DETERMINANTS OF SHARIA-BASED MONEY MARKETS IN INDONESIA: AN EMPIRICAL STUDY

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DOI: https://doi.org/10.37178/ca-c.23.1.376

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Abstract

In line with the implementation of law 21 of 2008, the Government must regulate sharia bank operations in detail and comprehensively. This study aims to explain the interbank money market model based on sharia principles in the Indonesian context. The mixed method of quantitative and descriptive causality is employed to describe the influence of the sharia money market phenomenon that occurs. Observation of cross-sectional time series data was performed in one specific time period, namely data from 2009 to 2020 using Eviews 9 software. Autoregressive Distributed Lag (ARDL) analysis was used as the basis for using the Ordinary Least Square (OLS) model so that stationarity tests were required on each variable using the Unit Root Test. The results showed that the volume of PUAS, interbank mudharabah investment, sharia SBI, GWM, deposit, financing, operation cost, ROA and exchange rate are the variables that shape the determinant of the sharia money market in Indonesia. This model is completely free from the problems of heteroskedastisitas, autocorrelation and multicollinearity and therefore it was used to generate a solution in the form of a model that can provide the best predictive results.

Key words: sharia money market, PUAS, sharia banking,

Introduction

According to Islamic law, money is not a commodity, but a tool to achieve increased economic value. Without the increased economic value, money cannot create prosperity. This is in stark contrast to an interest-based economy where money breeds money. It doesn't matter whether it is used in productive activities or not, time is the main factor. Meanwhile, in the view of sharia, money will only grow if it is invested in real economic activities. Thus, the relationship between Islamic financial actors and their customers is more like partners rather than lenders and borrowers. Additionally, Islamic finance can act as a buyer, seller, or leasing party [1]

The scope of sharia banking business is universal banking which includes commercial banking and investment banking. However, the Islamic banking system in principle is very different from the conventional banking system. These differences result in the need for arrangements that are different from conventional banking arrangements, for example, regulations on liquidity control patterns [2]. In line with that, the objective of the Central Bank of Indonesia issuing money market instruments through monetary operations is to support the effectiveness of sharia monetary control [3]Effective liquidity management will greatly impact the level of income and profit (Alarussi & Alhaderi, 2018), thus high liquidity is often associated with low profitability, resulting in a *tradeoff* between the interests of fulfilling liquidity obligations and profitability. Optimal liquidity management can support health, stability and reduce the risk of bank bankruptcy [4]

Common obstacles faced are the lack of access to liquidity funds from the Central Bank (except in some Islamic countries); and lack of access to the Money Market so that Islamic Banks can only maintain liquidity in cash form [1, 5] Hence the bank's management strategy to maximize its profits is in the form of investing as much of the available funds as possible. However, management is also motivated by the need to have sufficient liquidity in order to overcome any mismatch problem that occurs between assets and liabilities [6-8]

Based on our best knowledge it is still very little research that exists that explains the determinants of forming money market models to the volume of the interbank money market based on sharia principles. The output of this research is to produce a strategic solution model to increase the volume of PUAS transactions as a means of managing Islamic banking liquidity. The purpose of this study is to fill the gap in strategic financial knowledge about the liquidity management model and the determinants of PUAS and the shaping factors of the Islamic money market model on the volume of PUAS.

Literature Review

The motive for the demand for money in Islamic law is the demand of money for transactions, not for trading. Islamic law does not recognize money demand as money for speculation. In line with the Islamic view, money is a flow concept, therefore it must always revolve in the economy, because the stronger the liquidity of the money in the economy, the higher the level of people's income and the better the economy [2, 9, 10]

The stronger or weaker the asset's liquidity capability is depends on two main factors, namely the asset's own liquidity (*self-contained liquidity*) and the asset's marketability. The asset's liquidity (self-liquidity) is determined by the terms of the sale of the asset, both the time period and the method of payment. Meanwhile, the marketability of an asset lies not only in the ability to transfer the asset to another party in a final or permanent manner, but also in the success of the offer to another party to participate in funding the asset [6, 11]

Considering the flow concept, management must strictly take into account the management of incoming funds so that they can immediately be invested profitably and

can be returned to customers at any time when they are withdrawn or have matured. In addition, management must simultaneously consider various risks that will affect changes in the level of profit earned. One of the operational constraints faced by Islamic banking is the difficulty in controlling its liquidity efficiently [11, 12]

The implications of liquidity management difficulties can be seen in several symptoms, namely the unavailability of immediate investment opportunities for the funds received. Eventually, these funds accumulate and remain idle for some time thereby reducing average earnings; difficulty disbursing investment funds that are currently running, when there is a withdrawal of funds in a critical situation [3, 13]

In order to ensure that Islamic Bank assets can be funded over time, Islamic Banks must maintain a high level of liquidity in order to anticipate the need for customer withdrawals. Thus, it is clear that the main problem for Islamic banks is the lack of access to find funds in the conventional money market to fund assets. Islamic banks with high liquidity is also a problem and requires the existence of a sharia-based money market [14, 15]

The Islamic money market is a place where Islamic banks sell and buy financial instruments. Basically, the existence of a money market is to invest funds. If one experiences liquidity problems, one can issue instruments that can be sold for cash. The Islamic money market is a mechanism that allows Islamic financial institutions to use market instruments with mechanisms that are in accordance with sharia principles both to overcome the problem of lack of liquidity and excess liquidity [14]The commodities traded in PUAS and managed by Bank of Indonesia are IMA, SBIS, deposits, operating profit, minimum statutory reserves, operational costs, and exchange rates [16, 17]

In the context of Indonesia, research [18]aims to analyze the effect of inflation rates, PUAS transactions and sharia investment on SBIS in 2012-2017. The analytical method used is the *Vector Auto Regression* (VAR) model. Based on the results of Granger's Causality analysis *Granger,* they show that there is a one-way causality relationship between inflation and PUAS transactions and returns on Bank of Indonesia Syariah Certificates (SBIS). There is a one-way causality relationship between sharia investments and PUAS transactions and there is no causal relationship pattern between SBIS yields.

Based on the analysis *of Impulse Response Function* (IRF) they show that the inflation response most quickly reached stability when shocks /*shock* on variable SATISFIED transaction. The response of PUAS transactions achieves stability the fastest when there is a *shock* to the sharia investment variable. The response of SBIS yields achieves stability the fastest when there are shocks on the variable of PUAS transactions. The difference with this study is the research method and the scope of the variables studied, while this study has similarities using the PUAS transaction volume variable [17-19].

Recent research on PUAS found that in order to create a new path towards trading Islamic Bonds in the near future through its regulations, Islamic Bonds will be converted into auction instruments among Islamic banks to help manage banking liquidity according to Islamic law. In addition, the theoretical framework for building the Islamic Interbank Money Market in Malaysia was also found. The difference between this study and the research conducted by [6]is the use of the PUAS volume variable and the research method, while this study has similarities using the Islamic Interbank Money Market variable.

Furthermore, the identification of sources of liquidity risk in Islamic banking and the general instruments used can reduce liquidity mismatches. Islamic liquidity management is an important basic framework for stable and efficient banking. The variables used have similarities with the variables that will be used in this study while the difference is in the selection of the PUAS volume variable and the research method used [20, 21]

Sshort-term investment instruments are generally needed to manage discrepancies in the banking liquidity portfolio. The government, in this case the central bank, demands liquidity facilities as well as meeting liquidity needs for infrastructure development and concurrent spending. This study uses a literature study method using the Islamic Interbank Money Market (IIMM) variable, with the aim of discussing the Islamic Interbank Money Market, functions, and instruments as well as making comparisons between leading countries in Islamic banking practices. For similarities with the research carried out, is the Money Market variable between Islamic Banks, and the difference is using the PUAS Volume variable with quantitative methods [3]

To achieve or ensure the functioning of the monetary system, generally the monetary authority oversees the entire system. The monetary sector is an important network and affects the real sector. Monetary policy is an important instrument of public policy in the economic system. Monetary policy in Islam aims to achieve economic prosperity with full employment opportunities, socio-economic justice and distribution of income and wealth.

Research Methods

The Method used in this research is a mixed study, namely descriptive causality research and quantitative methods. Quantitative research methods used are descriptive and causal research. Research observations used (*time series*) that are *cross-sectional,* meaning that the information or data obtained is the result of research conducted in a certain time period.

The population in this study were all activities and volumes of PUAS. The data series studied as a population are PUAS volume data every month in the period from 2009 to 2020, such as PUAS transaction volume, IMA reward rate, SBIS yield, minimum statutory demand deposit, third party funds, financing, operating profit, operational costs and exchange rate.

The unit of analysis in this study is 14 Islamic banks operating in Indonesia until 2020, consisting of fourteen Islamic Commercial Banks and twenty Sharia Business Units with the unit of observation being the PUAS volume, in order to obtain Islamic banking preferences in liquidity management, both excess and lack of liquidity.

Descriptive analysis was used to explore the research variables and the behavior of the causal factors and to answer the objectives of the first study. Descriptive analysis was also used to determine the effect of the variables studied on the PUAS volume. The analysis was performed using Eviews 9 software.

Stationarity test is the most important stage in analyzing *time series* data to see whether or not there is a *unit root* on the variable so that the relationship between variables in the equation becomes *valid*. Tested by using the formula:

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{j=1}^{p-1} \alpha j \, \Delta Y_{tj} + \varepsilon_t$$

Stationarity is one important prerequisite in econometric models for time series *(time series)* data*.* Stationary data is data that shows the mean, variance and auto variance (on the lag variation) and remains the same at any time the data is formed or used, meaning that with stationary data the time series model can be said to be more stable. If there is data used in the model that is not stationary, then the validity and stability of the data should be reconsidered, because the regression results from non-stationary data will cause *spurious regression*. *Spurious regression* is a regression that has$R^{2,}$ a high but no significant correlation of both [22]

The model built in the dynamic econometric model (*Auto Regressive Distributed Lag*/ARDL) is a model that includes the dependent variable (PUAS volume) and several

independent variables that explain Islamic banking operations. The consideration in selecting the econometric model to be used is the *Auto Regressive Distributed Lag* (ARDL/*Dynamic Model*), namely:

a. Each variable in the Islamic banking industry can function either as an independent variable (explaining other variables) or as a dependent variable (explained by other variables) in a model equality.

b. In addition, the time lag of the variables in the ARDL model is also more precise and influential in explaining the dependent variable.

c. *Multivariate* (ARDL model) equations have the potential to track causal relationships between variables and the interconnections between variables.

Results and Discussion

PUAS is one of the media/means that can be used by Islamic banking in managing liquidity so that it can be managed properly. An effective PUAS will describe the supply and/or demand for Islamic banking funds that have excess or lack of liquidity to finance operational activities.

In the implementation of PUAS, indicators of PUAS transaction activity can be seen from the volume of PUAS itself. To obtain a model and to determine the amount of PUAS volume absorbed by Islamic banking is to use the Interbank Money Market volume model (Freixas & Rochet, 2008) which was adjusted to:

$$= r_f F + \text{rM} - r_D \text{D} - \text{C (D, F)} \quad (1)$$

The profit of sharia banking is where, r_f is the amount of profit sharing, F is the total financing, r is the rate of return of IMA, r_D is the profit sharing of sharia deposits, D is the total savings and C is the total costs incurred by sharia banking in managing deposits and financing.

The profit of sharia banking is determined or influenced by the amount of financing provided, the amount of profit sharing (financing margin), rewards in the money market between sharia banks, the number of sharia deposits, the Statutory Reserves determined by the central bank, and the cost of managing deposits and financing. Because of the assumption of the cost function C, Islamic banking profit maximization is formulated as follows:

$$\frac{\partial \pi}{\partial F} = \left(r_f r\right) - \frac{\partial C}{\partial F}(D,F) = 0, assuming\ \frac{\partial C}{\partial F}(D,F) = \gamma_F\ so \quad (2)$$

$$r_F = \gamma_F + r \quad \text{and} \quad (3)$$

$$\frac{\partial \pi}{\partial D} = (r(1-\alpha) - r_D) - \frac{\partial C}{\partial D}(D,F) = 0, \text{ assuming } \frac{\partial C}{\partial D}(D,F) = \gamma_D \quad (4)$$

then:

$$r = \frac{\gamma_D + r_D}{(1-\alpha)} \quad (5)$$

From the model, the formulation for the optimal profit (π) of Islamic banking by considering the optimization of the interbank money market based on Islamic principles (PUAS) is:

$$= \gamma_D + r(1-\alpha) + \left[\frac{\gamma_D + r_D}{(1-\alpha)}\right] M r_D DC(D,F) \quad (6)$$

thus, the models show SATISFIED volume is:

$$M = \frac{\pi - \gamma_F r(1-\alpha) + r_D D + C(D,F) + NT}{\left[\frac{\gamma_D + r_D}{(1-\alpha)}\right]} \quad (7)$$

Where M is the liquidity or the transaction volume of Islamic banking in PUAS, r is the *rate of return* bonds (rate of return on IMA and SBIS yield), F is the total financing, π is

the Islamic banking operating profit, α is a Statutory , D is the total deposits and C is the total operating costs.

It is also based on the fact that Islamic banking also serves the sale and purchase of foreign currencies, so information on the exchange rate represented in the USD to IDR (USD/IDR) dollar exchange rate is needed so as to obtain a comprehensive picture in order to produce a determinant of the *robust* (best) Islamic money market model against PUAS volume. The model adds one independent variable, namely the exchange rate.

Thus, the determinant of the sharia money market model including the level of PUAS volume remuneration, IMA, yields SBIS yields, financing, operating profit (ROA), statutory reserves, deposits, operating costs and the exchange rate (USD / IDR) are listed in model 7.

Once the eight variables are set that will be used in the model formation process, statistical tests were first performed on the dependent variable and the independent variable. The results of the descriptive statistical test using the eViews 9 software can be seen in the following table:

Table 1

Results of the Descriptive Statistical Test

Variable Name	Variable	Unit	Mean	Median	Std.Deviation
Volume PUAS	PUAS	IDR Billion	579.02	593.50	440.61
Investment Mudharabah Interbank	IMA	%	5.13	6.26	1.06
SBI Syariah	SBIS	%	6.03	6.26	1.06
Statutory Reserves	Statutory Reserves	IDR Billion	11,045. 42	10466.50	6217.74
Deposit	Dep	IDR Billion	126,190.90	130,611.00	68406.78
Financing	Pembyan	IDR Billion	196,587.30	197,959.50	103,446.40
Operating Cost	BO	IDR Billion	9464.33	7258.50	7336.74
Return on Assets	ROA	%	1.41	1.45	0.57
Exchange Rate (USD/IDR)	NT	IDR	11,939.78	12,532.50	2160.71

Based on the results of descriptive statistical tests, the mean value of the dependent variable and all independent variables are above the standard deviation. This shows that all of these variables have relatively few data variations and are homogeneous or have a low level of deviation.

This study used the *Autoregressive Distributed Lag* (ARDL) model. The purpose of the stationary test was to eliminate the *trend* in the data *series*. The stationarity test was then conducted which was the most important stage in analyzing the *time series* data to see whether or not there was a *unit root* in the variable causing the relationship between variables in the equation to become *valid*. The test equipment used to test stationarity were *Augmented Dickey-Fuller* (ADF) and *Phillips-Perron* (PP). ADF test with modification to the equation was performed by solving subtraction equation with Y_{t-1} so that it became:

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{j=1}^{p-1} \alpha j \, \Delta Y_{tj} + \varepsilon_t$$

Results stationary test using ADF and PP can be seen in the table below:

Table 2

Stationarity Test Results

Variable	ADF		PP	
	Level	1st Difference	Level	1st difference
Puas	-2.847289 *	-17.410930 ***	-9.244582 ***	-116.210000 ***
Ima	-2.441966	-13.063600 ***	-3.951320 ***	-21.963380 ***
Sbis	-2.326983	-5.181394 ***	-3.020547 ***	-8.191405 ***
Bo	-1.478066	-11.409810 ***	-4.173651 ***	-18.234970 ***
Deposito	-0.064996	-3.158711 **	-0.0540036	-11.399350 ***
Pembiayaan	0.048315	-2.944158 **	-1.225821	-12.979710 ***
Gwm	-1.179999	-11.445720	-1.157778	-13.465080 ***
Roa	-2.959921 **	-13.520720 ***	-2.607490 *	-16.2922990 ***
nt	-0.721051	-12.803560 ***	-0.683066	-12.824050 ***

Keterangan: Stasioner pada Critical value: ***) 1%; **) 5%; *) 10%

Based on the results of the stationarity test using the ADF test, it can be concluded that only the PUAS and ROA variables are stationary at the level, while the other variables are not stationary at the level but are stationary at 1st *differences level*. Meanwhile, it is known that the variables PUAS, IMA, SBIS, BO, and ROA are stationary at the level, while the variables for deposits, financing, GMW, and NT are stationary at 1st. *differences level*. From the results of this test it can be concluded that all variables used in this study are stationary and there is no stationary data at 2nd *difference* or L (2).

Furthermore, a correlation test was carried out using Eviews 9, where the relationship between the PUAS variable (dependent variable) with the IMA and SBIS variables (independent variable) had a weak correlation (range 0.01 to 0.30/-0.01 to -0.30), while the relationship between PUAS variable with other independent variables has a moderate correlation (range 0.31 to 0.70/-0.31 to -0.70).

Table 3

Correlation Coeficient

	Nilai Koefisien Korelasi								
	PUAS	IMA	SBIS	BO	DEPOSITO	PEMBIAYAAN	GWM	ROA	NT
PUAS	1.000	.0.1464	-0.0029	0.4557	0.5380	0.5445	0.5390	-0.3583	0.5614
IMA	.0.1464	1.000	0.7961	-0.2842	-0.5631	-0.5795	-0.4706	0.0344	-0.3414
SBIS	-0.0029	0.7961	1.000	-0.1833	-0.3426	-0.3715	-0.2500	-0.1706	-0.0694
BO	0.4557	-0.2842	-0.1833	1.000	0.6627	0.6567	0.6148	-0.4287	0.6399
DEPOSITO	0.5380	-0.5631	-0.3426	0.6627	1.000	0.9934	0.9473	-0.4411	0.9061
PEMBIAYAAN	0.5445	-0.5795	-0.3715	0.6567	0.9934	1.000	0.9165	-0.3955	0.8975
GWM	0.5390	-0.4706	-0.2500	0.6148	0.9473	0.9165	1.000	-0.4380	0.8613
ROA	-0.3583	0.0344	-0.1706	-0.4287	-0.4411	-0.3955	-0.4380	1.000	**-0.5594**
NT	0.5614	-0.34114	-0.0694	0.6399	0.9061	0.8975	0.8613	-0,5594	1.000

Based on the results of the correlation test, the relationship between the PUAS variable and other variables is that PUAS has a negative relationship with the IMA, SBIS and ROA variables. On the other hand, the PUAS variable has a positive relationship with the variables of Operational Costs, deposits, financing, Statutory Reserves and the exchange rate.

After going through several tests, the dependent variable can be used as the robust (best) model if it is in accordance with the requirements, namely having the *Best Linear Unbiased Estimator* (BLUE) trait. To produce an equation model that has BLUE properties, the equation model must be free of *heteroscedasticity, autocorrelation* and *multicollinearity* problems considering the data used was *time series* data*.* The resulting equation model is expected to have the smallest value *error*s so that the deviation between the equation model and the observed value is as small as possible. Based on the test results to produce robust (best) equation model using variables that are free of problems *heteroscedasticity, autocorrelation* and *multicollinearity* problems*.* These variables include PUAS, BO, GWM, ROA and NT, so the equation model used in this study is written with the equation:

$$\mathbf{puas} = \alpha_t + \beta_1 \mathbf{puas}_{t-3} - \beta_2 \mathbf{bo}_{t-2} + \beta_3 \mathbf{gwm}_t + \beta_4 \mathbf{roa}_{t-3} + \beta_5 \mathbf{nt}_t + \varepsilon_t$$

Furthermore, the interpretation of the results of the model equation 1.24. above, can be summarized as follows:

Test R^2 (coefficient of determination test /*Goodness of* Fit) is used to measure how far the model's ability is to explain the dependent variable. The value of the coefficient of determination is between 0 to 1. If the coefficient value is getting closer to 1, then almost all of the independent variables can explain the dependent variable and the model can be said to be getting better. The result is 0.4332, so it can be concluded that the equation model has the ability to explain the dependent variable (PUAS) of 43.32%, while the rest (56.68%) is explained by other variables outside the model.

The F test or the regression coefficient test simultaneously is used to determine whether the independent variables together have a significant effect on the dependent variable. The significance level used was 10% (0.10). The result is a Prob (F-stat) of 0.000 or < 0.10, so it can be concluded that the independent variables together have a significant effect on the dependent variable.

The t test or partial regression coefficient test is used to determine whether the independent variable partially affects the dependent variable. The level of confidence used is 10% (0.10). The result is Prob (t-Stat) variable $\beta_1 \text{puas}_{t-3}$, $\beta_2 \text{bo}_{t-2}$, $\beta_4 \text{roa}_{t-3}$ < 0.10, so it can be concluded that each of these independent variables has a significant effect on the dependent variable.

Based on the results of ADRL testing to form model estimates, it is known that there are two variables whose prob (t-Stat) is > 10% (0.10), namely the GWM variable of 11.61%

and the NT variable of 34.65%. Furthermore, this ARDL model can be interpreted as follows:

Every change of IDR 1 billion in Operational Costs (BO) in the past two months, will reduce the volume of the Interbank Money Market Based on Sharia Principles (PUAS) in the current month period by IDR 0.0117 billion or IDR 11. 7 million, ceteris paribus assumption. Each change of Rp1 billion in *Return on Assets* (ROA) in the past three months, will increase the volume of the Sharia-Based Interbank Money Market (PUAS) in the current month period by Rp240.5 billion, ceteris paribus assumption.

Any change of IDR1 billion in the volume of the Sharia-Based Interbank Money Market (PUAS) in the past 3 months, will increase the volume of the Sharia-Based Interbank Money Market (PUAS) in the current month period by IDR0.2835 billion or IDR283.5 million, assuming ceteris paribus. The Islamic money market equation model comprehensively based on the test results in this study can be written with the following equation:

$$PUAS = -84.2345 + 0.2835satisfied_{t-3} - 0.0117bo_{t-2} + 0.0169gwm_t + 240.5406roa_{t-3} + 0.0320nt_t + \varepsilon_t$$

Conclusions and Research Implications

Based on the tests that have been carried out, the new Islamic money market robust (best) equation model was produced on PUAS volume. This Islamic money market equation model is proven to be free of *heteroscedasticity, autocorrelation* and *multicollinearity* problems. The variables in the determinants of the new money market equation model include PUAS, Operating Costs (BO) and Operating Profit (ROA), which all have the ability to explain the dependent variable, namely the PUAS volume of **43.32%**.

These three variables as determinants of the money market equation model together (simultaneously) and individually (partially), namely the PUAS variable, Operating Costs (BO) and Operating Profit (ROA) have a significant influence on the PUAS volume. (Gulisashvili & Tankov, 2016; Yalcin & Seker, 2016).

The results of this study were effectively and efficiently used to formulate solutions to problems related to sharia banking liquidity management by optimizing the role of PUAS. The existence of PUAS as a medium/means that facilitates Islamic banking as *surplus units* and *deficit units*, as to create mutually beneficial cooperation for both parties. This cooperation pattern can also provide increased value related to the existence and volume of PUAS as a medium/means of transactions in maintaining the adequacy of sharia banking liquidity management.

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