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No. Pemeriksaan : 2022.03.10.174

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# THE APPLICATIONS OF MULTIPLIER ANALYSES IN ANALYZING THE ROLES OF THE HEALTHCARE SECTOR: THE CASE OF INDONESIA\_turnitin

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**Submission date:** 17-Feb-2022 10:39PM (UTC+0700)

**Submission ID:** 1764652773

**File name:** zing\_the\_roles\_of\_the\_healthcare\_sector\_The\_case\_of\_Indonesia.pdf (238.67K)

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**Character count:** 13683

## THE APPLICATIONS OF MULTIPLIER ANALYSES IN ANALYZING THE ROLES OF THE HEALTHCARE SECTOR: THE CASE OF INDONESIA

U. ZUHDI<sup>1</sup>, I. PRATOMO, N. NASORI, T. HERLAMBANG, AND R. S. PUTRA

**3** **ABSTRACT.** The purpose of this study is to analyze the roles of the healthcare sector in the Indonesian national economy by using simple output and simple household income multipliers, the analysis tools in Input-Output (IO) analysis. The analysis period of the study is 2010. The study uses the 2010 Indonesian IO table as data. The table consists of seventeen industries, and utilizes basic prices. The healthcare sector is represented by human health and social work activities, sector number 16. The results show that the analyzed sector included in the top five sectors on the analysis period from the points of view of both multipliers. This fact indicates that, by using both multipliers, the sector had the important positions in the Indonesian economy in 2010.

### 1. INTRODUCTION

According to [1], health is important for the well-being of individuals and for nurturing inclusive and sustainable growth. The importance of healthcare can be seen on the economic aspect too. Meanwhile, [2] explains that the savings of public spending would be large, approaching 2% of GDP on average in the OECD, by improving the healthcare system efficiency. According to [3], the results of projection show that in most scenarios, the growth of health spending

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2010 Mathematics Subject Classification. 91B66.

Key words and phrases. Healthcare Sector, National Economy, Simple Output Multiplier, Simple Household Income Multiplier.

per capita is expected to be slower than the historical growth, but still above growth in the economy over the next fifteen years.

There are many previous studies in the area of healthcare. For example, [4] analyzes the impacts of birth weight on child health and growth by utilizing information from 66 countries. On the other hand, [5] suggests a new structure to discuss the problems of self-control in the context of life-cycle health and longevity. Meanwhile, the insight on the education policies ability to influence youth substance use by providing the first assessment of the impacts of state alcohol, tobacco, and other drug education requirements is provided by [6]. Besides, by using the novel longitudinal data from 19 monthly waves of the Singapore Life Panel, the examination of the short-term dynamics of the impacts health shocks have on household health and nonhealth spending and income by the elderly is conducted by [7].

The topic of the roles of the healthcare sector in the national economy of specific country, however, is not discussed by the mentioned previous studies. In other words, the research focuses on the analysis of healthcare sector of particular country from the point of view of macroeconomics is still limited from the mentioned previous studies. The research is needed in order to obtain the characteristics of the sector so the suggestions for improving the national economy of the analyzed country through the industry can be made properly. The current study is conducted in fulfilling the gap.

The purpose of the study is to analyze the roles of the healthcare sector in the Indonesian economy. The period of analysis of the study is 2010. The study uses the Input-Output (IO) analysis as an analysis device. More specifically, the study employs simple output and simple household income multipliers in the process of analysis. Both multipliers are suitable instruments in explaining the roles.

The next chapters of this paper are described as follows. Section 2 scientifically describes the methodology of the study. Section 3 explains the results of calculations. The results analysis is also done on the section. The next section, section 4, shows the conclusions of the study, and suggestions for the future researches.

## 2. METHODOLOGY

This part scientifically describes the methodology of the current study. The first step of the methodology is to explain the data used. The study utilizes the 2010 Indonesian IO table as data. The source of the table is [8]. The table consists of seventeen industrial sectors, and employs basic prices. The second step is to show the Indonesian industries used in this study. Table 1 describes those industries. The healthcare sector is represented by the sector number 16, human health and social work activities.

Sector Number	Sector Name
1	Agriculture, forestry, and fishing
2	Mining and quarrying
3	Manufacturing
4	Electricity and gas
5	Water supply, sewerage, waste management, and remediation activities
6	Construction
7	Wholesale and retail trade; repair of motor vehicles and motorcycles
8	Transportation and storage
9	Accommodation and food service activities
10	Information and communication
11	Financial and insurance activities
12	Real estate activities
13	Business activities
14	Public administration and defence; compulsory social security
15	Education
16	Human health and social work activities
17	Other services activities

TABLE 1. Indonesian industrial sectors used in this study (Source: [9])

The third step is to conduct the calculations by using simple output and simple household income multipliers. These multipliers are parts of IO analysis. The

equations of both multipliers are explained by [10] as follows:

$$m(o)_j = \sum_{i=1}^n l_{ij},$$

$$m(h)_j = \sum_{i=1}^n a_{n+1,i} l_{ij}.$$

The former equation shows the simple output multiplier while the latter one explains the simple household income multiplier. More specifically,  $m(o)_j$ ,  $m(h)_j$ ,  $a_{n+1,i}$ ,  $n$ , and  $l_{ij}$  are the multiplier of simple output for sector  $j$ , the multiplier of simple household income for sector  $j$ , the coefficients of labor-input, the number of analyzed economic sectors, and a matrix of sector-to-sector multipliers, respectively. According to [10], an output multiplier for sector  $j$  is the total value of production in all industries of the economy that is required in order to fulfill a currency's worth of final demand for the output of sector  $j$ . Furthermore, [10] describes that, in the case of the multiplier of simple output, the total value of production is coming from the model of household exogenous. On the other hand, [10] argues that the multiplier of simple household income is applied to explain the economic effects of a new final demand as calculated by the new household income by utilizing the household exogenous model. The next step is to analyze the roles of the healthcare sector in the Indonesian economy on the analysis period. Conclusions of the study, and suggestions for further researches are described on the final step.

### 3. RESULTS AND DISCUSSION

Table 2 describes the top five Indonesian industries viewed from the values of the multiplier of simple output. Human health and social work activities sector includes in those industries. The value of the simple output multiplier of the sector is 2.071. The value indicates that in order to satisfy a rupiah's worth of final demand for the sector's output, all Indonesian industries need to produce the products which the total value is Rp2.071. Meanwhile, the highest simple output multiplier value on the analysis period was owned by electricity and gas. The value was 2.889 in 2010. One can say that, based on the results, an additional final demand for the sector would give attractive effects to the economy of Indonesia on the period of analysis. Figure 1 shows the simple

output multiplier values of all Indonesian economic sectors in 2010. On the analysis period, the lowest value was owned by <sup>12</sup> water supply, sewerage, waste management, and remediation activities sector. Meanwhile, the simple output multiplier value of information and communication sector, sector number 10, was 1.695 on the analysis period. This value is below the average value. The same phenomenon can be seen on the sector number 11, financial and insurance activities. On the other hand, table 3 explains the top five Indonesian industries viewed from the values of the multiplier of simple household income in 2010. As with the previous multiplier, human health and social work activities sector includes in those sectors. The simple household income multiplier value of the sector was 0.377 in 2010. The value describes that, on the period of analysis, an additional rupiah of final demand for the sector would generate Rp0.377 of new household income, when all direct and indirect impacts were changed into rupiah estimates of income. The highest value of the multiplier in 2010 was owned by <sup>17</sup> public administration and defence; compulsory social security sector. The value was 0.665 on the analysis period. Based on the results, one can argue that both sectors gave attractive effects to the Indonesian national economy on the analysis period.

No.	Sector no.	Sector Name	Simple output multiplier
1	4	Electricity and gas	2.889
2	6	Construction	2.300
3	8	Transportation and storage	2.184
4	3	Manufacturing	2.150
5	16	Human health and social work activities	2.071

TABLE 2. Top five Indonesian industrial sectors viewed from the values of simple output multiplier, 2010 (Source: [11])

Figure 2 explains the values of simple household income multiplier of all Indonesian industries in 2010. Based on the information in the figure, the lowest value on the analysis period was owned by the sector number 12, real estate activities. Meanwhile, the value of information and communication sector on the analysis period was 0.289, below the average value. As with the previous

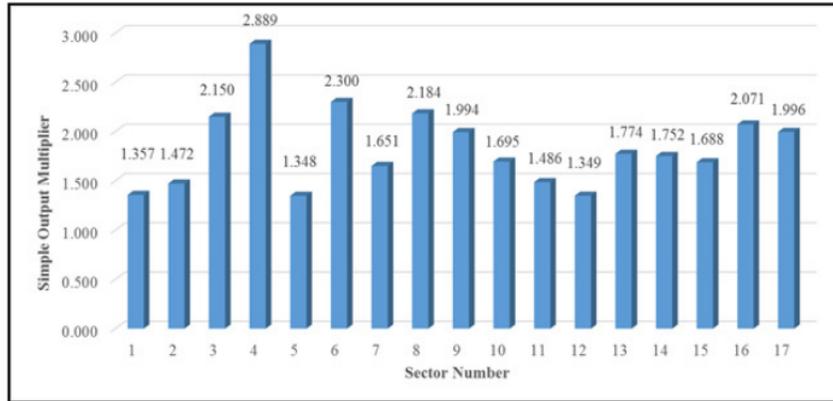


FIGURE 1. The values of simple output multiplier of Indonesian industrial sectors, 2010 (Source: [11])

multiplier, in 2010, the simple household income multiplier value of financial and insurance activities sector was below the average one.

No.	Sector no.	Sector name	Simple household income multiplier
1	14	Public administration and defence; compulsory social security	0.665
2	15	Education	0.642
3	17	Other services activities	0.480
4	16	Human health and social work activities	0.377
5	8	Transportation and storage	0.322

TABLE 3. Top five Indonesian industrial sectors viewed from the values of simple household income multiplier, 2010 (Source: [11] with the slight modifications)

The calculation results of both multipliers describe that the analyzed sector included in the top five sectors in 2010. This fact indicates that the sector had the important positions in the national economy of Indonesia on the period of analysis. The activists of healthcare in Indonesia can use the results as a base

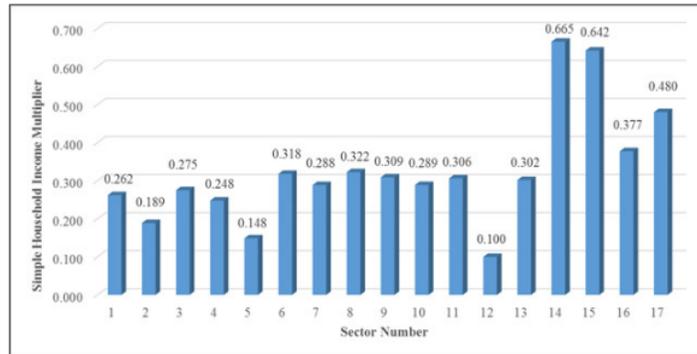


FIGURE 2. The values of simple household income multiplier of Indonesian industrial sectors, 2010 (Source: [11])

in making strategic actions for improving the sector. Besides, the Indonesian government can use the fact as an input in deciding the direction of government movement, especially the determination of prioritized industries.

#### 4. CONCLUSIONS AND FURTHER RESEARCHES

This study analyzes the roles of the healthcare sector in the national economy of Indonesia in 2010. The study uses IO analysis as an analysis device. More specifically, the study employs simple output and simple household income multipliers in the analysis process. The study focuses on the seventeen industrial sectors. The healthcare sector is represented by the sector number 16, human health and social work activities. The results show that, by using both multipliers, the analyzed sector included in the top five sectors on the analysis period. More specifically, in 2010, by using the simple output multiplier, the sector grabbed the fifth position while the fourth position was owned by the sector from the point of view of simple household income multiplier. Based on the results, one can say that the sector had the important positions on the period of analysis. The activists of healthcare, and government of Indonesia can use the results in determining the direction of movement to make improvements for the Indonesian healthcare sector. The understanding regarding the roles of the healthcare sector in the Indonesian national economy on the analysis period is obtained from the current study. However, the study

utilizes the aggregated economic sectors. In other words, the opportunity to conduct the deeper analysis regarding the sector is still available especially in exploring the derivative healthcare sectors. Therefore, as a further research, the study proposes the same methodology by using the disaggregated Indonesian IO table. The other suggested further study from the current research is to conduct an international comparison on the same research topic. The comparison can be focused on developed-developed, developed-developing, or developing-developing countries. The comparison might explore the characteristics of the healthcare sector of compared countries so the similarities and differences regarding the industry in discussed countries can be analyzed. One example is the comparison between Indonesia and Philippines.

15

## ACKNOWLEDGMENT

The authors would like to thank University of Nahdlatul Ulama Surabaya for providing research funding.

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