



Table Installments Finance Sharia of Motor Vehicle Using Proportional, Annuity, and Effective Rate Method

Rini Cahyandari^{1*}, Faridatul Hasanah²

^{1,2}*Department of Mathematics, Faculty of Science and Technology, UIN Sunan Gunung Djati, Bandung, Indonesia*

**Corresponding author email: rini_cahyandari@uinsgd.ac.id*

Abstract

One of the products offered by sharia banks is financing. In this financing, Islamic banks usually take profits in the form of margin or it can also be done by profit sharing. The base profit rate model was introduced to determine margins in Islamic bank financing. The margin generated using the base profit rate model is only in the form of a percentage. Therefore, follow-up was carried out by forming a sharia financing installment table to make it easier to see profits in nominal form. The methods used in making this installment table are the proportional method, annuity method and effective rate method. From research conducted in the case of sharia motor vehicle financing with a term of 1 year, a margin of 66.61785% was obtained and the profit based on the calculation results of the proportional method, annuity method and effective rate method was respectively IDR. 9,992,677.20, IDR 5,945,097.50, and IDR 5,412,700.31. So it can be concluded that the effective rate method takes the smallest profits, then followed by the annuity method and finally the proportional method which takes profits that tend to be larger.

Keywords: Margin, Base profit rate method, Proportional method, Annuity method, Effective rate method

1. Introduction

Sharia financial mathematics is a branch of mathematics which discusses many sharia economic issues. The main study in sharia financial mathematics is sharia banking and sharia insurance which in every problem uses mathematics as a problem solving tool. One of the products offered by sharia banks is financing with the sale and purchase principle (using a murabahah contract, salam contract, or istishna contract) and financing with a rental principle (using an ijarah contract or ijarah mutaniyya bittamlik contract), for example sharia financing of motor vehicles which in determining profits can be done by setting a margin.

The base profit rate model is a new model that can be used in determining Islamic bank margins. This model was introduced by Nadhirah Gazali et al. (2017) through a journal entitled "Alternative Profit Rate Sharia-Compliant for Islamic Banking". However, the margin generated from this model is only a percentage, so it is quite difficult to see exactly how much profit a sharia bank will gain. Therefore, the margin percentage obtained from the base profit rate model is reprocessed into an installment table using the proportional method, annuity method and effective rate method. So you can see exactly how much profit the sharia bank will get and you can also see the comparison of the three methods of making installment tables.

Based on the explanation above, this research was conducted to determine the application of the base profit rate model in creating installment tables (margin calculations) for sharia motor vehicle financing using the proportional method, annuity method and effective rate method. Apart from that, this research also aims to compare the proportional method, annuity method and effective rate method. Therefore, this research is entitled "Application of the Base Profit Rate Model to the Sharia Motor Vehicle Financing Installment Table Using Proportional, Annuity and Effective Rate Method".

2. Materials and Methods

The model used to determine margin in percentage form is the base profit rate model. This model is the result of a proposal from the majority of Muslim scholars, including Imam Syafi'i, Imam Hanbali, and Imam Maliki, who stated that the margin that can be applied from buying and selling activities is $\frac{1}{3}$ (or 33.33%) of the market price. Apart from

that, this model also uses economic bubble parameters to adjust to economic conditions. The mathematical equation of the base profit rate model is (Puspa et al., 2017):

$$u_t = 33.33\% + gt \quad (1)$$

with the ratio of economic bubble sizes (denoted by g) determined using the following generalized Johansen Ledoit Sornette model (Indiran, 2015; Indiran et al., 1997)

$$g = \frac{p_c - \widehat{p}_1}{p_c} \times 100\% \quad (2)$$

The intrinsic value of shares from a sharia stock index (notated by $\widehat{p}_1$) can be determined by finding a central data measure of the intrinsic value of shares of companies (notated by p_1) using Benjamin Graham's formula and the following average annual growth rate formula. (Kohardinata, 2015).

$$p_1 = [EPS(8.5 + 2G)] \times \frac{Y}{AAA} \quad (3)$$

$$G = \left[\left(\frac{\text{nilai akhir}}{\text{nilai awal}} \right)^{\frac{1}{n'}} \right] - 1 \quad (4)$$

Making installment tables is carried out using the proportional method, annuity method and effective rate method, each calculation of which is presented in the tables below (Ibrahim & Salam, 2021; Zakhariah & Hesniati, 2022)

Table 1: Table of Sharia Financing Installments Generally Using the Proportional Method

Period	Principal	Margin installments	Monthly installments	Remaining principal
1	$AP = \frac{P}{n}$	$AM = P \times \frac{u_t}{n}$	$AB = AP + AM$	$P - (AP \times 1)$
2	$AP = \frac{P}{n}$	$AM = P \times \frac{u_t}{n}$	$AB = AP + AM$	$P - (AP \times 2)$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
n	$AP = \frac{P}{n}$	$AM = P \times \frac{u_t}{n}$	$AB = AP + AM$	$P - (AP \times n) = 0$

Table 2: Table of Sharia Financing Installments Generally Using the Annuity Method

Period	Principal	Margin installments	Monthly installments	Remaining principal
1	$AP(1) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^{1-1}}{\left(1 + \frac{u_t}{n}\right)^n - 1} \right] \times P \times \left(\frac{u_t}{n}\right)$	$AM(1) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^n}{\left(1 + \frac{u_t}{n}\right)^{1-1} - 1} - 1 \right] \times AP(1)$	$AB = AP(1) + AM(1)$	$\frac{AM(2)}{\left(\frac{u_t}{n}\right)}$
2	$AP(2) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^{2-1}}{\left(1 + \frac{u_t}{n}\right)^n - 1} \right] \times P \times \left(\frac{u_t}{n}\right)$	$AM(2) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^n}{\left(1 + \frac{u_t}{n}\right)^{2-1} - 1} - 1 \right] \times AP(2)$	$AB = AP(2) + AM(2)$	$\frac{AM(3)}{\left(\frac{u_t}{n}\right)}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
n	$AP(n) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^{n-1}}{\left(1 + \frac{u_t}{n}\right)^n - 1} \right] \times P \times \left(\frac{u_t}{n}\right)$	$AM(n) = \left[\frac{\left(1 + \frac{u_t}{n}\right)^n}{\left(1 + \frac{u_t}{n}\right)^{n-1} - 1} - 1 \right] \times AP(n)$	$AB = AP(n) + AM(n)$	$\frac{AM(n+1)}{\left(\frac{u_t}{n}\right)} = 0$

Table 3: Table of Sharia Financing Installments Generally Using the Effective Rate Method

Period	Principal	Margin installments	Monthly installments	Remaining principal
1	$AP = \frac{P}{n}$	$AM(1) = \left(P - ((1-1)AP) \right) \frac{u_t}{n}$	$AB(1) = AM(1) + AP$	$P - (AP \times 1)$
2	$AP = \frac{P}{n}$	$AM(2) = \left(P - ((2-1)AP) \right) \frac{u_t}{n}$	$AB(2) = AM(2) + AP$	$P - (AP \times 2)$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
n	$AP = \frac{P}{n}$	$AM(n) = \left(P - ((n-1)AP) \right) \frac{u_t}{n}$	$AB(n) = AM(n) + AP$	$P - (AP \times n) = 0$

3. Results and Discussion

The data taken is data on net profit in 2019, net profit in 2020, and net profit per share (EPS) from companies listed in the Indonesian Sharia Stock Index (ISSI) in 2019-2020 and the closing price of ISSI shares reached its maximum value in IDR195,09 for that time period. It is also known that the yield on corporate bonds with an AAA rating with a term of 10 years is 8% and the yield on Indonesian government bonds with a term of 10 years is 6%. Apart from that, sharia financing for motor vehicles with a term of 1 year has a principal amount of IDR15,000,000.00. Using the help of R software, a graph of the intrinsic value of company shares is obtained as follows.

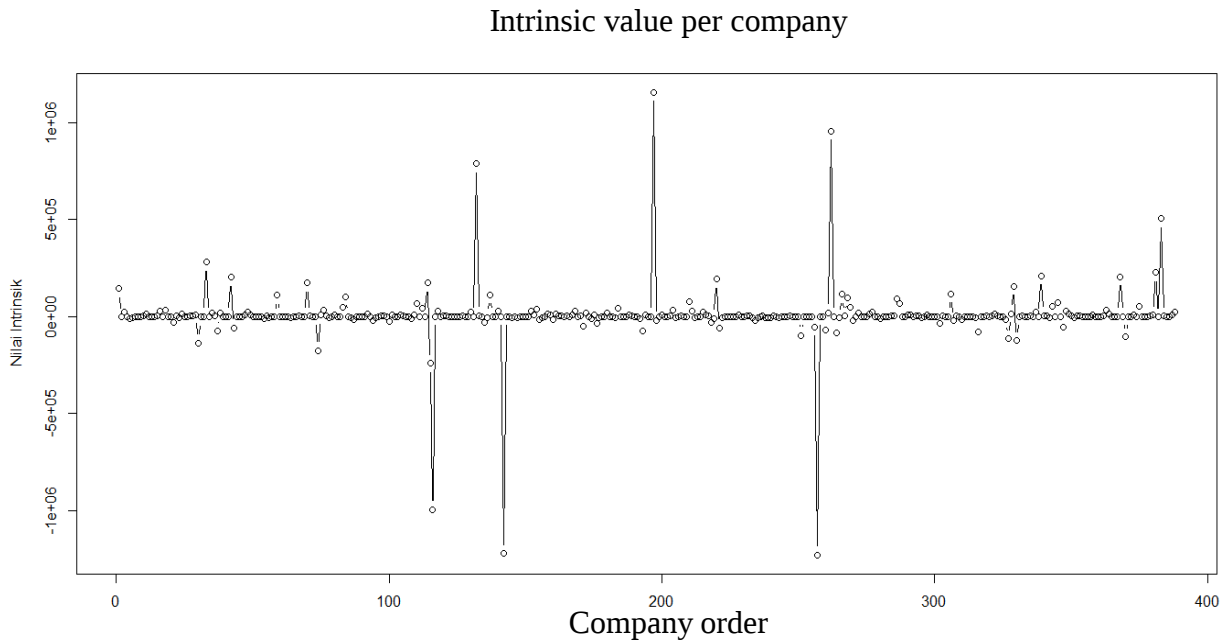


Figure 1: Intrinsic Value of Shares per Company

So the median was chosen from the data above, which is IDR130,1487. The economic bubble size ratio obtained is:

$$g = \frac{195.09 - 130.1487}{195.09} \times 100\% = 33.28785\%$$

Then, with the help of R software, we obtain margins and installment tables for sharia financing for the proportional method, annuity method and effective rate method, including:

Margin dan Tabel Angsuran

Masukkan rasio ukuran gelembung ekonomi (dalam %):

Masukkan periode dalam t tahun:

Masukkan pokok/jumlah pembiayaan:

Margin (dalam %)

[1] 66.61785

Tabel Angsuran dengan Metode Proporsional

Periode	Angsuran	Pokok	Angsuran	Margin	Angsuran	Bulanan	Sisa	Pokok
1	1	1250000	832723.1	2082723	13750000			
2	2	1250000	832723.1	2082723	12500000			
3	3	1250000	832723.1	2082723	11250000			
4	4	1250000	832723.1	2082723	10000000			
5	5	1250000	832723.1	2082723	8750000			
6	6	1250000	832723.1	2082723	7500000			
7	7	1250000	832723.1	2082723	6250000			
8	8	1250000	832723.1	2082723	5000000			
9	9	1250000	832723.1	2082723	3750000			
10	10	1250000	832723.1	2082723	2500000			
11	11	1250000	832723.1	2082723	1250000			
12	12	1250000	832723.1	2082723	0			

Figure 2: Margin Obtained from the Base Profit Rate Model and Installment Table for Sharia Motor Vehicle Financing with a Period of 1 Year Using the Proportional Method

Tabel Angsuran dengan Metode Anuitas

	Periode	Angsuran Pokok	Angsuran Margin	Angsuran Bulanan	Sisa Pokok
1	1	912701.7	832723.12	1745425	14087298
2	2	963370.2	782054.61	1745425	13123928
3	3	1016851.6	728573.23	1745425	12107077
4	4	1073301.9	672122.84	1745425	11033775
5	5	1132886.2	612538.62	1745425	9900888
6	6	1195778.2	549646.59	1745425	8705110
7	7	1262161.7	483263.11	1745425	7442949
8	8	1332230.4	413194.36	1745425	6110718
9	9	1406189.0	339235.75	1745425	4704529
10	10	1484253.4	261171.34	1745425	3220276
11	11	1566651.6	178773.20	1745425	1653624
12	12	1653624.1	91800.73	1745425	0

Tabel Angsuran dengan Metode Effective Rate

	Periode	Angsuran Pokok	Angsuran Margin	Angsuran Bulanan	Sisa Pokok
1	1	1250000	832723.12	2082723	13750000
2	2	1250000	763329.53	2013330	12500000
3	3	1250000	693935.94	1943936	11250000
4	4	1250000	624542.34	1874542	10000000
5	5	1250000	555148.75	1805149	8750000
6	6	1250000	485755.16	1735755	7500000
7	7	1250000	416361.56	1666362	6250000
8	8	1250000	346967.97	1596968	5000000
9	9	1250000	277574.38	1527574	3750000
10	10	1250000	208180.78	1458181	2500000
11	11	1250000	138787.19	1388787	1250000
12	12	1250000	69393.59	1319394	0

Figure 3: Table of Sharia Motor Vehicle Financing Installments with a Term of 1 Year using the Annuity Method and Effective Rate Method

From the tables above, you can see the profits of Islamic banks from this financing transaction by adding up the margin installments from period 1 to period 12. The profit obtained if you use the proportional method calculation is IDR. 9,992,677.20, the profit if you use the annuity method is IDR 5,945,097.50, and if using the effective rate method it is IDR5,412,700.31.

4. Conclusion

The base profit rate model can determine the Islamic bank's margin in percentage form, for motor vehicle financing with a term of 1 year and principal financing of IDR. 15,000,000, obtained a margin of 66.61785%. By applying the margin value to the proportional method, annuity method and effective rate method, installment tables with different patterns are obtained. The proportional method has a fixed pattern of principal installments, margin installments and monthly installments from the beginning to the end of the period. The annuity method has a principal installment pattern that increases as the period increases, while the margin installments decrease as the period increases, but the monthly installments remain the same from the beginning to the end of the period. The effective rate method has a fixed principal installment payment pattern from the beginning to the end of the period, but the margin and monthly installments decrease as the period increases. Of the three methods for making installment tables, the methods that take advantage from smallest to largest in sequence are the effective rate method, annuity method, and proportional method.

References

- Gazali, N., Halim, N. A., & Ghazali, P. L. (2017, September). Alternative profit rate shariah-compliant for islamic banking. In *Journal of Physics: Conference Series* (Vol. 890, No. 1, p. 012165). IOP Publishing.
- Ibrahim, A., & Salam, A. J. (2021). A comparative analysis of DSN-MUI fatwas regarding murabahah contract and the real context application (A study at Islamic Banking in Aceh). *Samarah: Jurnal Hukum Keluarga dan Hukum Islam*, 5(1), 372-401.
- Indiran, D. (2015). Predicting Crash-Time of Rational Speculative Bubbles of Malaysian Stock Market during the Year 2008.

- Indiran, D., Halim, N. A., & Ahmad, W. M. A. W. (1997). An Application Of Generalised Johansen-Ledoit-Sornette (GJLS) Model To Detect Size Of Rational Speculative Bubble In DJIA Stock Market During.
- Kohardinata, C. (2015). Benjamin Graham's Stock Valuation Formula (Case study of PT. Wintermar Offshore Marine). Proceeding the 2nd international seminar and call for paper in management and Business–10 juni 2015–P. 69–Departemen Manajemen Fakultas Ekonomi dan bisnis Universitas Mercu Buana.
- Puspa Liza, G., Gazali, N., & Halim, N. A. (2017). Alternative profit rate shariah-compliant for islamic banking. Alligood, K. T., Sauer, T. D. and Yorke, J. A. (1996). *Chaos: An Introduction to Dynamical Systems*. New York: Springer-Verlag.
- Zakhariah, C., & Hesniati, H. (2022). Comparative Analysis of Islamic Commercial Banks and Sharia Business Units in Indonesia. *Jurnal Ilmiah Ekonomi Islam*, 8(2), 1393-1403.