

## **New Proposed Determinants of Money Markets Interbank Based on Shariah Principles: An Empirical Overview from Indonesia**

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### **Abstract**

As the implementation of law 21 of 2008 the Government must regulate sharia bank operations in detail and comprehensively. This study aims to explain the money markets interbank based on shariah principles in Indonesian context. The mixed method of quantitative and descriptive causality is employed to describe the influence of sharia money market phenomenon that occurs. Observation of time series data that is cross section in one specific time period, namely data from 2009 to 2020 using Eviews 9 software. Autoregressive Distributed Lag (ARDL) analysis is used as the basis for using the Ordinary Least Square (OLS) model so that stationary tests are 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 forms the determinant of sharia money market in Indonesia. This model is considered to generate a solution in the form of a model that can provide the best predictive results.

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

### **1. Introduction**

As the biggest Muslim populated country in the world, the government of Republic of Indonesia needs to accommodate a requirement for financial transactions conforming to Islamic law, such as sharia banking services. The government's active role was manifested in the Indonesian sharia-based banking system, resulting in the acknowledgment as a part of national development's effort to create a just and prosperous community based on social justice (Ayyub et al., 2019; Hidayati et al., 2017). This active role was achieved not only at the regulation policy level, but also it has entered within functional domains.

On the policy level, the government issues the regulation of Indonesian sharia banking operational that is Sharia Banking Act No. 21 of 2008, it manages in detail and comprehensive, so that the operational aspect has a solid legal standing. On the operational level, the Bank of Indonesia, as the central bank, places sharia banking as an integral part of national banking system development following Indonesian Banking Architecture (API).

API is a framework of the Indonesian banking system that is comprehensive and directing, shaping, and organizing banking for the next five to ten years to come. The API directives and formulation

were based on the vision for achieving a healthy banking system that was strong and efficient to create financial system stability in its function as intermediary financial institutions (Riyanto et al., 2019).

The bank's role as the financial institution between the party with excess funds and short in funds requires liquidity management skills. Bank's management in managing its liquidity asset will significantly influence its profit gain (Alarussi & Alhaderi, 2018). The high liquidity is often followed by low profitability so that it occurs trade-off between interests of obligation to fulfill liquidity and profitability. Therefore, the role of management becomes very strategic to manage liquidity optimally. Optimum liquidity management can support health, stability and decrease bank's bankruptcy risks (Alarussi & Alhaderi, 2018; Setiawati et al., 2018).

Sharia, a liquidity management instrument regulated by the Central Bank, is the Bank of Indonesia Sharia Certificate (SBIS) and Interbank Mudharabah Investment Certificate (IMA) as the instrument of Inter-Bank Money Market Based on Sharia Principle (PUAS). The instrument is issued as one of the market operations instruments in controlling the monetary. The SBIS and IMA correlate to, if the SBIS return result is lower than the IMA return rate, the Islamic bank will choose transaction in PUAS, likewise if IMA return rate is lower than SBIS return result, sharia bank can choose to place their funds in SBIS (Hidayati et al., 2017; Riyanto et al., 2019).

The money market mechanism will help the banks with liquidity problems, positively impacting the real sector. Correspondingly, the Bank of Indonesia's objective in establishing a money market instrument through monetary operation instrument is to support the effectiveness of controlling sharia monetary control (Hidayati et al., 2017; Juhandi et al., 2019).

As far as the researcher's concern, there has not been any study discussing factors that establishes sharia money market toward interbank money market volume based on sharia principles. Thus, it is essential to research to obtain a detailed description of the determinants model of the sharia money market toward PUAS volume.

## **2. Literature Review**

As an Islamic law-based financial institution, Sharia Bank takes part in two Islamic financial elements: *baitul-maal* dan *baitut-tamwil*. *Baitul maal* receives consignment funds, such as alms, *infaq*, *sadaqah*, and optimizing its distribution by channeling it to various parties or *ashnaf* conforming to the regulation and trust received. *Baitut-tamwil* conducts productive business development and investment activities to increase economic quality by encouraging saving money and supporting economic activity financing. In other words, *baitulmaal* has a social function; that is, it lies on alms, *infaq*, *sadaqah*, and cash *waqf*. As for *baituttamwil* has a business function: profit sharing, selling, purchasing, services, and real sector (Habib, 2018; Hadjri et al., 2019; Juhandi et al., 2019).

In terms of financial service, sharia bank operates to maintaining trust given by fulfilling a transaction requirement for the financial service users. The philosophy of sharia bank operation pursues the principle of justice, efficiency, togetherness and helps each other synergistically to obtain optimum profit (Habib, 2018).

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One of the crucial parts that need to be maintained by a financial institution is that the ability of liquidity management (Alaro & Alalubosa, 2019). In contrast to the liquidity definition in financial business, in banking practices, liquidity explored is much complex. From an assets perspective, liquidity can change the whole assets into cash, while from a liabilities perspective, liquidity is the bank's ability to cover the fund's demand through increasing liabilities portfolio (Ayyub et al., 2019; Çokgezen & Kuran, 2015).

In general, liquidity implication is the ability to fulfill the entire daily operational obligation, including when urgent funds are needed, and the ability to meet the expectation and service satisfaction for the investor and customer with investment return and placement fees (Sulaiman et al., 2013; Tlemsani, 2020). The concept of liquidity management is expanded by the lending bank function, which is financing external parties. The meaning of financing is related to the possibility of the customer who will draw their money at any time with unpredictable amounts and still have to meet minimum Legal reserve requirements set by the Bank of Indonesia (Ahmad et al., 2020; Yanti, 2018).

Indonesian sharia-based money market instrument which Bank of Indonesia has issued is Inter-Bank Money Market Based on Sharia Principle (PUAS). Referring to Bank of Indonesia Regulation No. 9/5/PBI/2007, PUAS is a short-term inter-bank financial transaction activity either in rupiah or foreign currency.

PUAS participants consist of sharia bank as the owner or beneficiary, and the conventional banks are only the fund's owner. The most highly used instrument in PUAS is the inter-bank *mudharabah* investment certificate (IMA) which the transaction using *mudharabah* agreement and PUAS instrument ownership transfer can be done only at one time. The manual taken as PUAS reference, which is not against sharia law, is the fatwa of National Sharia Chamber No. 37/DSN-MUI/X/2002 regarding Inter-Bank Money Market Based on Sharia Principle.

In addition, there is also the Bank of Indonesia Sharia Certificate (SBIS) which defines as short-term securities in rupiah currency and issued by the Bank of Indonesia. The SBIS issuance is one of the contradicting open market operation instruments. The objective in publishing SBIS is to support the effectiveness in controlling sharia monetary. Through SBIS issuance, it is expected to assist the Bank of Indonesia in performing its task in determining and undertaking monetary policy to fulfill the Bank of Indonesia's objective: to achieve and maintain rupiah currency stability. Meanwhile, for sharia banking, the instrument can be used in managing short-term liquidity.

One of the risks handled by sharia banking is the risk of liquidity; a mismatch in managing liquidity causes it. It is needed that the PUAS medium functioned efficiently and effectively to overcome the risk of liquidity for continuing sharia banking activities. PUAS existence can become an intermediation of sharia banking in overcoming liquidity pressure, either surplus or deficit in liquidity (Riyanto et al., 2019; Yanti, 2018).

Research regarding the sharia money market is the study to evaluate Islamic Interbank Benchmark Rate (IIBR), conducted by investigating its relationship with conventional benchmark rates (Tlemsani, 2020). The research's primary finding is a significant negative correlation between IIBR and London Interbank Offered Rate (LIBOR) and other inter conventional bank benchmark rates.

The negative linear relationship is caused by IIBR, which represents replacement investment for international investors when the standard rates decrease regarding IIBR. The study contributes to the principle understanding of the IIBR framework and its value to finance the short-term interbank sharia market in the future and present time for the sharia financial industry.

In the Indonesian context, PUAS transaction experiences fluctuation with a significant difference; it is different with SBIS, which its movement is relatively low yet stable (Yanti, 2018). Sharia banking fund placement is still dominant in the central bank compared to placing the fund in PUAS. It is reflected on (under 3.5%) the PUAS volume ratio toward placing funds in BI (Bank Indonesia, 2020). In Indonesia, PUAS existence has not optimal yet; it is seen from the PUAS utilization as the medium of liquidity placement and management, and also providing transparent information has not yet become a primary priority in sharia banking (Mujahidin, 2019; Setiawati et al., 2018).

The latest research on PUAS finds out that there is a one-way causality pattern relationship between sharia investments with PUAS transactions. However, there is no causality pattern relationship between SBIS return results with PUAS transaction. Afterward, based on the Impulse Response Function (IRF) analysis result, the fastest inflation response achieves stability during the shock that occurred in the PUAS transaction variable (Nurmaida, 2019). The research uses *Vector Auto Regression* and *Granger Causality* model in the transaction during 2012 - 2017.

Later on, a study on identifying liquidity risk sources in sharia banking and the common instrument used to decrease mismatch liquidity. Sharia liquidity management is the essential basic framework for stable and efficient banking (Bello et al., 2017). The variable used in the previous study is similar to the variable applied in this study, whereas the difference is selecting the PUAS volume variable and the research method used.

Sharia money market instrument used for short-term financing investment and import and export assets (Issoufou, 2019) and sharia money market instrument significantly contribute to developing economies through financing sector. The instrument traded in the market is a long-term halal investment instrument used to provide liquidity for assets' availability.

In achieving or ensuring a monetary system, generally, monetary authority supervise the entire system. The monetary sector is an important network and influence the real sector. In Islam, the monetary policy tries to achieve economic welfare with a full working economy, social-economic justice, and income and wealth distribution.

### **3. Method**

The research method was mix method approach, that is, quantitative and descriptive causality research. The quantitative research method which will be used was descriptive and causality research. Research observation used a cross-section time-series range, which means the information or data obtained was research result conducted in a certain period, data spanning from 2009 until 2020.

The population in the research was the entire activity and PUAS volumes. Data series which will be examined as the population was PUAS monthly volume data during 2009 until 2020, such PUAS

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transaction volume, IMA return rates, SBIS return result, Legal reserve requirement, third party fund, financing, operational profit, and exchange rates.

The analysis unit in this research is the entire sharia banking until 2020; it consists of fourteen Sharia Public Banks and twenty Sharia Business units with observation unit such as PUAS volume, to obtain sharia banking preference in liquidity management either liquidity deficit or surplus.

A descriptive analysis was used to excavate research variables and behavior as a preliminary factor and answer the initial research's objective. The descriptive analysis was also used to find out the influence of variables examined on PUAS volume. The analysis was conducted using eViews 9 software.

A stationarity test is the most crucial part of analyzing time-series data to determine whether any unit roots in variable or not so that the relationship between variables on the equation becomes valid. It was tested using the following formula:

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

Stationarity is one of the vital perquisites in the econometrics model for time series data. A stationary data is the one showing mean, variance, and auto variants (on lag variation) was still the same at anytime when the data was formed or used; it means that the time series stationary data model was relatively stable. If any data used in the model was not stationary, the data should be reconsidered in its validity and stability because regression results from not static data will cause spurious regression. It was a regression with a high  $R^2$ ; however, there is no significant relationship between the two (Merah et al., 2015).

### 4. Result and Discussion

PUAS is one of the media used by sharia banking to manage liquidity well. An effective PUAS will describe offering and/or demand sharia banking with a liquidity surplus or deficit to financing operational activities.

In performing PUAS, its transaction activity indicator can be seen from PUAS volume itself. To obtain model and to find out PUAS volume absorbed by sharia banking, it can use the Inter-Bank Money Market volume model (Freixas & Rochet, 2008), which adjusted into the following:

$$\pi = r_f F + r M - r_D D - C(D, F) \quad (1)$$

of which  $\pi$  is sharia banking profit,  $r_f$  is the profit-sharing amount,  $F$  is the total financing,  $r$  is IMA return rates,  $r_D$  is sharia savings profit sharing,  $D$  is the savings total, and  $C$  is the total cost expended by sharia banking in managing savings and financing.

That sharia banking profit was set or influenced by the number of financing given, profit-sharing amount (financing margin), return in inter sharia banking money market, sharia saving amount, GWM set by the central bank, and saving and financing management cost. Because of the assumption of  $C$  cost function, sharia banking profit maximalizing was formulated in the following:

$$\frac{\partial \pi}{\partial F} = (r_f - r) - \frac{\partial C}{\partial F}(D, F) = 0, \text{ assumption } \frac{\partial C}{\partial F}(D, F) = \gamma_F \text{ so that (2)}$$

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

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

so :

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

from the above model, it was obtained formulation for ( $\pi$ ) the optimum sharia banking profit by considering optimizing inter-bank money market based on sharia principle (PUAS) the formula was:

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

Therefore, the model showing PUAS volume is:

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

Of which M is liquidity or transaction volume of sharia banking in PUAS. Whiler isthe securities *rate of return*(IMA return rates and SBIS return result), F is the total financing,  $\pi$  is the operational profit of sharia banking,  $\alpha$  is Legal Reserve Requirement, D is the total deposit, and C is the total operational cost. It is also based on the fact that Islamic banking also serves foreign exchange trading; thus, it is necessary to provide exchange rate information represented in the USD exchange rate toward IDR (USD/IDR).

Hence, the determinant model of sharia money market toward PUAS volume covers IMA return rates, SBIS return result, financing, operational profit (represented by ROA), Legal reserve requirement, deposit, operational cost, and exchange rates (represented by USD/IDR) as seen in model 7.

After it was set the eighth variable, which will be used in the model formulation process, first and foremost, the study will conduct a statistic test on the dependent and independent variables. The result of the descriptive statistics test uses eViews 9 software; it can be seen on the following table:

Variable Name	Variable	Unit	Mean	Median	Standard Deviation
PUAS Volume	PUAS	Rp Billion	579.02	593.50	440.61
Interbank Mudharabah Investment	IMA	%	5.13	6.26	1.06
BI Sharia Certificate	SBIS	%	6.03	6.26	1.06
Legal reserve requirement	GWM	Rp Billion	11,045.42	10,466.50	6,217.74
Deposit	Dep	Rp	126,190,90	130,611.00	68,406.78

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		Billion			
Financing	Payment	Rp Billion	196,587.30	197,959.50	103,446.40
Operational Cost	BO	Rp Billion	9,464.33	7,258.50	7,336.74
<i>Return on Assets</i>	ROA	%	1.41	1.45	0.57
Exchange Rates (USD/IDR)	NT	Rp	11,939.78	12,532.50	2,160.71

Based on statistics descriptive test, dependent variable mean value and the entire independent variables are above standard deviation. The finding shows that the entire variables have relatively slight data variation and homogeneity or low deviation levels.

The research uses *Autoregressive Distributed Lag* (ARDL) model; that is, it formed using Ordinary Least Square (OLS) model so that it necessary to conduct a stationarity test on every variable using Root Test Unit; the result is as follows:

Variabel	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	-3,158711 **	-4,173651 ***	-18,234970 ***
deposito	-0,064996	-11,409810 ***	-0,054036	-11,399350 ***
pembiayaan	0,048315	-2,944158 **	1,225821	-12,979710 ***
gwm	-1,179999	-13,520720 ***	-1,157778	-13,465080 ***
Roa	-2,959921 **	-11,445720 ***	-2,607490 *	-16,292990 ***
Nt	-0,721051	-12,803560 ***	-0,683066	-12,824050 ***

Information based on Stasioner *Critical Value*: (\*\*\*) 1%; (\*\*) 5%; (\*) 10%

Based on the stationarity test result using the ADF test, it was obtained that only PUAS variables and ROA were stationary in the level tier, while other variables were not stationary in the level tier; however, it was stationary on 1<sup>st</sup> *differencetier*. Afterward, based on the PP test result, it can find out

that PUAS, IMA, SBIS, BO, and ROA were all stationary in the level tier, while variables of deposit, financing, GMW, and NT were stationary on 1<sup>st</sup> differencetier. The test result can be concluded that the entire variables used in the research were stationary and not one was stationary on 2<sup>nd</sup> difference or I(2).

The stationary test result of operational cost using ADF and PP shows that PUAS variables on the level tier in which ADF statistics absolute value is greater than MacKinnon Critical Values on a critical value of 10% (Prob < .10). Later on, PP statistics absolute value was more significant than *MacKinnon Critical Values* on 1% critical value (Prob < .01).

Operational cost amount very much has an impact on the bank's performance. The bank must make every effort to reduce operational costs. The effort conducted by sharia banking to decrease operational cost is to create cost efficiency in the entire operational aspect and conduct intensive monitoring for all operational cost components (Kalayci & Tekin, 2016; Khalique et al., 2018). These savings efforts were conducted by upholding service level agreements set by sharia banking management toward customers and/or the stakeholders (Nidhi, 2016; Roziq et al., 2021).

Sharia Bank has a much higher cost of the fund than the conventional bank (Habib, 2018); hence, this burdening operational cost of sharia bank (Hidayati et al., 2017; Sukardi & Wijaya, 2013a). Within the last two years, the operational cost grows quite significantly, and it shows efficiency conducted by sharia banking management. In 2020, the growth of operational cost was as much as 7.31% (yoy); it decreased compared to the previous year, which decreased by about 1.72% (Bank Indonesia, 2020).

The ROA variable was stationary on the level tier using ADF and PP, in which ADF absolute value was more significant than *MacKinnon Critical Values* on 5% critical value (Prob < .05), while PP statistics absolute value was more significant than *MacKinnon Critical Values* on 10% critical value (Prob < .10). The NT variable was stationary on 1<sup>st</sup> differencetier using ADF and PP, the statistics absolute value of ADF and PP respectively greater than *MacKinnon Critical Values* 1% critical value (Prob < .01).

Relationship characteristics between Operational Cost and PUAS can be described as follows. One of the bank performance indicators is profitability through ROA proxy (Le & Ngo, 2020). Efficiency was measured by comparing the attained profit with assets or capital-producing profit. The higher profitability of a bank, the bank's performance is better (Roziq et al., 2021).

Sharia banking profitability was relatively lower than conventional bank (Hidayati et al., 2017; Sukardi & Wijaya, 2013b). The Sharia banking ROA average in 2020 was 1.35%, decreasing compared to the previous year in which the ROA was as much as 1.73%. ROA growth in 2020 was still below a good ROA standard as determined by the bank supervision regulator, that is, by 1.5% (Bank Indonesia, 2020). When ROA was under the standard indeed, it will affect the decreasing PUAS supply. However, at the same time, sharia bank, contrary to the fact, required additional liquidity for daily operational activities. Up to this point, PUAS return profit-sharing has increased.

The financing variable was stationary on 1<sup>st</sup> differencetier using ADF, in which the statistic absolute value of ADF was greater than *MacKinnon Critical Values* on 5% critical value (Prob < .05) and was

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stationary on 1<sup>st</sup> differencetier using PP. The absolute value was more significant in those statistics than *MacKinnon Critical Values* on 1% critical value (Prob <.01).

Relationship characteristics between Sharia Financing and PUAS were found through the growth of financing distribution by sharia banking in 2020 as much as 381.430 billion rupiahs; it decreased compared to 2019 with a financing amount of 355.182 billion rupiahs. Based on the use in murabahah financing in 2020, it grew 8.17% (yoy), it increased compared to 2019 by 3.78% (yoy). Meanwhile, *musyarakah* financing in 2020 grew 9.76% (yoy), it decreased compared to 2019, which rose up to 21.48% (yoy). The growth slowdown indicates the beginning of financing demand increase. In 2020, the financing structure was still dominated by Murabaha financing with a market share of 48.42%, and it was followed by *musyarakah* financing (33.17%) and then *mudharabah* financing (18.42%) (Bank Indonesia, 2020).

IMA variable was stationary on the 1<sup>st</sup> differencetier using ADF, in which the statistic absolute value of ADF was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01). However, on the tier level using PP, PP's statistic absolute value was more significant than *MacKinnon Critical Values* on 1% critical value (Prob <.01).

The relationship characteristics between PUAS and IMA were described with the number of return rates mudharabah investment profit-sharing in publisher bank conforming to investing period and profit-sharing percentage, which became the biggest motivation. Return result balance level will be achieved if the fund demands are equal to the fund offering. The imbalance of fund's demand and offer will encourage volatility return results (Alarussi & Alhaderi, 2018; Habib, 2018; Le & Ngo, 2020).

Transaction volume through PUAS in 2020 was around 1,160 billion rupiahs or increasing by 35.67% (yoy) compared to the previous year, that is, 855 billion. Likewise, mudharabah and musyarakah also increase quite significantly (Bank Indonesia, 2020). The growth in PUAS activity showing there are increasing demands and offering of short-term liquidity sharia banking. The increase also cannot be separated from the fact that there have been increasing sharia banks joining in the trade (Abdul-Rahman et al., 2017; Hidayati et al., 2017).

The SBIS variable was stationary on the 1<sup>st</sup> differencetier using ADF, in which the statistic absolute value of ADF was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01). However, it was stationary on the level tier using the PP test, in which the statistic absolute value of PP was greater than *MacKinnon Critical Values* on 5% critical value (Prob <.05). The BO variable was stationary on the 1<sup>st</sup> differencetier using ADF, in which the statistic absolute value of ADF was greater than *MacKinnon Critical Values* on 5% critical value (Prob <.05). However, it was stationary on the level tier using PP, in which the statistic absolute value of PP was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01).

The relationship characteristic between SBIS and PUAS was described using the SBIS return result set by the Bank of Indonesia. The return amount became one factor in considering sharia banking to be a PUAS participant to influence PUAS volume (Nurmaida, 2019). If there is any economic hardship and inflation mounting that responded by monetary policy by which increasing SBIS return

result, it will create an increasing liquidity surplus of sharia banking in Bank of Indonesia in the form of SBIS.

If the SBIS return result increases and is not followed by increased IMA return rates, the SBIS return result increases higher than IMA return rates. As a result, the effect will be decreasing PUAS volume funding placement. The condition will impact PUAS volume decreasing, considering that sharia banking prefers to place their liquidity surplus in SBIS than in PUAS (Habib, 2018; Riyanto et al., 2019; Setiawati et al., 2018).

The Deposit variable was stationary on the 1<sup>st</sup>*differencetier* using ADF and PP, in which the statistic absolute of ADF and PP respectively was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01).

The relationship characteristic between Sharia Deposit and PUAS were seen in the increasing yearly deposit volume of sharia banking. The total deposit amount collected by sharia banking in 2020 was 236.748 trillion rupiahs or rising by 7.39% (yoy). Although, it was lower than the previous year, which grows by 10.93% (yoy) with a sharia deposit total of 225.646 trillion rupiahs (Bank Indonesia, 2020). The deposit volume mounting shows that people increasingly trust for sharia banking performance in managing liquidity (deposit) based on the sharia principle (Abdul-Rahman et al., 2017; Sulaiman et al., 2013).

The GWM variable was stationary on the 1<sup>st</sup>*differencetier* using ADF and PP, in which the absolute statistic value of ADF and PP respectively was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01). The relationship characteristic between Legal Reserve Requirement and PUAS was described through liquidity management of bank's fund to fulfill primary reserve requirement. GWM or *Legal Reserve Requirement* is an instrument to arrange monetary policy in controlling inflation, exchange rate, and money circulation.

Based on the GWM balance position data of sharia banking in 2009 until 2020, it was increasing significantly every year, that is, by 13.477 billion rupiahs or 529.35% from the initial amount of 2.590 billion rupiahs into 16.067 billion rupiahs. It was confirmed from the total savings, credit transfer, and deposit which also mounting quite significant (Bank Indonesia, 2020).

GWM changes significantly influence the development of a bank's liquidity with small assets. However, GWM was not affecting, on the contrary, the bank with much larger liquidity. GWM only functioned as a reserve or buffer on the liquidity requirement for operational activities (Handayani & Putra., 2018; Roziq et al., 2021).

NT variable was stationary on the 1<sup>st</sup>*differencetier* using ADF and PP, in which the statistic absolute value of ADF and PP respectively was greater than *MacKinnon Critical Values* on 1% critical value (Prob <.01). The relationship characteristic between Exchange rates and PUAS was seen in the operational domain, and sharia bank was allowed to do foreign exchange trading based on Sharia Banking Act No. 21 of 2008 or National Sharia Chamber – Indonesian Ulema Council. The trade was intended to give trading and purchasing services of foreign currencies to meet people's requirements, including the American dollar currency (USD).

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The development of the Rupiah exchange rate toward American dollar, which was notated in USD/IDR from 2009 until 2020, decreased (depreciation) as much as 3.50% (yoy) to 14,625.25 rupiahs. Meanwhile, the development in 2019 strengthened (appreciation) by 0.95% or 14,130.58 rupiahs (Bank Indonesia, 2020). In general, several conditions which become a fundamental factor of USD/IDR exchange rate strengthening or weakening are USD demand for paying foreign debt, either from the government or private sector, and import goods purchase to meet domestic necessity (Alarussi & Alhaderi, 2018; Diallo et al., 2015).

### 5. Conclusion

Several specific findings which can be concluded from the study on determinants model of sharia money market toward PUAS volume is that these PUAS models are entirely free from heteroscedasticity, autocorrelation, and multicollinearity problems. Such immune to the problems indicates how ARDL operations worked by generating solutions in a model to give the best prediction result (Gulisashvili & Tankov, 2016; Yalcin & Seker, 2016).

Effectively and efficiently, the research result was used to compile solutions to the problem regarding sharia banking liquidity management by optimizing the role of PUAS. The implication of PUAS is the creation of mutualism cooperation among sharia banks such as the provision of valid and real-time information about the liquidity position of Sharia banking so that it can be known when there is excess and lack of liquidity in a period. Furthermore, improving access to short-term funding to meet liquidity shortfalls.

This pattern of cooperation has also proven effective in reviewing new instruments that can accommodate the development of Islamic financial markets and can be generally accepted by PUAS actors. The implication is to provide added value related to strengthening the existence and increasing the volume of PUAS transactions in maintaining the adequacy of sharia banking liquidity management.

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