

## BANK MUAMALAT INDONESIA (BMI) PRODUCTIVITY ANALYSIS USING MALMQUIST INDEX

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**Abstract:** The aim of this study is to measure Bank Muamalat Indonesia's productivity by using Malmquist Index method. The sample of the study is monthly report of Bank Muamalat Indonesia during 2011 to 2015. The result of the study shows that Bank Muamalat Indonesia's productivity level in the period of 2011-2015 every year is fluctuated. On the other hand, the average of Total Factor Productivity (TFP) growth during 2011 to 2015 is 0.968 and the main factor that contributes toward productivity level increase comes from technological change (TECHCH).

**Keyword:** Bank Muamalat Indonesia, Productivity, Malmquist Index, Technology Change, Efficiency Change.

### I. INTRODUCTION

There are two reason why Islamic banks in Indonesia established. *First*, Islamic banks can accomodate customer who refuses to open an account at conventional banks which use interest rate in the operation because of the usury (*riba*) prohibiton by Islamic law. *Second*, Islamic banks have a potential of big market cap in Indonesia as world most populous country.

According to the Indonesian Census at 2015, the country population was 255,461,686 and enact Indonesia as the fourth largest population in the world. Indonesia is the world's most populous Muslim-majority nation with 85% of Indonesians declared themselves Muslim (Statistics Indonesia, 2015). Therefore the economic potential of muslim population should be optimized to spur economic growth.

Bank Muamalat is the first Indonesian Islamic bank established since 1992. Although the establishment of first Islamic banks in Indonesia was late than other Muslim countries, the growth of Islamic banking in Indonesia is rapid. The high growth of Islamic banking in Indonesia followed by the establishment of new Islamic banks, Islamic business unit, dan Islamic rural banks.

The growth of Islamic banking industry in Indonesia is satisfying from the previous year of study. It can be showed from table 1 which provide Islamic banking growth in Indonesia during 2009 to 2016.

**Table 1**  
**Islamic banks growth**

| <i>Period</i> | <i>Third-Party Funds</i> | <i>Financing</i> |
|---------------|--------------------------|------------------|
| 2009          | 52.271                   | 46.886           |
| 2010          | 76.036                   | 68.181           |
| 2011          | 115.415                  | 102.655          |
| 2012          | 147.512                  | 147.505          |
| 2013          | 183.534                  | 184.122          |
| 2014          | 217.858                  | 199.330          |
| June-2015     | 215.339                  | 203.894          |

*Source:* IndonesianIslamicBankingStatistic, 2016.

The table shows that there are improvement and growth of Islamic banks in Indonesia and it proved the success of sharia system implementation in Indonesia. One of the way to look bank performance can be analyzed through its financial report (Kasmir; 2009). The performance assessment is the benchmark and tools to measure capability of management to succeeding policy

implementation goal. It can be expressed, that financial report is the figure of Management performance in the past and it can be used as references to increasing the future performance (Kasmir; 2009).

The financial report tools of analysis used to measuring bank performance in productivity is *malmquist productivity index* (MPI). The productivity is ratio between obtained output against used input. The productivity measurement in the study refers to the *total factor productivity* (TFP) from all factors and not partial productivity such as *labor productivity* or *capital productivity*. Partial measurement can influence *misleading* when assessing companies or industries performance (Surjaningsih and Permono; 2014).

Since the establishment of Bank Muamalat Indonesia in 1992, the number of Islamic bank and other financial institutions increased significantly. The development is encouraged by various factors which are most of Indonesian population is Moslem and the Islamic finance legal aspects have already ruled by Indonesian Law. The question is, how Bank Muamalat Indonesia productivity level this time which has been operating for more than 26 years. The research problems in this study are (1) How productivity level of Bank Muamalat Indonesia during 2011 to 2015?, (2) How productivity change level of Bank Muamalat Indonesia per-year?, and What factors that influence productivity level of Bank Muamalat Indonesia during 2011 to 2015?.

## II. LITERATURE REVIEW

Based on Law Number 21/2008, Islamic bank is the bank that implements businesses activities based on sharia principle and according to the types it consist of Islamic Commercial Banks, Islamic Business Unit and Islamic Rural Bank. Bank Muamalat Indonesia (BMI) was established as cooperation between the Indonesian Ulema Council (Majelis Ulama Indonesia/MUI) and team from banking practioners. The certificate of incorporation of BMI signed on 1 November 1991 and accumulated Rp84 billion of shares.

In the initial establishment of BMI, the presence of Islamic bank has not yet optimum attention in the national banking industry. Islamic banks operates under profit-

sharing system as legal basis in banking law. Bank operation legal basis was regulated in Law Number 7/1992 and the law only provide Islamic banking operation in profit shraing system as legal basis.

In 1998, Islamic banking development shows a good progress with the approval of Law Number 10/1998 that regulated the details of law base and its type of business that can be operated and implemented by Islamic banks. The law also give directions for conventional banks to open sharia unit branch and converted it become Islamic banks.

According to George J. Washnis (1980) productivity consist of two base concepts – efficiency and effectivity. Efficiency shows the ability to allocate human capital and natural resources needed to realize a certain output while effectivity shows the output and the quality from its allocating resources.

According to Kadarusman (2006), there are three elements of productivity that should be fulfilled which are efficiency, effectivity and quality. Efficiency is to measure how optimal of internal resources to produce the number of output. Effectivity is to measure how far the institution goal can be reached based on time and quality. Then, Quality is to measure the ability to meet the minimum requirements, specification, and consumer satisfaction.

Gasperz (2000) introduces a formal concept that called as productivity circle which used in productivity level continuously. There are four related and continuously steps in the circles: 1). Productivity Measurement, 2). Productivity Evaluation, 3). Productivity Plan, and 4). Productivity Improvement.

If productivity in an industry able to measured, the next step is evaluating actual productivity level to be compared with the specified target. The different between the actual productivity and the specified target is productivity problem which should be evaluated and founded to resolve the problem. Based on the evaluation, it can be reviewed the productivity target that will be achieved, both in the short or long-term period. To reach the specified productivity target, various of formal programs can be conducted to increase continuity productivity in Islamic banking Industry.

Sten Malmquist (1953) introduced a productivity measurement called Malmquist Productivity Index. However, Caves, Christensen and Diewert (1982) accomplished Malmquist Index by a distance function approach to describe technology in defining index of input, output, and productivity. The output that is produced in period of  $t$  and  $t+1$ , there are technologies which produce maximal output by using  $x_t$  and  $x_{t+1}$ .

The Total Productivity Factor (TFP) score is multiplication between EFFCH and TECHCH index which the score can be bigger, equal or less than 1. Therefore, TFC formulation is:

$$TFP = EFFCH \times TECHCH$$

This score shows how far company's position toward production frontier. Similar with efficiency change, technological change score can be bigger as well, equal, or less than one which show whether frontier moved increased, fixed, or decreased. The increase of shifting frontier indicated there is technology increase, equal with one or its mean there is no change in technology and less than one that indicated there is technology decline between  $t$  and  $t+1$  period. There are the advantages and disadvantages of Malmquist Index TFP compared to other productivity calculation.

Some advantages of Malmquist Index are; first Malmquist Index as non-parametric method, thus it does not need the specification of production function form. Second, this index does not need the economic behaviour assumption of production unit such as cost minimisation or profit maximisation, thus it is very useful for different or unknown producers. Third, index calculation does not need unavailable price data. The fourth is productivity index can be separated to be two components which are efficiency and technology change, it is very useful as the analysis can be done more specific based on component.

Meanwhile, the disadvantages of Malmquist Index are; first, it is specific. Second it is *extreme point technique*, the false in measuring can affect a fatal error. Third it is only measure relative to productivity from economic activities without absolute productivity. Fourth hypothesis test in statistic based on result is difficult to be done.

### 3. RESEARCH METHODS

#### 3.1. Source and Technique of Data Collecting

Data source obtained from Bank Indonesia's (BI) website report as the institution which published Bank Muamalat Indonesia's (BMI) financial data during 2011-2015 period, including the literature and documents which regarding productivity. Technique of data collecting which is used in this study is desk research that also known as literature study. In the desk research, researcher gain data by using BMI's financial report with visiting BI's website. In addition, with this technique, data also can obtain by reading from various sources; books, journals and other scientific papers regarding productivity.

#### 3.2. Input-Output Identification

Productivity measurement in this study used the total factor productivity method of Malmquist Index to describe total output change which produced toward overall input that used. Table 2 showed input-output variable in this study:

**Table 2**  
**Input-Output Variable**

| <i>Method</i>   | <i>Input</i>  | <i>Output</i>                    |
|-----------------|---|----------------------------------|
| Malmquist Index | Total Saving<br>Capital<br>Operating Cost<br>Labor Cost | Split Income<br>Servicing Income |

Total saving ( $X_1$ ) is the total of current account that added with number of saving and its deposit number. Capital ( $X_2$ ) is financial assets or the financial value of assets, such as funds held in deposit accounts, as well as the tangible machinery and production equipment used in environments such as factories and other manufacturing facilities. Operating Cost ( $X_3$ ) is a cost which unrelated directly to company's product but it related with daily company's operating activities. Labor Cost ( $X_4$ ) is price that burdened for utilizing the human resources. Split Income ( $Y_1$ ) is all banks' income which as the result of payment product (*Mudharabah* and *Musyarakah*). Service Income ( $Y_2$ ) is all banks' income which as the result of service product (*Murabahab*, *Ijarah* and others).

### 3.3. Data Analysis Method

This study used quantitative analysis method which is in processing input and output data which used from finance balance sheet and income statement. This analysis uses Malmquist Index as productivity method which standardized as measurement method of unit activity performance. The Malmquist index uses software DEAP 2.1.

Productivity measurement method with Total Factor Productivity - Malmquist Index (TFPMI) is intended to show the change of banking productivity level especially for BMI during 2011-2015. Malmquist Index is defined by using distance function allowed multi-input and output utilization without involving explicit price information.

Total Factor Productivity Malmquist Indeks (TFPMI) calculation is formulated with

$$m_{i(y_{t+1}, x_{t+1}, \bar{y}_t, \bar{x}_t)} = \left[ \frac{d_i^{t+1}(y_{t+1}, x_{t+1})}{d_i^t(y_t, \bar{x}_t)} \right] \left[ \frac{d_i^t(y_{t+1}, x_{t+1})}{d_i^{t+1}(y_{t+1}, x_{t+1})} \times \frac{d_i^t(y_t, x_t)}{d_i^{t+1}(y_t, x_t)} \right]^{\frac{1}{2}} \quad (1)$$

(x,y) is distance function of input. The ratio in the first parenthesis is technical efficiency change (EFFCH) between t and t+1, while ratio in the second parenthesis is technology change (TECHCH), thus is can be formulated as:

$$\text{Technical Efficiency Change (EFFCH)} = \left[ \frac{d_i^{t+1}(y_{t+1}, x_{t+1})}{d_i^t(y_t, \bar{x}_t)} \right] \quad (2)$$

$$\text{Technology Change (TECHCH)} = \left[ \frac{d_i^t(y_{t+1}, x_{t+1})}{d_i^{t+1}(y_{t+1}, x_{t+1})} \times \frac{d_i^t(y_t, x_t)}{d_i^{t+1}(y_t, x_t)} \right]^{\frac{1}{2}} \quad (3)$$

Technical efficiency change (EFFCH) concept to describe the ability of company to get maximum output from input component. Afterwards, EFFCH can be defined into pure technical efficiency and scale efficiency. Pure technical efficiency measures management's ability in maximizing the output. Meanwhile, scale efficiency measures whether a unit decision has maximum operated and it could be showed by > 1, < 1 or = 1 which

referenced whether company in improvement, stagnant condition (no changes) or slump performance.

Pure technical efficiency change (PEFFCH) is formulated as:

$$\left[ \frac{d_i^{t+1}(y_{t+1}, x_{t+1})}{d_i^t(y_t, x_t)} \right] \quad (4)$$

Scale efficiency (SEFFCH) is formulated as = EFFCH/PEFFCH (5)

The change of this concept shows the ability of company in using maximal technology. Measuring how much the limit change and its result, whether the company conducted the best performance thus there is an improvement, stagnant condition (no change) or slump performance. All can be showed with > 1, < 1 or = 1 that referenced that whether the technology change is positive, negative or neutral (stable condition).

Efficiency change index value can be more than one, which is showed efficiency level is jump, similar with one, its mean there is no change in efficiency, and less than one which showed a decline in efficiency between t and t+1 period.

This score shows how far a company's position toward production frontier. Similar to efficiency change, technological change score can be bigger as well, equal, less than one show whether frontier moved increased, fixed, or decreased. The shifting of frontier indicated there is technological increase, equal to one or it means there is no change in technology, and less than one indicated there is technology decline between t and t+1 period.

TFP value is multiple between EFFCH and TECHCH index the score can be bigger as well, similar or less than one. Therefore, TFP can be formulated as:

$$\text{TFP} = \text{EFFCH} \times \text{TECHCH} \quad (6)$$

## 4. ANALYSIS AND DISCUSSION

### 4.1. General Analysis in Bank Muamalat Indonesia Productivity Level

In this approach, we measured Bank Muamalat Indonesia (BMI) productivity level during 2011 to 2015 by using

intermediation approach. Table 3 shows the annual average of productivity index:

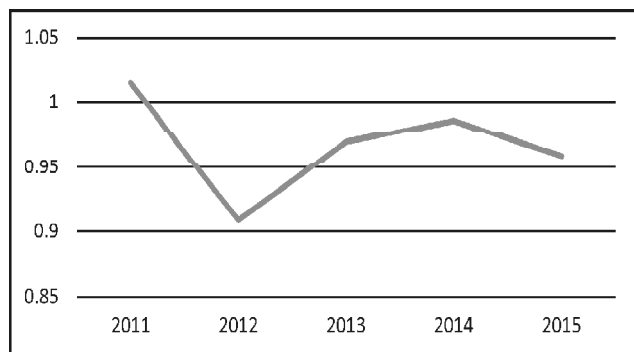
**Table 3**  
**The Average of Productivity Level Bank Muamalat Indonesia in 2011-2015**

|               | 2011  | 2012  | 2013  | 2014  | 2015  | Annual Average |
|---------------|-------|-------|-------|-------|-------|----------------|
| TFPCH average | 1.015 | 0.909 | 0.970 | 0.986 | 0.959 | 0.968          |

Source: Data Processed

Based on table 3, the average of BMI's productivity level in 2011 gained 1.015 or BMI's TFP change average increased at 0.015. The average of BMI productivity level in 2012 declined from previous year at 0.909. Thus, in 2012, BMI TFP average declined at 0.091. Despite of increased from previous year, The average of BMI productivity level in 2013 is declined to 0.970 or BMI TFP change average declined at 0,030. The average of BMI productivity level in 2014 increased at 0.016 to 0.986 and the average of BMI productivity level in 2015 decreased in 2015 at 0.027 from the previous year to 0.959. Therefore, the average of BMI productivity level tend to be fluctuating every year. In spite of fluctuation, the average of BMI productivity level is not in a good condition, because TFP change < 1 or 0.968, thus it showed that BMI productivity level performance declined.

Graph 1 showed the average of productivity level in 2011-2015:



**Graph 1: The Average of Productivity Level at Bank Muamalat Indonesia during 2011 - 2015**

Source: Data Processed

## 4.2. Bank Mumalat Indonesia Productivity Level per Year

### 4.2.1. Bank Muamalat Indonesia Productivity Level in 2011

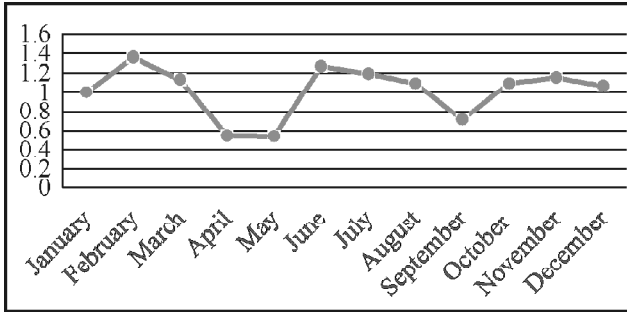
**Table 4**  
**Bank Muamalat Indonesia Productivity Level in 2011**

| Period    | EFFCH    | TECHCH | PECH  | SECH     | TFPCH |
|-----------|----------|--------|-------|----------|-------|
| January   | 1.000    | 1.000  | 1.000 | 1.000    | 1.000 |
| February  | 1.000    | 1.359  | 1.000 | 1.000    | 1.359 |
| March     | 1.000    | 1.134  | 1.000 | 1.000    | 1.134 |
| April     | 1.000    | 0.549  | 1.000 | 1.000    | 0.549 |
| May       | 1.000    | 0.544  | 1.000 | 1.000    | 0.544 |
| June      | 0.990    | 1.282  | 1.000 | 0.990    | 1.268 |
| July      | 1.011    | 1.182  | 1.000 | 1.011    | 1.194 |
| August    | 1.000    | 1.095  | 1.000 | 1.000    | 1.095 |
| September | 1.000    | 0.713  | 1.000 | 1.000    | 0.713 |
| October   | 1.000    | 1.095  | 1.000 | 1.000    | 1.095 |
| November  | 1.000    | 1.155  | 1.000 | 1.000    | 1.155 |
| December  | 1.000    | 1.070  | 1.000 | 1.000    | 1.070 |
| Average   | 1.000083 | 1.015  | 1.000 | 1.000083 | 1.015 |

Source: Data Processed

The table 4 showed that the highest TFP change was gained in February at 1.359 while the lowest at 0.544 in May 2011. The increasing of TFP change in February was caused by increasing of efficiency change (EFFCH) at 1.000 and technological change (TECHCH) at 1.359. Meanwhile the TFP change decline in May 2011 was caused by declining in TECHCH at 0.544.

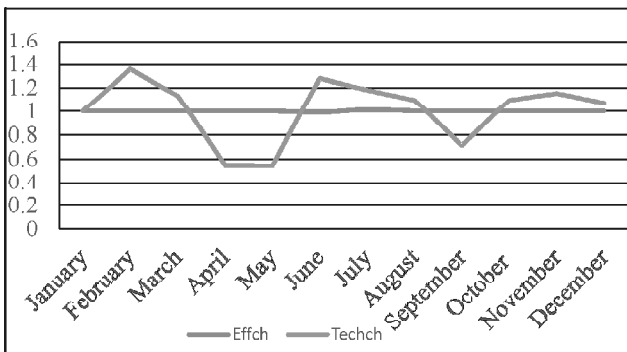
The table 4 showed the increasing of TECHCH at 1.359 in February 2011 as well and it was caused by increasing capital at Rp 1,832 billion in the month and the decline techch in May at 0.544 was caused by increasing of operating cost at Rp 228 billion in the month. In 2011, there are several the declines of TFP change (<1) in April at 0.549, in May at 0.544 and in September at 0.731 while in the other months there are the increase of TFP change (>1). Graph 2 showed the movement of productivity level during 2011:



**Graph 2: Productivity Level of Bank Muamalat Indonesia in 2011**

Source: Data Processed

Graph 3 showed the movement of productivity level and its EFFCH and TECHCH change movement during 2011:



**Graph 3: The Comparison of Efficiency Change and Technological Change of Bank Muamalat Indonesia in 2011**

Source: Data Processed

**4.2.2. Bank Muamalat Indonesia Productivity Level in 2012**

**Tabel 5**

**Bank Muamalat Indonesi Productivity Level in 2012**

| Period   | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|----------|-------|--------|-------|-------|-------|
| January  | 1.000 | 0.641  | 1.000 | 1.000 | 0.641 |
| February | 1.000 | 1.052  | 1.000 | 1.000 | 1.052 |
| March    | 0.981 | 1.007  | 1.000 | 0.981 | 0.988 |
| April    | 1.006 | 1.103  | 1.000 | 1.006 | 1.110 |
| May      | 0.988 | 0.623  | 1.000 | 0.988 | 0.615 |
| June     | 1.025 | 1.363  | 1.000 | 1.025 | 1.398 |
| July     | 1.000 | 0.733  | 1.000 | 1.000 | 0.733 |

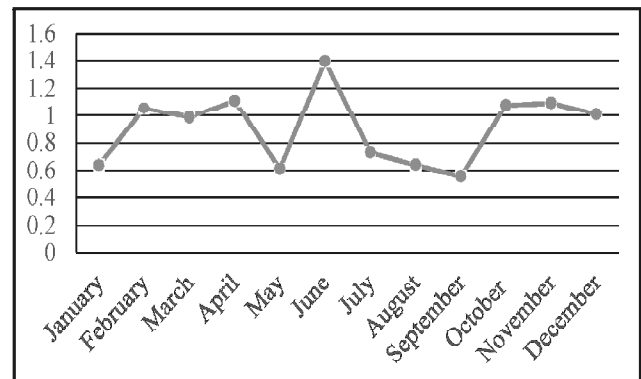
contd. table 5

| Period    | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|-----------|-------|--------|-------|-------|-------|
| August    | 0.996 | 0.645  | 1.000 | 0.996 | 0.642 |
| September | 1.004 | 0.555  | 1.000 | 1.004 | 0.558 |
| October   | 0.988 | 1.089  | 1.000 | 0.988 | 1.077 |
| November  | 1.012 | 1.081  | 1.000 | 1.012 | 1.093 |
| December  | 1.000 | 1.012  | 1.000 | 1.000 | 1.012 |
| Average   | 1.000 | 0.909  | 1.000 | 1.000 | 0.909 |

Source: Data Processed

Table 5 showed that the highest TFP change gained in June at 1.398 while the lowest at 0.558 in September 2012. The increasing of TFP change in June was caused by the increasing of EFFCH at 1.025 and TECHCH at 1.363. Meanwhile the TFP change decline in September because of the declining in TECHCH at 0.555. The table 5 also showed the increase of TECHCH at 1.025 and EFFCH at Rp 1.363 in June because the capital increase at Rp 1,832 billion and total saving at Rp 28,229 billion and the decline of TECHCH in September at 0.555 because of the increasing of operating cost at Rp 491 billion in the month.

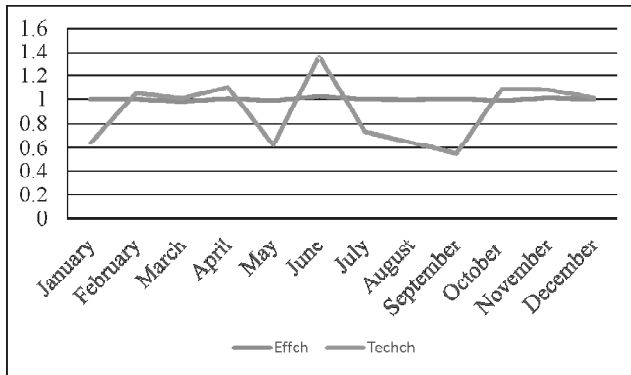
In 2012, there are several the declines of TFP change (<1) in January at 0.641, in March at 0.988, in May at 0,615, in July at 0.733, in August at 0.642 and in September at 0.558, on the other months there are the increase of TFPch (>1). Graph 4 showed the movement of productivity level and its EFFCH and TECHCH change movement during 2012:



**Graph 4: Productivity Level of Bank Muamalat Indonesia in 2012**

Source: Data Processed

Graph 5 showed the movement of productivity level and its effch and techch change movement during 2012:



Graph 5: The Comparison of Efficiency Change and Technological Change of Bank Muamalat Indonesia in 2012

Source: Data Processed

4.2.3. Bank Muamalat Indonesia Productivity Level

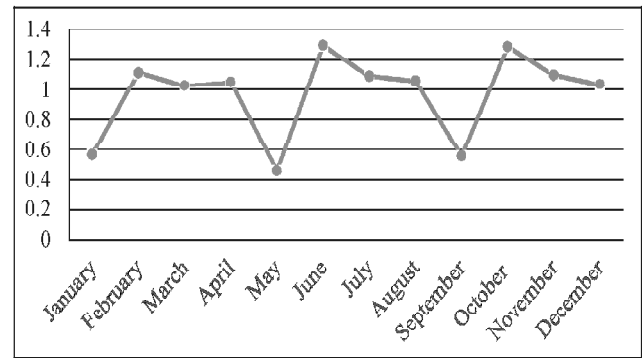
Tabel 6  
Bank Muamalat Indonesia Productivity Level in 2013

| Period    | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|-----------|-------|--------|-------|-------|-------|
| January   | 0.976 | 0.583  | 1.000 | 0.976 | 0.568 |
| February  | 1.025 | 1.087  | 1.000 | 1.025 | 1.114 |
| March     | 1.000 | 1.027  | 1.000 | 1.000 | 1.027 |
| April     | 1.000 | 1.051  | 1.000 | 1.000 | 1.051 |
| May       | 0.902 | 0.512  | 1.000 | 0.902 | 0.461 |
| June      | 1.108 | 1.167  | 1.000 | 1.108 | 1.294 |
| July      | 0.985 | 1.108  | 1.000 | 0.985 | 1.092 |
| August    | 1.015 | 1.043  | 1.000 | 1.015 | 1.059 |
| September | 0.941 | 0.592  | 1.000 | 0.941 | 0.558 |
| October   | 1.062 | 1.211  | 1.000 | 1.062 | 1.286 |
| November  | 1.000 | 1.098  | 1.000 | 1.000 | 1.098 |
| December  | 1.000 | 1.035  | 1.000 | 1.000 | 1.035 |
| Average   | 1.001 | 0.959  | 1.000 | 1.001 | 0.970 |

Source: Data Processed

Table 6 showed that the highest TFP change gained in June at 1.294, while the lowest at 0.461 in May 2013. The increasing of TFP change in June is caused by increasing of EFFCH at 1.108 and techch at 1.167. Meanwhile the TFP change decline in May is caused by declining in EFFCH and TECHCH at 0.902 and 0.512, respectively. The table 6 also showed the increasing of

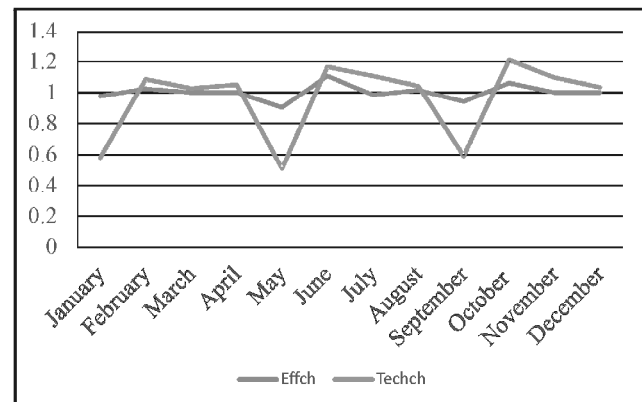
EFFCH at 1.108 and TECHCH at 1.167 in June and it is caused by declining operating cost at Rp 399 billion and increasing capital at Rp 2,744 billion and total saving at Rp 40,780 billion. Meanwhile, the declining of TECHCH in May at 0.512 and EFFCH at 0.902 is caused by increasing of operating cost at 554,491 in the month. In 2013, there are several declines of TFPch (<1) in January at 0.568, in May at 0.461, and in September at 0.558, while in the other months there are the increase of TFPch (>1). Graph 6 showed the movement of productivity level during 2013:



Graph 6: Productivity Level of Bank Muamalat Indonesia in 2013

Source: Data Processed

Graph 7 showed the movement of productivity level and its effch and techch change movement during 2013:



Graph 7: The Comparison of Efficiency Change and Technological Change of Bank Muamalat Indonesia in 2013

Source: Data Processed

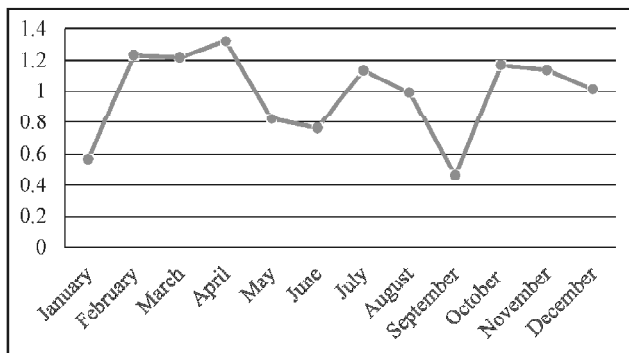
**4.2.4. Bank Muamalat Indonesia Productivity Level in 2014**

**Tabel 7**  
**Bank Muamalat Indonesia Productivity Level in 2014**

| Period    | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|-----------|-------|--------|-------|-------|-------|
| January   | 0.884 | 0.644  | 1.000 | 0.884 | 0.569 |
| February  | 1.086 | 1.134  | 1.000 | 1.086 | 1.231 |
| March     | 1.042 | 1.167  | 1.000 | 1.042 | 1.217 |
| April     | 1.000 | 1.321  | 1.000 | 1.000 | 1.321 |
| May       | 1.000 | 0.820  | 1.000 | 1.000 | 0.820 |
| June      | 0.996 | 0.766  | 1.000 | 0.996 | 0.763 |
| July      | 1.004 | 1.132  | 1.000 | 1.004 | 1.136 |
| August    | 1.000 | 0.991  | 1.000 | 1.000 | 0.991 |
| September | 0.979 | 0.476  | 1.000 | 0.979 | 0.467 |
| October   | 0.981 | 1.192  | 1.000 | 0.981 | 1.169 |
| November  | 1.041 | 1.094  | 1.000 | 1.041 | 1.139 |
| December  | 1.000 | 1.013  | 1.000 | 1.000 | 1.013 |
| Average   | 1.001 | 0.979  | 1.000 | 1.001 | 0.986 |

Source: Data Processed

Table 7 showed that the highest TFP change gained in April at 1.321 while the lowest at 0.467 in September 2014. The increasing of TFP change in April caused by the increasing of TECHCH at 1.321. Meanwhile, the TFP change decline in September caused by declining of EFFCH and TECHCH at 0.979 and 0.476, respectively. The table 7 also showed the increasing of TECHCH at 1.321 in April caused by the increasing of capital at Rp 4,606 billion and total saving at Rp 45,960 billion. Meanwhile, the decline of EFFCH in September at 0.979 and TECHCH at 0.476 caused by the increasing of

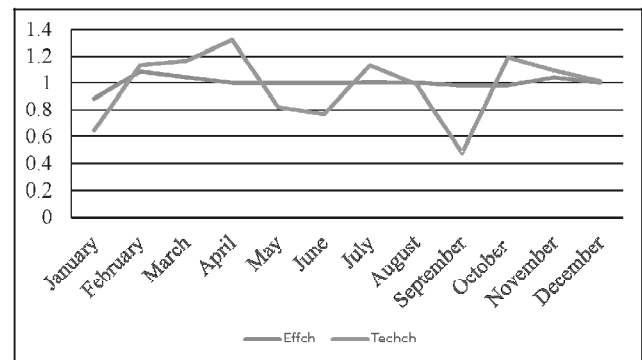


**Graph 8: Productivity Level of Bank Muamalat Indonesia in 2014**

Source: Data Processed

operating cost at Rp 687 billion and the declining of capital at Rp 4,135 billion. In 2014, there are several declines of TFP change (<1) in January at 0.563, in May at 0.820, in June at 0.763, in August at 0.991 and in September at 0.467, while on the other months there are the increase of TFP change (>1). Graph 8 showed the movement of productivity level during 2014:

Graph 9 showed the movement of productivity level and its effch and techch change movement during 2014:



**Graph 9: The Comparison of Efficiency Change and Technological Change of Bank Muamalat Indonesia in 2014**

Source: Data Processed

**4.2.5. Bank Muamalat Indonesia Productivity Level in 2015**

**Table 8**  
**Bank Muamalat Indonesia Productivity Level in 2015**

| Period    | EFFCH   | TECHCH | PECH  | SECH    | TFPCH |
|-----------|---------|--------|-------|---------|-------|
| January   | 0.937   | 0.536  | 1.000 | 0.937   | 0.502 |
| February  | 1.039   | 1.217  | 1.000 | 1.039   | 1.265 |
| March     | 1.026   | 1.077  | 1.000 | 1.026   | 1.106 |
| April     | 1.000   | 1.064  | 1.000 | 1.000   | 1.064 |
| May       | 1.000   | 0.937  | 1.000 | 1.000   | 0.937 |
| June      | 1.000   | 0.989  | 1.000 | 1.000   | 0.989 |
| July      | 1.000   | 1.074  | 1.000 | 1.000   | 1.074 |
| August    | 1.000   | 1.001  | 1.000 | 1.000   | 1.001 |
| September | 1.000   | 0.600  | 1.000 | 1.000   | 0.600 |
| October   | 1.000   | 1.030  | 1.000 | 1.000   | 1.030 |
| November  | 1.000   | 0.928  | 1.000 | 1.000   | 0.928 |
| December  | 1.000   | 1.020  | 1.000 | 1.000   | 1.020 |
| Average   | 1.00017 | 0.956  | 1.000 | 1.00017 | 0.959 |

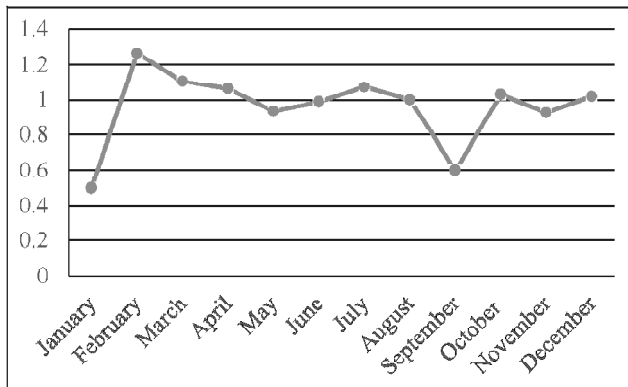
Source: Data Processed



Table 8 showed that the highest TFP change gained in February at 1.265 while the lowest at 0.502 in January 2015. The increase of TFP change in February caused by increasing of EFFCH at 1.039 and TECHCH at 1.217. Meanwhile, the TFP change decline in January caused by declining of EFFCH and TECHCH at 0.937 and 0.536, respectively. Table 8 also showed the increasing of EFFCH at 1.039 and TECHCH at 1.217 in February caused by increasing of capital at Rp 4,058 billion and total saving at Rp 44,600 billion. Meanwhile, decline of EFFCH at 0.937 and TECHCH at 0.536 in January caused by increasing of operating cost at 82,678.

In 2015, there are several declines of TFP change ( $<1$ ) in January at 0.502, in May at 0.937, in June at 0.989, in September at 0.600 and in November at 0.928, while on the other months there are the increase of TFPch ( $>1$ ).

Graph 8 showed the movement of productivity level during 2015:



Graph 10: Productivity Level of Bank Muamalat Indonesia in 2015

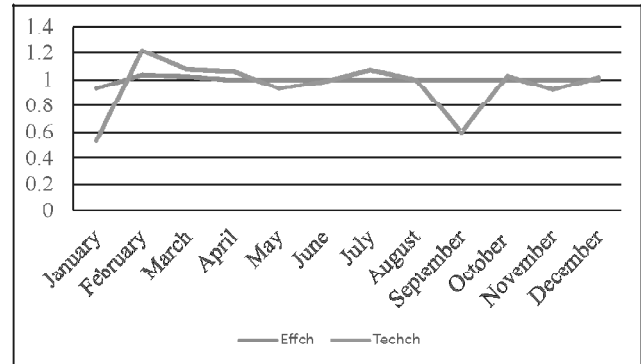
Source: Data Processed

Graph 11 showed the movement of productivity level and its effch and techch change movement during 2015:

## 5. CONCLUSION AND SUGGESTION

### 5.1. Conclusion

The average of Bank Muamalat Indonesia productivity level during 2011-2015 by using intermediation approach tend to fluctuate and decline with the average of Total Factor



Graph 11: The Comparison of Efficiency Change and Technological Change of Bank Muamalat Indonesia in 2015

Source: Data Processed

Productivity (TFPch) at 0.968, the highest productivity at 1.015 in 2011 and the lowest at 0.909 in 2012.

During period of study, Bank Muamalat Indonesia's TFPch continues the fluctuation every year and tend to decline, with the highest of TFPch at 1.398 in June 2012 with EFFCH at 1.025 and TECHCH at 1.363. Meanwhile, the lowest of TFPch at 0.461 in May 2013 with EFFCH at 0.902 and TECHCH at 0.512.

Based on the empirical results, the increasing and decreasing of Bank Muamalat Indonesia TFPch influenced by operating cost, capital and total saving.

### 5.2. Suggestion

1. For Bank Muamalat Indonesia which fluctuated productivity level, BMI should set policy in increasing bank productivity performance or to maintain a good trend, BMI should continue improvement its infrastructure in services, products, network distribution, branch office, electronic channel and others.
2. For further study, it should include various variable to get better formula and also suggested to use other approach method in measuring others TFPch.

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