The impacts of final demands changes on the total outputs of Japanese industrial sectors: A further study

Ubaidillah Zuhdi
Faculty of Management and Economics, Gdansk University of Technology, Gdansk 80-233, Poland
zuhdi@zie.pg.gda.pl

Abstract. The purpose of the current study is to expand the previous studies which analyze the impacts of final demands changes on the total outputs of industrial sectors of a specific country. More specifically, the study conducts the analysis regarding the impacts on the total outputs of Japanese industries. The study employs a demand-pull Input-Output (IO) quantity model, one of the calculation tools in the IO analysis. The study focuses on thirteen industries. There are two scenarios used in this study, namely exports and imports modifications. The “whole sector change” condition is considered in the calculations. An initial period in this study is 2011. The results show that the positive impacts on the total outputs of focused sectors are delivered by scenario 1, the change of exports. On the contrary, the negative impacts are distributed by scenario 2, the modification of imports. The suggestions for improving the total outputs of discussed sectors are based on the results.

1. Introduction
Industrial sectors have an important role in the economic activities of one country. The importance can be seen on the macro and micro scopes. Therefore, an analysis of industries cannot be separated from the exploration of economic situations of one or several countries. Further, the proposals for improving the economic conditions of focused countries might be generated from the analysis.

The examples of previous studies which focus on the analysis are [1], [2], [3], [4], [5], and [6]. These previous studies investigate the impacts of final demands changes on the total outputs of industrial sectors of analyzed countries. The previous studies, however, only focus on the specific industries. In other words, the study focuses on examining the impacts on the whole sector of particular countries is still needed. This examination is required in order to know the responds of industries when the final demands changes appear so the suggestions for improving the sectors can be made properly. The current study is performed in order to fulfill the gap.

The purpose of the study is to expand the previous studies which analyze the impacts of final demands modifications on the total outputs of industries of a specific country. More specifically, the study aims to conduct a further investigation regarding the impacts by using the new data as well as new approach, namely to analyze all industrial sectors. The study focuses on the case of Japan, and employs the Input-Output (IO) analysis as an analysis instrument.

2. Methodology
The methodology of the current study refers to the previous studies which were conducted, for example, by [1] and [2]. The first step of the methodology is to expose the data source. The data source of this study is the 2011 Japanese IO table. The table is obtained from [7]. The second step is to describe the industrial sectors of Japan used in this study. Table 1 shows the industries. The table consists of thirteen industrial sectors.
Table 1. Japanese industrial sectors used in this study.

| Sector Number | Sector Name                           |
|---------------|---------------------------------------|
| 1             | Agriculture, forestry, and fishery    |
| 2             | Mining                                |
| 3             | Manufacturing                         |
| 4             | Construction                          |
| 5             | Electricity, gas, and water supply     |
| 6             | Commerce                              |
| 7             | Finance and insurance                 |
| 8             | Real estate                           |
| 9             | Transport and postal services         |
| 10            | Information and communications        |
| 11            | Public administration                 |
| 12            | Services                              |
| 13            | Activities not elsewhere classified   |

The third step is to conduct the calculations in order to identify the impacts of final demands changes on the total outputs of discussed industries. A demand-pull IO quantity model, one of the calculation tools in the IO analysis, is employed in the calculations. [8] expose that the following equation is a representation of the model:

\[
x^1 = L^0 f^1
\]  

(1)

where \(x\), \(L\), and \(f\) are the matrices of the total outputs of industries, the Leontief inverse, and the final demands of industries, respectively. 0 and 1 explain initial and future periods, respectively. An initial period in this study is 2011. The scenarios of final demand modification are described in table 2. There are two scenarios used in this study, namely exports and imports modifications.

The condition of “whole sector change” is considered in the calculations. In this condition, the change on each scenario is addressed to all Japanese industries. The analysis regarding the impacts is done on the next step. Conclusions of this study, and suggestions for further researches are described on the final step.

Table 2. The scenarios of final demand modification used in this study.

| The component of the final demand | Scenario          |  |  |
|----------------------------------|-------------------|---|---|
|                                  | 1 Exports         | 2 Imports        |
| Exports modification             | Increase 30%       | Constant         |
| Import                           | Constant           | Increase 30%     |
3. Results and analysis

Table 3 describes the total outputs of analyzed sectors for each scenario. Figures 1-13 explain in more details the dynamics of the total outputs of focused sectors for each scenario. Based on the information in the tables and figures, the positive impacts on the total outputs of analyzed sectors are given by scenario 1, the modification of exports. On the contrary, the negative impacts are distributed by scenario 2, the change of imports.

The suggestions for improving the total outputs of discussed sectors are based on above results. One can say that the Japanese government should reinforce the activities of national economy so Japanese industries have a stimulus in producing more outputs. One of the actions that the Japanese government can conduct is to increase the exports targets. On the contrary, they should set carefully the rate of imports.

Table 3. The total outputs of analyzed sectors for each scenario (100 million Yen).

| Sector Number | Sector Name                                      | \( X_t, t = 2011 \) | \( X_{t+1} \), Scenario 1 | \( X_{t+1} \), Scenario 2 |
|---------------|-------------------------------------------------|----------------------|---------------------------|---------------------------|
| 1             | Agriculture, forestry, and fishery               | 120,360.00           | 131,012.89                | 101,435.11                |
| 2             | Mining                                          | 7,600.00             | 30,140.90                 | (84,918.00)              |
| 3             | Manufacturing                                    | 2,899,045.00         | 3,230,899.09              | 2,579,848.77             |
| 4             | Construction                                     | 525,145.00           | 528,990.91                | 520,455.86               |
| 5             | Electricity, gas, and water supply               | 257,547.00           | 268,981.06                | 243,309.95               |
| 6             | Commerce                                        | 936,558.00           | 983,963.55                | 906,919.68               |
| 7             | Finance and insurance                           | 320,939.00           | 329,502.58                | 309,384.65               |
| 8             | Real estate                                     | 711,875.00           | 716,714.09                | 706,463.88               |
| 9             | Transport and postal services                    | 482,340.00           | 524,157.06                | 428,526.11               |
| 10            | Information and communications                  | 461,603.00           | 471,273.74                | 449,612.73               |
| 11            | Public administration                            | 394,052.00           | 394,605.77                | 393,319.93               |
| 12            | Services                                        | 2,229,582.00         | 2,276,303.92              | 2,173,435.88             |
| 13            | Activities not elsewhere classified             | 50,103.00            | 52,544.12                 | 46,875.94                |

Figure 1. The dynamics of the total output of the agriculture, forestry, and fishery sector.
Figure 2. The dynamics of the total output of the mining sector.

Figure 3. The dynamics of the total output of the manufacturing sector.

Figure 4. The dynamics of the total output of the construction sector.
**Figure 5.** The dynamics of the total output of the electricity, gas, and water supply sector.

**Figure 6.** The dynamics of the total output of the commerce sector.

**Figure 7.** The dynamics of the total output of the finance and insurance sector.
Figure 8. The dynamics of the total output of the real estate sector.

Figure 9. The dynamics of the total output of the transport and postal services sector.

Figure 10. The dynamics of the total output of the information and communications sector.
**Figure 11.** The dynamics of the total output of the public administration sector.

**Figure 12.** The dynamics of the total output of the services sector.

**Figure 13.** The dynamics of the total output of the activities not elsewhere classified sector.
4. Conclusions and further researches

This study, as a continuation of previous ones, conducts the analysis regarding the impacts of the modifications of demands on the total outputs of Japanese industrial sectors. This study employs a demand-pull IO quantity model, one of the calculation instruments in the IO analysis, as an analysis device. This study focuses on thirteen industries. The “whole sector change” condition is considered in the calculations. In this condition, the modification on each scenario is addressed to all focused industries. An initial period in this study is 2011.

The results show that the positive impacts on the total outputs of focused sectors are delivered by scenario 1, the change of exports. On the contrary, the negative impacts are distributed by scenario 2, the modification of imports. The suggestions for improving the total outputs of discussed sectors are based on the results. One can argue that the Japanese government should push the activities of national economy so Japanese industries have a stimulus in producing more products. One of the push actions that the Japanese government can do is to increase the exports targets. On the contrary, they should stipulate carefully the rate of imports.

The deeper understanding regarding the impacts of the changes of final demands on the total outputs of Japanese industrial sectors is obtained from this study. However, this study focuses on the aggregated industries. In other words, this study is still far in describing the whole view about the impacts on the Japanese national economy. This view is needed in order to know better the conditions of Japanese national economy so the comprehensive policies for increasing those in the future can be made. Therefore, as a further research, this study proposes the same analysis for the disaggregated Japanese industries.

The other suggested further research from this study is to conduct the same analysis on the specific regional area. This analysis might be useful in describing the characteristics of countries in the area in responding the impacts. An interesting example is to conduct the analysis on the ASEAN countries. Besides, the analysis for the EU countries might be another interesting discussion.

References
[1] Zuhdi U 2016 The dynamics of the total output of the fishery sector: the case of Indonesia Journal of Physics: Conference Series 710 012039
[2] Zuhdi U 2016 The dynamics of the total outputs of Japanese information and communication technology sectors: a further study Journal of Physics: Conference Series 710 012041
[3] Zuhdi U 2015 An application of input-output analysis in analyzing the impacts of final demands changes on the total outputs of Japanese energy sectors: a further study Journal of Physics: Conference Series 622 012041
[4] Zuhdi U 2015 An application of multiplier analysis in analyzing the role of information and communication technology sectors on Indonesian national economy: 1990-2005 IOP Conference Series: Earth and Environmental Science 23 012015
[5] Zuhdi U 2015 The dynamics of Indonesian creative industry sectors: an analysis using input-output approach Journal of the Knowledge Economy 6 1177–90
[6] Kramer W J, Jenkins B and Katz R S 2007 The Role of the Information and Communications Technology Sector in Expanding Economic Opportunity [online] http://www.hks.harvard.edu/m-rebg/CSRI/publications/report_22_EO%20ICT%20Final.pdf (accessed 5 January 2016)
[7] Japanese Ministry of Internal Affairs and Communications 2016 2011 Input-Output Tables for Japan [online] http://www.soumu.go.jp/main_content/000443188.pdf (accessed December 30, 2016)
[8] Miller R E and Blair P D 2009 Input-Output Analysis: Foundations and Extensions (Cambridge: University Press)
[9] Zuhdi U, Prasetyo A D and Sianipar C P M 2013 Analyzing the dynamics of total output of Japanese creative industry sectors: an input-output approach Procedia Economics and Finance 5 827–35
[10] Zuhdi U 2012 Analyzing the influence of creative industry sector to the national economic structural changes by decomposition analysis: the case of Indonesia Procedia-Social and Behavioral Sciences 65 980–5
[11] Zuhdi U, Utomo D S and Alamanda D T 2011 Analyzing the role of ICT sector to the national economic structural changes: the case of Indonesia Jurnal Manajemen Teknologi 10 299–307
[12] Zuhdi U, Mori S and Kamegai K 2014 Analysis of influences of GDP and ICT on Indonesian industrial structural changes using statistical analysis: 1990-2005 Journal of Finance and Accountancy 17 1–19
[13] Zuhdi U 2016 The ranks of Indonesian and Japanese indsutrial sectors IOP Conference Series: Earth and Environmental Science 38 012008
[14] Chenery H B and Watanabe T 1958 International comparisons of the structure of productions Econometrica 4 487–521
[15] Nazara S 2005 Input-Output Analysis [in Indonesian] (Jakarta: The Faculty of Economics of University of Indonesia)
[16] Zuhdi U 2014 Analyzing the impacts of final demand changes on total output using input-output approach: the case of Japanese ICT sectors IOP Conference Series: Earth and Environmental Science 19 012016
[17] Zuhdi U 2014 Analyzing the role of creative industries in national economy of Japan: 1995-2005 Open Journal of Applied Sciences 4 197–211
[18] Zuhdi U 2014 An input-output approach to analyze the ways to increase total output of energy sectors: the case of Japan IOP Conference Series: Earth and Environmental Science 19 012015
[19] Zuhdi U 2014 The dynamics of total output of Indonesian information and communication technology sector when final demand changes occur: an analysis using input-output approach Advanced Science Letters 20 2254–57
[20] Zuhdi U 2014 The other perspective related to the role of information and communication technologies sectors in national economy: the case of Japan Advanced Science Letters 20 483–6
[21] Zuhdi U 2014 The role of information and communication technology sectors in Indonesian national economy from 1990 through 2008: an analysis using input-output approach Advanced Science Letters 20 1932–5
[22] Zuhdi U 2014 Using multipliers analysis in order to get another perspective related to the role of ICT sectors in national economy of Indonesia: 1990-2005 Journal of Physics: Conference Series 495 012051
[23] Zuhdi U 2015 An analysis of the role of information and communication technology sectors on Japanese national economy from 1995 through 2005: an application of multiplier analysis IOP Conference Series: Earth and Environmental Science 23 012014
[24] Zuhdi U 2016 The dynamics of the total output of the Japanese fisheries sector: an analysis using input-output approach Journal of Physics: Conference Series 710 012040
[25] Zuhdi U 2016 The Indonesian economy in 2005: an analysis using the input-output approach Proceedings of 20th EBES Conference-Vienna 3 1825–42
[26] Zuhdi U, Mori S and Kamegai K 2012 Analyzing the role of ICT sector to the national economic structural changes by decomposition analysis: the case of Indonesia and Japan Procedia-Social and Behavioral Sciences 65 749–54
[27] Zuhdi U, Mori S and Kamegai K 2013 Analysis of influences of ICT on structural changes in Japanese commerce, business services and office supplies, and personal services sectors using multivariate analysis: 1985-2005 The Asian Journal of Technology Management 6 102–11
[28] Zuhdi U, Mori S and Kamegai K 2014 Statistical analysis of influences of ICT on industrial structure changes from 1985 through 2005: the case of Japan Journal of Computers 9 1291–9
[29] Zuhdi U, Mori S and Kamegai K 2015 Forecasting the influences of information and communication technology on the structural changes of Japanese industrial sectors: a study using statistical analysis International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering 9 531–7
[30] Zuhdi U and Prasetyo A D 2014 Examining the total output changes of ICT sectors of Japan: an approach of input-output Procedia-Social and Behavioral Sciences 109 659–63
[31] Zuhdi U, Prasetyo A D and Putranto N A R 2014 Analyzing the changes of total output of Japanese livestock sector: an input-output approach Procedia-Social and Behavioral Sciences 109 649–53
[32] Zuhdi U, Putranto N A R and Prasetyo A D 2014 An input-output approach to know the dynamics of total output of livestock sectors: the case of Indonesia *Procedia-Social and Behavioral Sciences* **109** 634–8

[33] Zuhdi U, Putranto N A R and Prasetyo A D 2014 Encouraging information and communication technology sectors using input-output approach: the case of Indonesia *Advanced Science Letters* **20** 199–202

[34] Zuhdi U 2014 The impacts of final demand changes on total output of Indonesian ICT sectors: an analysis using input-output approach *IOP Conference Series: Materials Science and Engineering* **58** 012011
