. Therefore, this study aimed to determine the effects of Islamic banking financing on economic growth in Indonesia, using Novel Dynamic ARDL Simulation approach with time series data from 2009Q1 to 2022Q4. The results showed that work capital (WCP) and investment (INV) were significantly, positively, and dynamically related to economic growth (GDP) in the short and long terms, with consumption (CON) having a relevant and negative association. Policy simulation scenarios also proved that a 5% increase in WCP and INV encouraged GDP to the 20th quarter of the experimental year. In this context, the marginal impact of the variables sustained long-term economic growth in a positive trend after financing threshold point.

Keywords: Role of Intermediation, Islamic Banking, Novel Dynamic ARDL Simulation

Dampak Pembiayaan Perbankan Syariah Terhadap Pertumbuhan Ekonomi di Indonesia

Abstrak
Optimalisasi fungsi intermediasi sektor keuangan merupakan salah satu tujuan utama Undang-Undang Nomor 4 Tahun 2023. Aturan tersebut memberikan peran bagi perbankan syariah dalam melakukan intermediasi, termasuk pembiayaan. Oleh karena itu, penelitian ini bertujuan untuk mengetahui pengaruh pembiayaan perbankan syariah terhadap pertumbuhan ekonomi di Indonesia menggunakan pedekatan Novel Dynamic ARDL Simulation dengan data runtun waktu 2009Q1 hingga 2022Q4. Hasil penelitian menunjukkan bahwa pembiayaan modal kerja (WCP) dan pembiayaan investasi (INV) mempunyai hubungan yang signifikan, positif, dan dinamis terhadap pertumbuhan ekonomi (GDP) dalam jangka pendek dan jangka panjang, sedangkan pembiayaan konsumsi (CON) memiliki hubungan signifikan dan negatif. Skenario simulasi kebijakan membuktikan bahwa peningkatan WCP dan INV sebesar 5% meningkatkan GDP hingga kuartal ke-20 dari tahun penelitian. Selain itu, dampak marjinal dari variabel-variabel tersebut mampu menjaga pertumbuhan ekonomi dalam jangka panjang ke tren yang positif setelah melewati titik ambang pembiayaan.

Kata Kunci: Peran Intermediasi, Perbankan Syariah, Novel Dynamic ARDL Simulation

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INTRODUCTION

The Indonesian banking world is presently provided with a new mandate through Law Number 4 of 2023, to emphasize the importance of the financial sector contribution to

inclusive, sustainable, and fair economic growth. This condition is responsible for improving people living standards, reducing economic inequality, and achieving a prosperous, advanced, and dignified Indonesia. The main objective of the Law also prioritizes the optimization of the intermediation role toward developing fiscal growth. Furthermore, Islamic banking is required to promote and enhance relevant financial sector as an institution operating with Muslim-based principles. This banking system shows promising prospects, as indicated in the Islamic Finance Development Report of 2019. In this context, monetary assets are capable of reaching USD 3.4 trillion by 2024, emphasizing a significant increase from the 2018 value of about USD 2.5 trillion (IFDI, 2019). The results were also supported by Consulting (2013), where Indonesia was ranked as the leading nation in Islamic Financial Country Index among 48 countries.

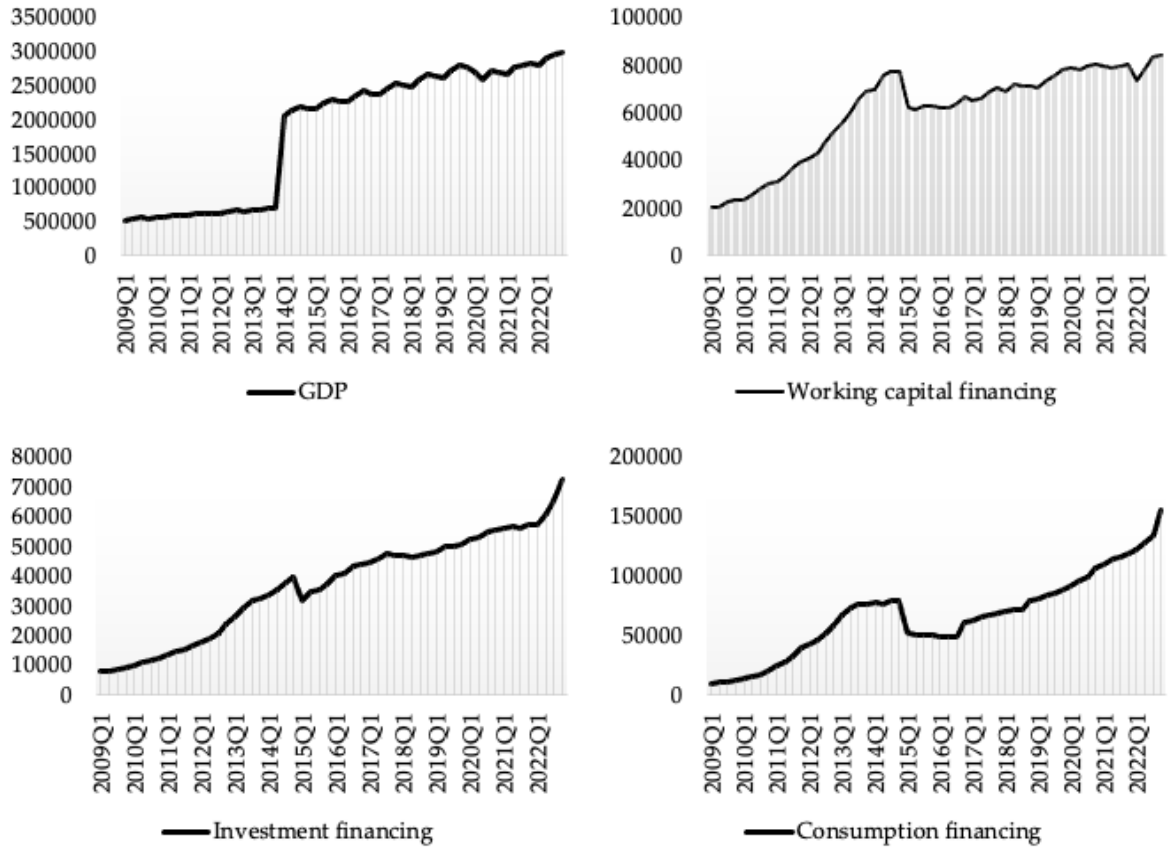

Figure 1. Development of Economic Growth (GDP), Working Capital Financing (WCP), Investment Financing (INV), and Consumption Financing (CON) between 2009Q1-2022Q4 in Indonesian Islamic Banking in billion Rp (Financial Services Authority, 2009-2024)

In Figure 1, the trend of improving performance in Indonesian Islamic Banking was observed through working capital, investment, and consumption financing concerning economic growth during 2009Q1-2022Q1. According to Afandi (2021), the urgency of banking financing included the following, (i) Financial activities at the macro level played a significant role in improving fiscal development by channeling third-party surplus funds into the real sector, and (ii) Funding events at the micro level showed that banking financing

was the primary source for entrepreneurs and individuals seeking to enhance production output, employment, and consumption. This was accompanied by the continuous improvement of economic circulation, significantly influencing the fiscal development of a country.

Khasanah *et al.* (2021) also stated that the role of Islamic banking financing in Indonesia had a short-term influence on economic growth. This was not in line with Iryanto *et al.* (2020) where financing domain had short and long-term effects on economic growth. In this case, the effects were empirically and more evenly distributed in limited proportions. Adzimatinur & Manalu (2021) also reported that Islamic banking financing positively affected fiscal development and only occurred in the first lag period (lag 1). Therefore, this study aims to bridge the gaps from previous reports through the following approaches. Firstly, it dynamically analyzes the cointegration of the short and long-term equilibrium relationships between Islamic banking financing and economic growth, by simultaneously incorporating the influence of data stationarity at both the level and difference in a single equation. This is not in line with previous reports (Iryanto *et al.,* 2020) where the cointegration process was separately observed between short and long-term effects. Secondly, it achieves model increases or decreases in economic growth when subjected to counterfactual shocks to financing through policy simulation scenarios. This analysis is not in line with previous studies (Adzimatinur & Manalu, 2021; Khasanah *et al.,* 2021), where the cointegration form was only shown separately, enabling its non-dynamism and unsuitability for policy simulation. Thirdly, it implements machine learning-based algorithms that excel in the calculation of pointwise marginal effects, accommodating heterogeneity aspects and nonlinear impact. This is not in line with previous reports (Iryanto *et al.,* 2020; Adzimatinur & Manalu, 2021; Khasanah *et al.,* 2021), where the marginal impact of each exogenous and endogenous variable movement was simultaneously unobtainable, leading to interpretation biases.

Based on the experimental gap description, the study problems include the following questions : (1) What is the dynamic nature of Islamic banking financing concerning Indonesia's economic growth? (2) What is the impact of altering the funding model, both in terms of increase and decrease, on the fiscal development of the country through policy simulation scenarios? and (3) What is the marginal impact of Islamic banking financing on GDP?. Therefore, this study aims to analyze dynamic, effect levels, and marginal impact of Islamic banking financing on Indonesia economic growth, through policy simulation scenarios. The analysis emphasizes the provision of several innovations. Firstly, the implementation of Novel Dynamic ARDL Simulation to effectively obtain both short and long-term activeness of the funding model on fiscal development. Secondly, the use of a policy simulation scenario to determine the impact of increasing GDP during the application of counterfactual shocks to financing determinants. Thirdly, the confirmation of the simultaneous movement of marginal impact among economic growth, working capital, investment, and consumption in Islamic banking. The results obtained are also expected to contribute to the development and enhancement of the Muslim-based financial sector, leading to the improvement of intermediation performance regarding the provisions of Law Number 4 of 2023.

Literature Review

Banks are responsible for playing a strategic role in enhancing economic growth through intermediation functions. This condition suggests that the enhancement of financial intermediation is capable of stimulating both the financial market and sector, leading to fiscal expansion (Babatunde & Oyedokun, 2021). Islamic Banking Intermediation also prioritizes two concepts, namely the theories of trust and agency. These theories play role in encouraging economic growth through financing schemes of Islamic banking (Drissi & Angade, 2019). The development of branch offices and the improvement of Islamic financial system are subsequently capable of motivating the accumulation of capital through fund pooling, which is channeled into working capital, investment, and consumption financing. In Saleem *et al.* (2021), a long-term impact was frequently observed on economic growth. Meanwhile, the contribution of Islamic banking financing to economic growth in the short and long term was inseparable from the support/participation of the community in increasing equity (capital).

The enhancement of risk control in Islamic banking is imperative for investors, depositors, and banking institutions. This scenario is essential in maintaining an investment-friendly climate, encouraging productivity, ensuring financial stability, and improving sustainable economic growth (Kassim, 2016). From a regulatory perspective, the application of Islamic principles within Muslim-based banking establishes more efficient channels for accumulating productive financing resources, toward the attainment of both short and long-term fiscal development (Mohd. Yusof & Bahlous, 2013). This condition was supported by Grassa & Gazdar (2014), where Islamic banking continuously implemented reforms and efficiency improvements alongside its superior system within the relevant financial system. In this case, increased savings and investment were stimulated, causing absolute contribution to long-term economic growth.

Furqani & Mulyany (2009) subsequently found that Islamic banking financing and economic growth were collaborative in the long term, exhibiting a positive and significant correlation. This indicated that a well-functioning banking system stimulated national GDP. The financial system focusing on a participatory approach was also an advantage emphasizing the enhancement of funding, leading to an impact on both short and long-term fiscal development (Jobarteh & Ergec, 2017). Furthermore, Zirek *et al.* (2016) showed a positive and significant relationship between Islamic financing and economic growth in the short and long period. This showed the instruments of the banking system were effective in distributing funds from surplus to deficit households for fiscal development. The results obtained were not in line with Ali & Uddin (2016), where the relationship between the monetary service system and economic growth was only prevalent in the short run. This was because similar banking platforms were more engaged in non-participatory activities with minimum period impact.

Role of Islamic banking financing was also important for empowering micro, small, and medium-sized enterprises (MSMEs) in driving the economic. This was in line with Amien & Zulkarnaen (2022), where role of financing system influenced economic growth due to the direct and indirect provision of support to the significant functions driven by micro, small, and medium-sized enterprises. In this context, the analyzed functions

included economic expansion, maintaining fiscal stability, job creation, and business development. Therefore, the entire empirical analyses served as the foundation emphasizing the formulation of a new experimental and hypothetical framework, concerning role of Islamic banking financing in economic growth of Indonesia. This foundation prioritized the determination of comprehensive information prioritizing present experimental progress. Based on the explanation from the empirical review, the hypothesis of this study is as follows:

H_0: I = 0 (there is no effect of working capital financing, investment financing, and consumption financing on economic growth)
H_1: I ≠ 0 (there is an effect of working capital financing, investment financing, and consumption financing on economic growth)

METHOD

This study was conducted in Indonesia using time series secondary data for 2009Q1-2022Q4, implementing the following variables and data sources.

Table 1. *Study Variables and Data Sources*

No	Variable	Unit	Source
1	Economic growth at constant prices	Rupiah	Bank Indonesia
2	Islamic Banking working capital financing	Rupiah	Financial Services Authority
3	Islamic Banking investment financing	Rupiah	Financial Services Authority
4	Islamic Banking consumption financing	Rupiah	Financial Services Authority

This study employs a novel dynamics ARDL simulation approach and Kernel-Based Regularization due to several advantages, including: (i) its ability to analyze the dynamic effects between variables; (ii) its suitability for formulating policies through simulation scenarios; and (iii) its capacity to capture the marginal effects of movements in each variable. However, its limitations include: (i) it cannot be used to observe cross-sectional variation patterns between regions, and (ii) it does not accommodate non-linearity effects within the model.

Several stages of an analytical approach were used to answer the objectives, including (a) Descriptive statistics, (b) Data stationarity test, (c) Optimal lag selection, (d) Cointegration test (ARDL Bound test), (e) Establishment of ARDL model, Novel Dynamic ARDL, and model diagnostic tests, (f) Kernel-based regularized least squares (KRLS) test and marginal impact, and (g) Simulation scenarios. Each of these stages was also comprehensively explained in Figure 2.

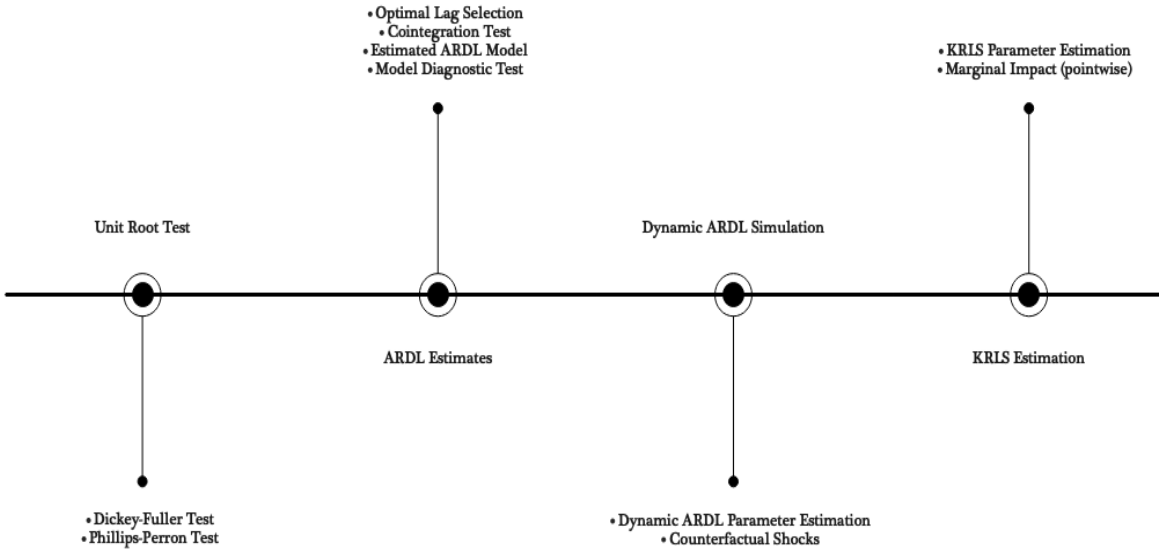

Figure 2. Dynamic ARDL Simulations and KRLS Estimation

Data Stationarity Test

The Dickey-Fuller and Phillips-Perron test was used to analyze data stationarity. According to Gujarati (2003), the test was important because of the following reasons, (i) Assuming that the applied information of the regression analysis emphasizing time series data was stationary despite the non-stationary status of most practical-based economic parameters, (ii) Determining the presence of unit roots in the experimental data, and (iii) Identifying the status of the time series data as a stationary trend or difference. From this context, stationary trend and difference time-series data commonly contained deterministic and variable trends, respectively. Moreover, the Phillips-Perron test adopted the Dickey-Fuller procedure, considering the assumption of uncorrelated residual e-distribution with constant variance. This test was a modified version of the DF analysis used to measure natural residual process constraints.

Optimal Lag Selection

The smallest value of HQIC (Hannan-Quinn Information Criterion) and SBIC (Schwartz Bayesian Information Criterion) at this stage was implemented to select the best lag for ARDL modeling at the next phase.

- HQIC

  HQIC model was solely used to compare estimated frameworks when the numerical value of the dependent variable was consistent across all compared estimates. This model is comprehensively explained by Khim & Liew (2004) as follows:

$$\mathrm{HQIC} = \ln\left(\widehat{\sigma}_{\mathrm{p}}^{2}\right) + 2\mathrm{T}^{-1}\mathrm{p}\ln[\ln(\mathrm{T})]$$

- SBIC
  SBIC model was used to select the optimal framework from a limited set, effectively addressing the issues emphasizing the addition of excessive parameter addition to a prototype. This model is comprehensively explained by Clement (2014) as follows:

$$-2.\ln p(x|k) \approx BIC = -2.\ln L + k\{\ln(n)\}$$

Cointegration Test (ARDL Bound Test)

The approach of ARDL Bound Test was implemented to determine the existence of a long-term relationship between WCP, investment financing, and consumption financing with economic growth. This approach emphasized the F and t statistical test values, which exhibited non-cointegration and cointegration when < the lower bound value I(0) and > the upper score I(1), respectively. According to Pesaran *et al.* (2001), ARDL approach included Error Correction (EC), leading to its impact on the relationship between Islamic banking financing and Indonesia economic growth as follows:

$$\begin{aligned}\Delta\ln(\mathrm{GDP})_t = \alpha_0 &+ \sum_{i=1}^{\rho} \beta_i\, \Delta\ln(\mathrm{GDP})_{t-i} + \sum_{i=0}^{\rho} \gamma_i\, \Delta\ln(\mathrm{WCP})_{t-i} + \sum_{i=0}^{\rho} \delta_i\, \Delta\ln(\mathrm{INV})_{t-i} \\ &+ \sum_{i=0}^{\rho} \zeta_i\, \Delta\ln(\mathrm{CON})_{t-i} + \theta_1 \ln(\mathrm{GDP})_{t-1} + \theta_2 \ln(\mathrm{WCP})_{t-1} + \theta_3 \ln(\mathrm{INV})_{t-1} \\ &+ \theta_3 \ln(\mathrm{CON})_{t-1} + \varepsilon_t\end{aligned}$$

where $\ln(GDP)$, $\ln(WCP)$, $\ln(INV)$, and $\ln(CON)$ = economic growth, working capital, investment, and consumption in natural logarithms, respectively, Δ = the degree of first difference for each variable, and ρ = the optimal lag length. The long-term model emphasizing the effects of Islamic banking financing on Indonesia economic growth is also explained as follows:

$$\begin{aligned}l\ln(\mathrm{GDP})_t = \alpha_1 &+ \sum_{i=1}^{\rho} \beta_i \ln(\mathrm{GDP})_{t-i} + \sum_{i=0}^{\rho} \lambda_i \ln(\mathrm{WCP})_{t-i} + \sum_{i=0}^{\rho} \varphi_i \ln(\mathrm{INV})_{t-i} \\ &+ \sum_{i=0}^{\rho} \omega_i \ln(\mathrm{CON})_{t-i} + \mu_t\end{aligned}$$

Establishment of ARDL Model, Novel Dynamic ARDL, and Model Diagnostic Test

The long-term ARDL model estimation was frequently operated when the study variables had a long-term relationship. Based on Johansen & Juselius (1990), ARDL approach was advantageous due to its implementation for the lag length of dependent and independent variables. This was different from other cointegration approaches commonly using the same lag length without differentiating its use for both variables. ARDL model prioritizing impact of Islamic banking financing on Indonesia economic growth is explained as follows:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^{q} \gamma_1 \ln GDP_{t-1} + \sum_{i=1}^{q} \gamma_2 \ln WCP_{t-1} + \sum_{i=1}^{q} \gamma_3 \ln INV_{t-1} + \sum_{i=1}^{q} \gamma_4 \ln CON_{t-1} + \varepsilon_t$$

γ = the variance of the long-run variable in the equation. The short-term ARDL model emphasizing the effects of banking financing system on economic growth is subsequently expressed as follows:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^{q} \lambda_1 \Delta \ln GDP_{t-1} + \sum_{i=1}^{q} \lambda_2 \Delta \ln WCP_{t-1} + \sum_{i=1}^{q} \lambda_3 \Delta \ln INV_{t-1} + \sum_{i=1}^{q} \lambda_4 \Delta \ln CON_{t-1} + ECT_{t-1} + \varepsilon_t$$

λ = the short-term variability of the variable and ECT = the error correction obtaining the adjustment speed of the variable imbalance. From this context, the estimated ECT coefficient ranged from -1 to 0. Novel Dynamic ARDL model was also formulated and implemented to obtain future shocks in the independent variables, namely working capital, investment, and consumption financing. This formulation and implementation were conducted while maintaining the constant nature of other factors as follows:

$$\Delta \ln GDP_t = \alpha_0 + \omega_0 \ln GDP_{t-1} + \theta_1 \Delta \ln WCP_t + \omega_1 \ln WCP_{t-1} + \theta_2 \Delta \ln INV_t + \omega_2 \ln INV_{t-1} + \theta_3 \Delta \ln CON_t + \omega_3 \ln CON_{t-1} + \varepsilon_t$$

Δ = the degree of first difference for each variable, α_0 = an intercept, ω_0 - ω_3 = the long-term coefficient, θ_1 - θ_3 = the short-term coefficient, and ε_t = the error term. Various model diagnostic tests were also experimentally implemented, namely the analyses of the Breusch Godfrey LM F-statistics and Chi-Square, as well as Cameron & Trivedi Decomposition Heteroscedasticity. This indicated that the Breusch Godfrey LM F-statistic and Chi-Square analyses were used to determine the autocorrelation problems of model, with the Cameron & Trivedi Decomposition Heteroscedasticity emphasizing the variance heterogeneity issues. The counterfactual shock in Novel Dynamic ARDL model was exhibited as an impulse response function, regarding a policy simulation of increasing and decreasing Islamic Banking-based working capital financing, investment financing, and consumption financing on economic growth.

KRLS Test and Marginal Impact

KRLS approach was used based on machine learning. In Hainmueller & Hazlett (2014), KRLS approach was implemented to carry out the following objectives, (i) Determine impact of heterogeneity between quantiles and averages of Islamic Banking financing, and (ii) Evaluate the effect of causality (cause-effect) originating between variables. This approach analyzed the marginal impact of heterogeneity on economic growth in Islamic Banking, by using derivatives on a percentile scale for working capital, investment, and consumption. In this context, the effectiveness of the intermediation role was appropriately

determined. The marginal impact was also presented as a pointwise derivative graph, explaining the long-term relationship of variability between variables.

FINDING AND DISCUSSION

The results and analysis emphasizing impact of Islamic banking financing on Indonesia economic growth were explained in this section. This included Novel Dynamic ARDL Simulation and Machine Learning model approach consisting of the following, (a) Descriptive statistics, (b) Data stationarity test, (c) Optimal lag selection, (d) Cointegration test (ARDL Bound test), (e) ARDL model estimation, Novel Dynamic ARDL, and model diagnostic tests, (f) KRLS results and marginal impact, and (g) Simulation scenarios. Each stage of the results and analysis is explained as follows.

Descriptive Statistics

Descriptive statistical outputs were responsible for explaining the distribution and behavior of the implemented data, namely economic growth, working capital, investment financing, and consumption, as shown in Table 2.

Table 2. *Descriptive Statistics of Study Variables*

Summary statistics	Obs	Mean	Std. dev.	Min	Max
Economic growth	56	1860141	957825.5	528057	2988637
Working capital financing	56	60508.54	19651.59	20315	84622
Investment financing	56	36990.36	17316.3	8015	72771
Consumption financing	56	67023.25	34674.98	9871	156351

Based on the Table 2, economic growth, working capital, investment, and consumption had minimum values of 528,057, 20,315, 8,015, and 9,871 billion Rupiahs, accompanied by the maximum estimations of 2,988,637 trillion, as well as 84,622, 72,771, and 156,351 billion Rupiahs, respectively. Besides this, the mean scores of 1,860,141 trillion, as well as 60,508.54, 36,990.36, and 67,023.25 billion Rupiahs for GDP, WCP, INV, and CON, respectively. From the results, the average values of the financing variables were closely interrelated than the economic growth. This indicated that most of the implemented variables had a symmetric distribution and low variability. The standard deviation value of each variable was also below the mean score, confirming that the applied data were less varied or more accurate with its average coefficient.

Data Stationarity Results

According to the Dickey-Fuller and Phillips-Perron unit root tests, the experimental variables, namely economic growth, working capital, investment financing, and consumption were not significant at level I(0). This indicated the need to carry out a unit root test on the degree of first difference I(I). Based on the first difference I(I) analysis, the four variables were stationary at $p < 0.05$, leading to the rejection of the null hypothesis. In this case, the issue of autocorrelation in the data residuals was addressed by applying the

most suitable stationary test, specifically the first difference I(I). This approach was subsequently recommended for the next analysis stage.

Table 3. *Stationarity Test*

Variable	Dickey-Fuller Statistical Test		Phillips-Perron Statistical Test	
	Level	1st Diff.	Level	1st Diff.
Economic growth	-0.915	-7.196***	-0.906	-7.195***
	(0.7830)	(0.0000)	(0.7861)	(0.0000)
Working capital	-1.790	-6.089***	-1.745	-6.072***
financing	(0.3857)	(0.0000)	(0.4082)	(0.0000)
Investment	0.622	-5.498***	0.455	-5.634***
financing	(0.9881)	(0.0000)	(0.9834)	(0.0000)
Consumption	1.151	-4.760***	0.676	-4.909***
financing	(0.9956)	(0.0001)	(0.9894)	(0.0000)

(*) statistical significance at 10%, (**) statistical significance at 5%, (***) statistical significance at 1%

Optimal Lag Selection Results

Based on the HQIC and SBIC parameter values, *lag 1* was a preferred selection regarding the tests of the optimal lag. These results served as a reference for estimating ARDL model in the next analysis. The constructed ARDL model also enabled the testing of selected lag differences. Table 4 shows the optimal lag selection for ARDL model.

Table 4. *Optimal Lag Selection Results*

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	44.758				2.5e-06	-1.56761	-1.51007	-1.41752
1	314.219	538.92	16	0.000	1.4e-10	-11.3161	-11.0284*	-10.5656*
2	330.241	32.044	16	0.010	1.4e-10	-11.317	-10.7991	-9.96611
3	353.616	46.75*	16	0.000	1.1e-10*	-11.6006*	-10.8526	-9.64939
4	366.102	24.972	16	0.070	1.4e-10	-11.4655*	-10.4872	-8.91385

The best lag is lag 1 with the smallest HQIC and SBIC values (*)

Cointegration Test Results

ARDL model (1, 0, 0.0) obtained through the selection of the best lag in the previous analysis was used in the cointegration test stage. In this stage, a relationship was observed between economic growth, working capital financing, investment financing, and consumption financing, regarding a significance level of 5% and 1%. The F and t statistical values were also 4.196 and -3.423 > the upper bound scores of 3.827 and -4.063 at significance levels of 5% and 1%, respectively, leading to the null hypothesis rejection prioritizing no cointegration. This indicated the existence of a long-term relationship (cointegration) between the implemented variables. The following are the outcomes of the cointegration test (ARDL Bound test).

Table 5. *Cointegration Test Results (ARDL Bound test)*

Statistic test	Value	H_0	H_1
F-statistics	4.196	There is no level of relationship	There's a relationship
t-statistics	-3.423		

Kripfganz and Schneider (2020) critical values

Significance	F-statistics		t-statistics		p-value F	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
10%	2.106	3.210	-1.617	-2.999	0.005***	0.033**
5%	2.600	3.827	-1.958	-3.362	p-value t	
1%	3.745	5.213	-2.627	-4.063	0.001***	0.044**

(*) statistical significance at 10%, (**) statistical significance at 5%, (***) statistical significance at 1%. The significance level of each degree indicates the rejection of the null hypothesis of no cointegration. The optimal lag length for each variable is based on the HQIC and SBIC indicators

Estimation Results of ARDL Model, Novel Dynamic ARDL and Diagnostic Model

According to Table 7, each parameter of ARDL and Novel Dynamic ARDL model was significant at the 1%, 5%, and 10% levels. This indicated that working capital financing positively and significantly affected economic growth in the long and short terms at 0.8810% and 0.2724%, respectively. From this context, the comparison of both terms proved that Islamic banks played role in increasing Indonesia GDP in the long run through WCP. Besides, working capital also dynamically contributed a value of 0.3447% to economic growth.

Islamic banks subsequently played role in enhancing national GDP through INV in the long and the short terms. In the long term, the impact of INV was capable of improving GDP by a larger margin at 1.3744%, compared to the short term at 0.4250%. Meanwhile, investment financing dynamically increased economic growth by 0.4021%.

The results also showed that CON negatively and significantly impacted GDP in the long and short terms. Regarding the long term, the negative impact of Islamic bank consumption financing on national economic growth was greater at -0.8762%, compared to the short-term values of -0.2709%. However, the impact of CON dynamically had an even greater negative effect on reducing GDP at -0.2782%, compared to the short term.

The positive and significant impact of working capital fand investment on economic growth was in line with Kassim (2016), where Islamic bank financing components influenced GDP in both the long and short terms. This indicated that the banks in Indonesia effectively met their financial intermediation role, specifically in WCP and INV. Working capital also played an important role in meeting the production requirements of individuals and companies. This was consistent with Taufik (2023), where WCP, channeled through Islamic principles to private businesses, corporations, or individuals, was capable of stimulating production and strengthening national GDP.

Meanwhile, Islamic-based investment financing proved highly effective for medium and long-term purposes, such as meeting capital goods expansion needs, establishing new businesses, as well as modernizing machinery and other production factors. These activities cumulative effect significantly contributed to the enhancement of national economic growth.

Table 6. *Estimation Results of ARDL Model, Novel Dynamic ARDL, and Model Diagnostic Test*

	Variable	Parameter	SE	Min 95	Max 95
ECT	$\ln GDP_{t-1}$	-0.3092***	0.0903	-0.4906	-0.1278
		(0.001)			
Long-Run[a]	$\ln WCP_{t-1}$	0.8810***	0.2398	0.3994	1.3625
		(0.001)			
	$\ln INV_{t-1}$	1.3744***	0.3547	0.6622	2.0865
		(0.000)			
	$\ln CON_{t-1}$	-0.8762***	0.2820	-1.4425	-0.3099
		(0.003)			
Short-Run[a]	$\Delta \ln WCP_t$	0.2724***	0.0988	0.0740	0.4709
		(0.008)			
	$\Delta \ln INV_t$	0.4250**	0.1939	0.0357	0.8144
		(0.033)			
	$\Delta \ln CON_t$	-0.2709**	0.1345	-0.5410	-0.0009
		(0.049)			
Dynamic Model[b]	$\ln WCP_{t-1}$	0.3447***	0.1140	0.1154	0.5741
		(0.004)			
	$\ln INV_{t-1}$	0.4021**	0.1999	0.0001	0.8040
		(0.050)			
	$\ln CON_{t-1}$	-0.2782*	0.1388	-0.5573	0.0008
		(0.051)			
Model Diagnostic Test					
	Breusch-Godfrey LM F-statistic test	0.7963[c]			
	Breusch-Godfrey LM chi-square test	0.7986[c]			
	Cameron & Trivedi's Decomposition Heteroscedasticity Test	0.2835[d]			
	RMSE	0.1331			
	Obs	55			

(*) statistical significance at 10%, (**) statistical significance at 5%, (***) statistical significance at 1%. [a]ARDL Model, [b]Novel Dynamic ARDL Model Model diagnostic test where [c]No autocorrelation problem, [d]There is no evidence of heteroscedasticity.

The success of Islamic Banks in carrying out banking intermediation role, specifically in financing working capital and investment, was unable to be separated due to several reasons provided by Soekarni (2011). These reasons included the following, (i) Economic growth conditions were increasingly conducive at 5.07% in the first quarter of 2021, (ii) Increased public trust in Islamic banks was observed through the significant growth of Third-Party Funds (DPK) in December 2022, amounting to 12.11% year-on-year (YoY). The DPK also experienced a YoY increase of 9.02%, exceeding the development rate of national banking institutions., (iii) The wider reach of Islamic banking services, namely the presence of 1,112 branch and sub-branch offices throughout Indonesia, (iv) The courage of

the bank leaders in expanding financing despite the various risks implemented, including those related to liquidity problems. This situation was observed in the Financing to Deposit Ratio indicator emphasizing the increase to 79.37% in 2022, exceeding the 73.39% and 74.52% recorded in 2021 and 2020, respectively. Consumption financing was also increasingly directed towards consumptive activities, causing the consistent smaller use of productive events. This suggested that the intermediation role of Islamic banking was yet to be achieved in channeling CON toward increasing productive events for national economic progress. Meanwhile, Arcand *et al.* (2012) stated that the large funding allocation by banks reduced GDP due to the existence of a productivity shift effect from the real sector to the financial industry. This was observed in consumption financing, where an inverted U-curve (nonlinear) relationship was likely observed with economic growth.

Simulation Results of Increasing Working Capital Financing, Investment, and Islamic Bank Consumption on National Economic Growth

In this section, the increasing Islamic Banking financing emphasizing working capital, investment financing, and consumption toward economic growth was simulated. This simulation scenario aimed to determine the elevation in economic growth when financing was increased or decreased by 5% through the counterfactual impulse response function graph in Novel Dynamic ARDL model.

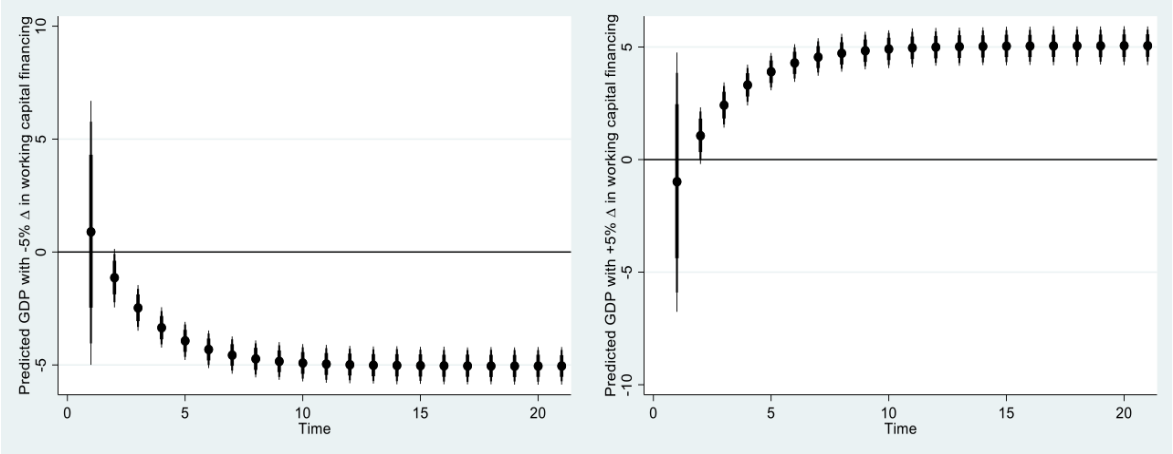

Figure 3. Counterfactual Shocks of a 5% Increase and Decrease in Working Capital Financing to Economic Growth

In Figure 3, a 5% shock to working capital financing increased economic growth from the 2nd to the 8th quarter. This GDP increase then stagnated in the 9th to 20th quarters of the experimental year. Meanwhile, a 5% decrease in WCP affected the decreasing GDP from the 2nd to the 10th quarters, and was prevalent to the 20th quarter. From the scenarios, the impact of an increase and a 5% decrease in working capital financing on economic growth also occurred in the same period, namely the 2nd quarter. This proved that the response to increases or decreases in WCP did not directly affect GDP, although acquired 2 quarters from the start of the shock.

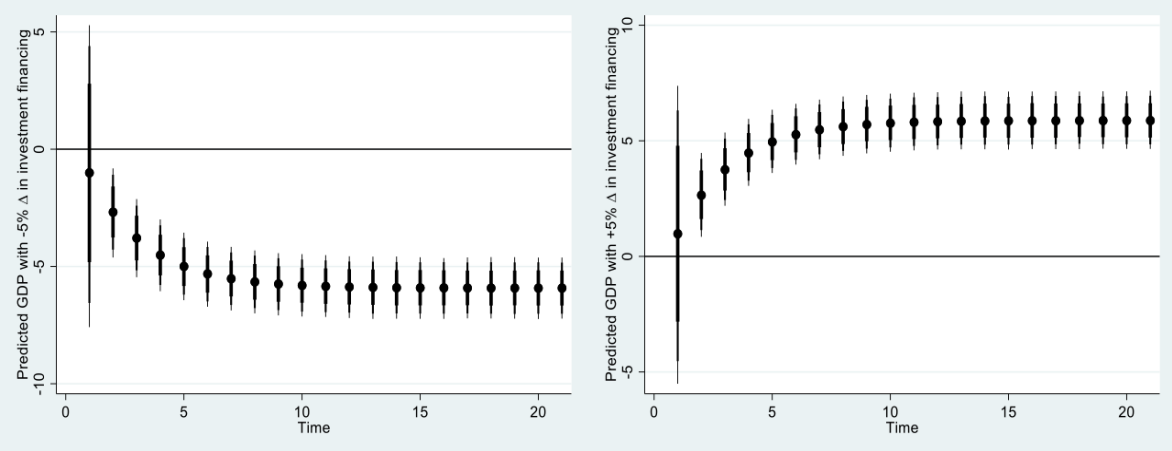

Figure 4. Counterfactual Shocks of a 5% Increase and Decrease in Investment Financing to Economic Growth

The counterfactual shock of a 5% increase in investment financing subsequently affected economic growth in quarters 1-10, accompanied by stagnation to quarter 20. This was in line with a 5% decrease in INV, where GDP was reduced from quarters 1 to 10, with stagnation observed to quarter 20. The impact of changes in the GDP obtained from INV was also significantly more rapid than that of WCP, specifically in quarter 1. This indicated that economic growth was more sensitive to fluctuations in investment financing than in working capital.

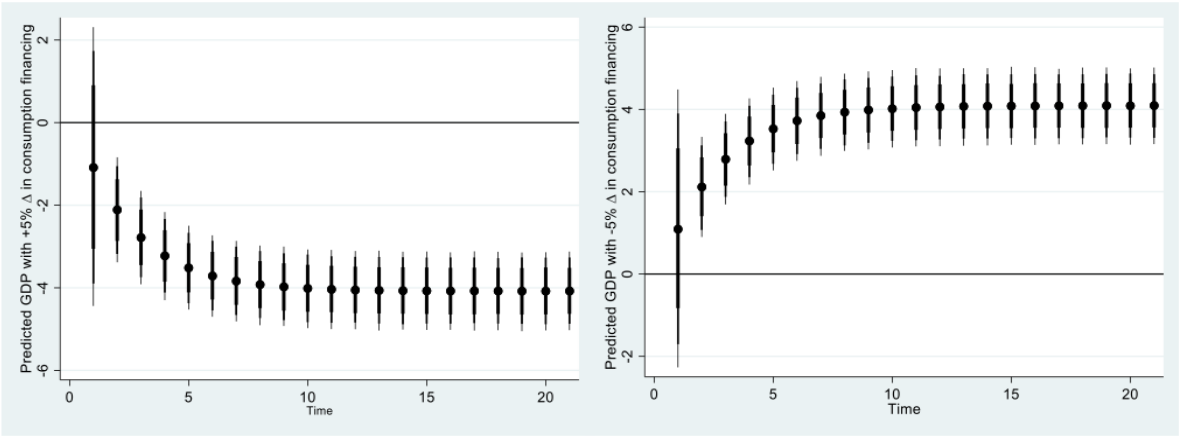

Figure 5. Counterfactual Shocks of 5% Increase and Decrease in Consumption Financing to Economic Growth

In Figure 5, different outcomes were observed in the counterfactual shocks of increasing or decreasing consumption financing to economic growth. This proved that an increase in CON by 5% decreased GDP in quarters 1-10 and was stagnant to quarter 20. An increase in GDP also occurred from quarters 1-9 regarding the reduction of CON by 5%, with stagnation identified to quarter 20. In this case, economic growth was slow because consumption financing allocations were mostly used for unproductive events. Meanwhile, GDP increased when the allocation of CON was reduced by 5% to support other variables.

KRLS and Marginal Impact Analysis Results

KRLS analysis was emphasized for the improvement of experimental outcomes. According to Table 8, the predictive power value (R^2) of 0.9642 was found with a significant value of 1%, indicating that working capital, investment, and consumption explained 96.42% of the variation in economic growth. The marginal impact of the three variables was also significant at 1%, with no heterogeneous effect observed at P25, P50, and P75 for average values of 1.1962%, 0.9823%, and -0.7297%, respectively. Moreover, the WCP of Islamic Banks impacted increasing GDP from the 25th, 50th, and 75th percentiles with a magnitude of 0.6023, 1.2664, and 1.7895, respectively. The increasing INV trend also positively affected GDP, with values of 0.5315, 1.0811, and 1.2784 at the 25th, 50th, and 75th percentiles, respectively. For CON at the 25th, 50th, and 75th percentiles, a decline was then experienced in economic growth with values of -1.0388, -0.7738, and -0.3842, respectively. This showed that the negative impact of consumption on GDP slowly increased towards a positive trend in the long term. Based on the results, the effectiveness of the intermediary role of Islamic Banking was exhibited in developing strong national economic growth.

Table 7. *Results of KRLS analysis*

Obs	= 56	Eff. df	= 9.531				
Lambda	= 0.0662	R^2	= 0.9642				
Tolerance	= 0.056	Looloss	=1.945				
Sigma	= 3						
lnGDP	Avg.	SE	t	p	P25	P50	P75
lnWCP	1.1962	0.2585	4.627	0.000***	0.6023	1.2664	1.7895
lnINV	0.9823	0.1034	9.494	0.000***	0.5315	1.0811	1.2784
lnCON	-0.7297	0.0957	-7.619	0.000***	-1.0388	-0.7738	-0.3842

(***) statistical significance at 1%, Avg. is the average marginal impact, SE is the standard error, P25, P50, and P75 are the 25th, 50th, and 75th percentiles, lnGDP is economic growth, lnWCP is working capital financing, lnINV is investment financing, lnCON is consumption financing.

According to Figure 6, the respective marginal (pointwise) effects of working capital, investment, and consumption financing were observed. In this context, Figure 6 shows that a higher increase in working capital financing increased economic growth to a threshold point where elevation remained prevalent at a lower level of working capital.

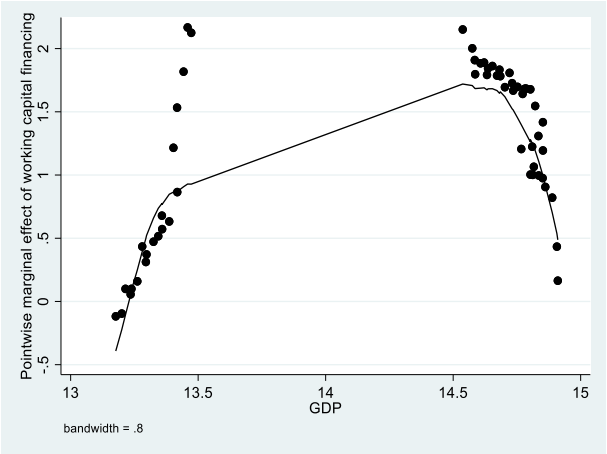

Figure 6. Marginal (Pointwise) Impact of Working Capital Financing

The marginal impact of Islamic Bank WCP-GDP was also similar to the movement of INV-GDP, as shown in Figure 7. In this context, the high allocation of investment increased economic growth to a threshold point and decreased with the elevation of GDP. This result was consistent with Andiani (2022), where the fiscal depth level of Islamic banking, specifically financing, positively influenced GDP. The downward movement of working capital and investment also positively affected economic growth, as presented in Figures 6 and 7. This condition reflected the intermediary role of Islamic banking in increasing national GDP, specifically in WCP and INV, maintaining economic growth to a positive trend in the long run after the funding threshold point.

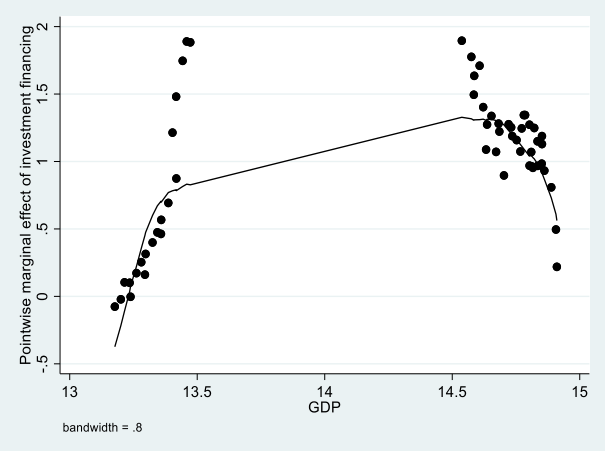

Figure 7. Marginal (Pointwise) Impact of Investment Financing

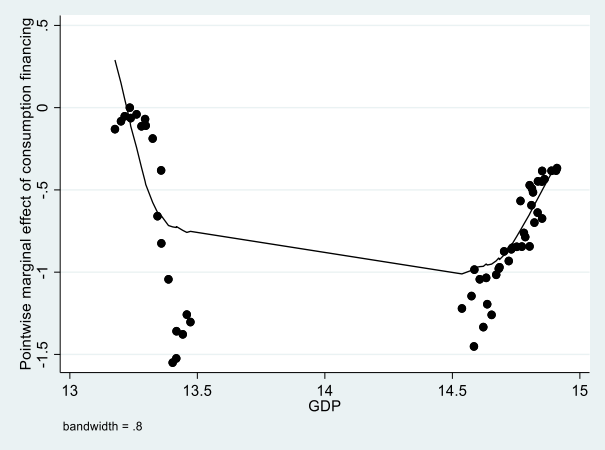

Figure 8. Marginal (Pointwise) Impact of Consumption Financing

Based on Figure 8, a different outcome occurred with the consumption financing of Islamic Banking. This indicated that the movement focusing on the marginal impact of CON decreased with the increase in economic growth to the point of decline threshold. In the phase after the threshold, an elevation was subsequently observed between CON and GDP. This proved that consumption had a positive trend in the long run toward economic growth, after passing the (negative) decline threshold point. The results were also supported

by Taufik (2023), where CON increased demand to stimulate the business world in elevating supply. This situation was effectively capable of increasing GDP in the short and long term.

CONCLUSION

According to the results and analyses, the following conclusions were obtained, (i) A significant and positive relationship was found between WCP and INV on GDP in the short and long term, with only CON having a relevant and negative association, (ii) A significant and positive relationship was dynamically observed between working capital financing and investment financing on economic growth in the short and long term, with consumption financing solely having a relevant and negative association, (iii) Simulation scenario showed that a 5% increase and decrease in WCP and INV increased and reduced GDP to the 20th quarter, respectively, and (iv) The marginal impact of working capital and investment maintained economic growth in the long term to a positive trend, after financing threshold point. Meanwhile, consumption produced a positive trend in the long run on GDP, after crossing the (negative) decline threshold point.

Based on the conclusions, the following policy implications contribute to better conditions in the future. Firstly, the intermediary function of Islamic Banking should be increased by 5% in achieving economic growth, as mandated in Law Number 4 of 2023 concerning working capital and investment financing. This emphasizes the necessity to consider the determinants of the Capital Adequacy Ratio (CAR). Secondly, the marginal impact of WCP and INV needs to acquire the main attention of the government, to increase GDP in the long term. This process should be conducted by strengthening the supporting infrastructure of Islamic financial industry toward having high competitiveness and resilience.

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