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

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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:

$$\mathbf{x}^1 = \mathbf{L}^0\mathbf{f}^1 \tag{1}$$

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	2
	Exports modification	Imports modification
Exports	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

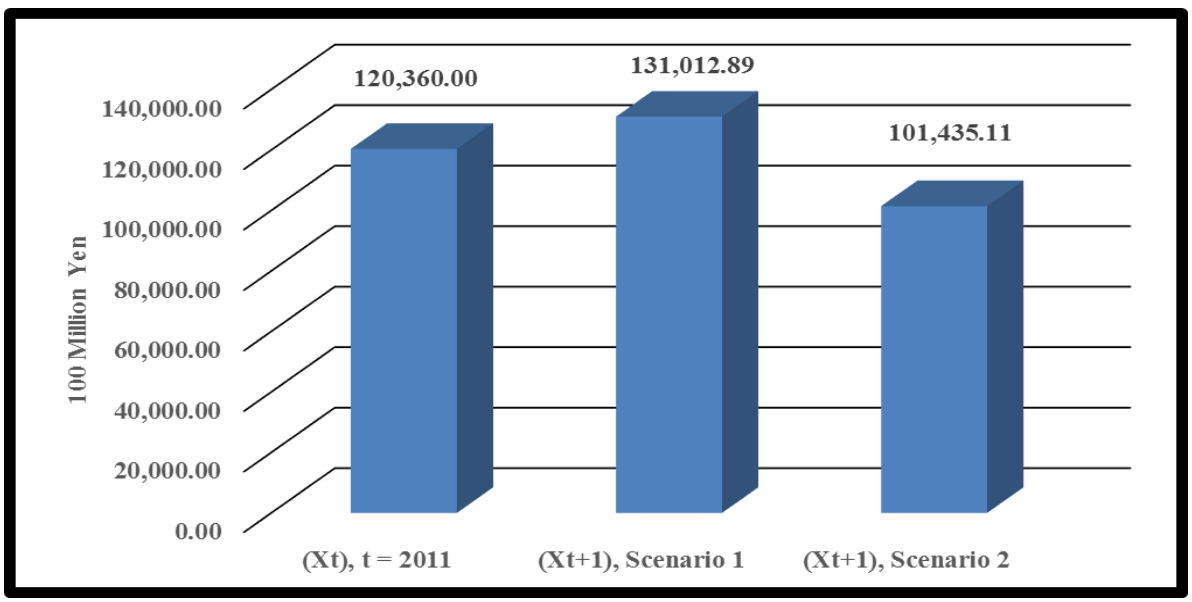

Figure 1. The dynamics of the total output of the agriculture, forestry, and fishery sector.

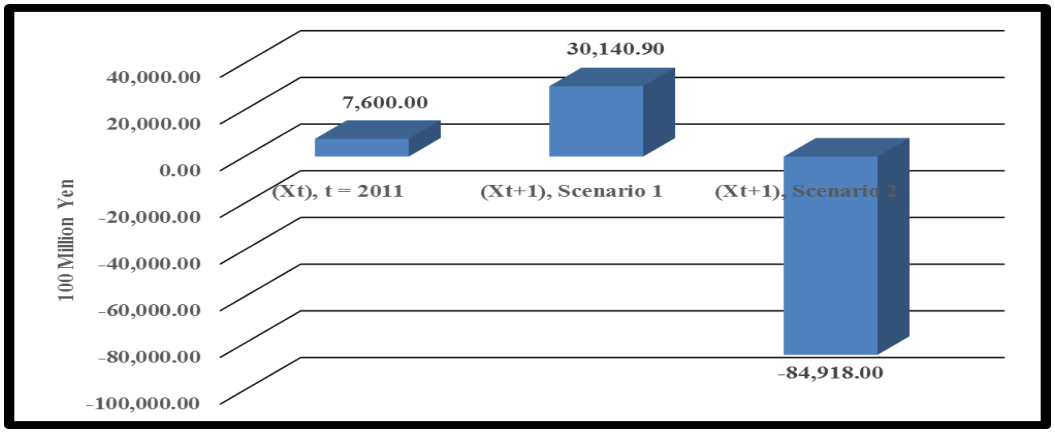

Figure 2. The dynamics of the total output of the mining sector.

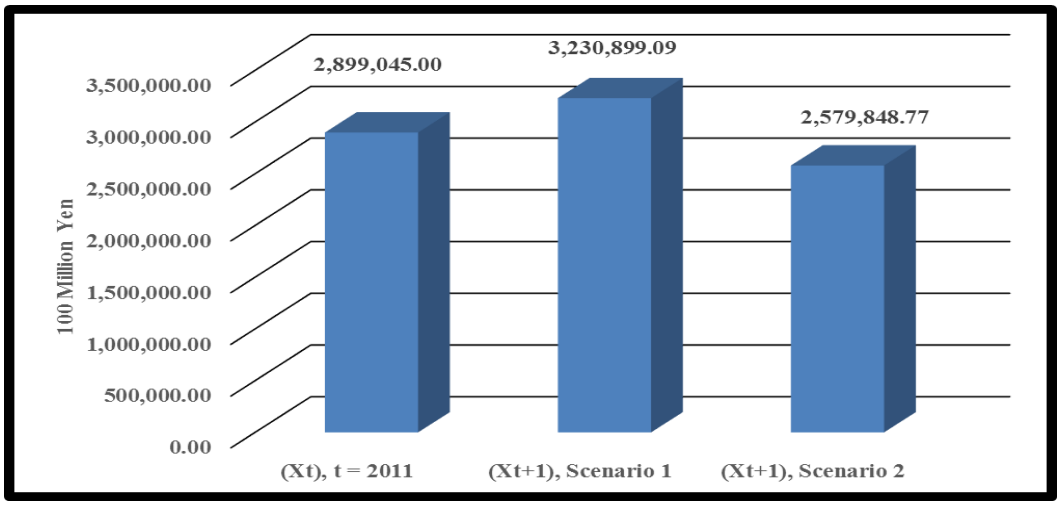

Figure 3. The dynamics of the total output of the manufacturing sector.

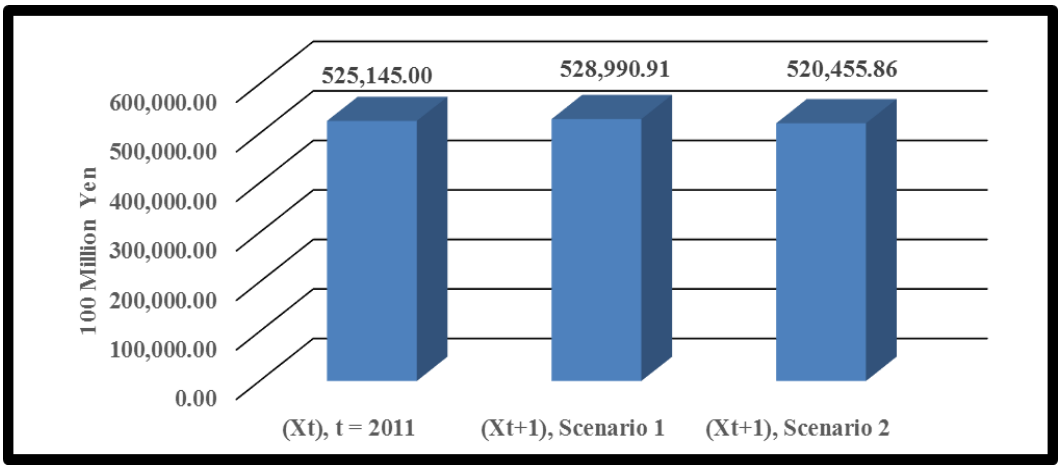

Figure 4. The dynamics of the total output of the construction sector.

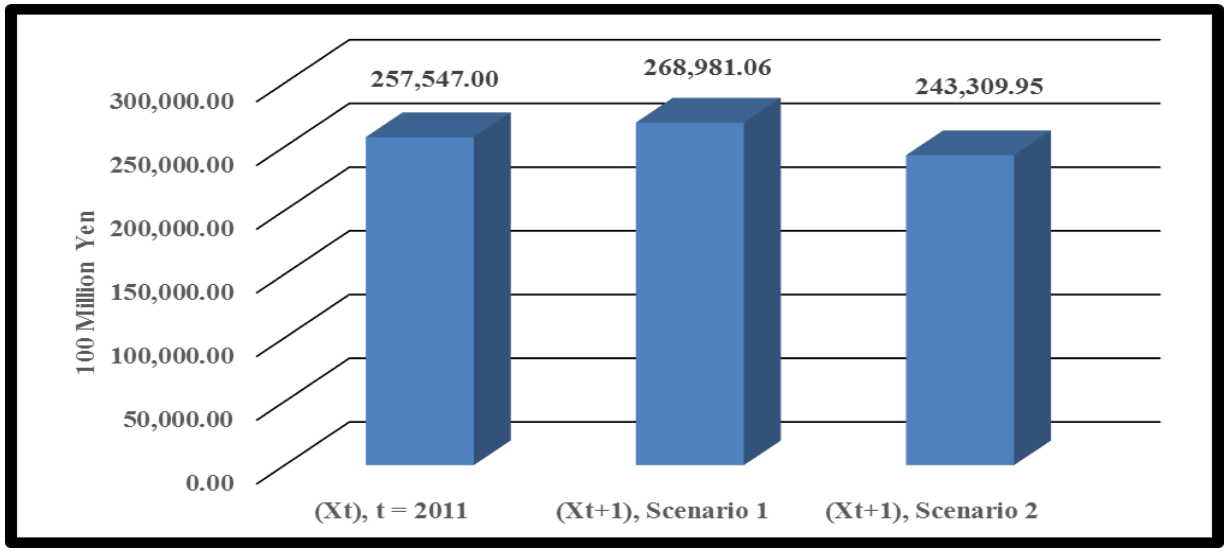

Figure 5. The dynamics of the total output of the electricity, gas, and water supply sector.

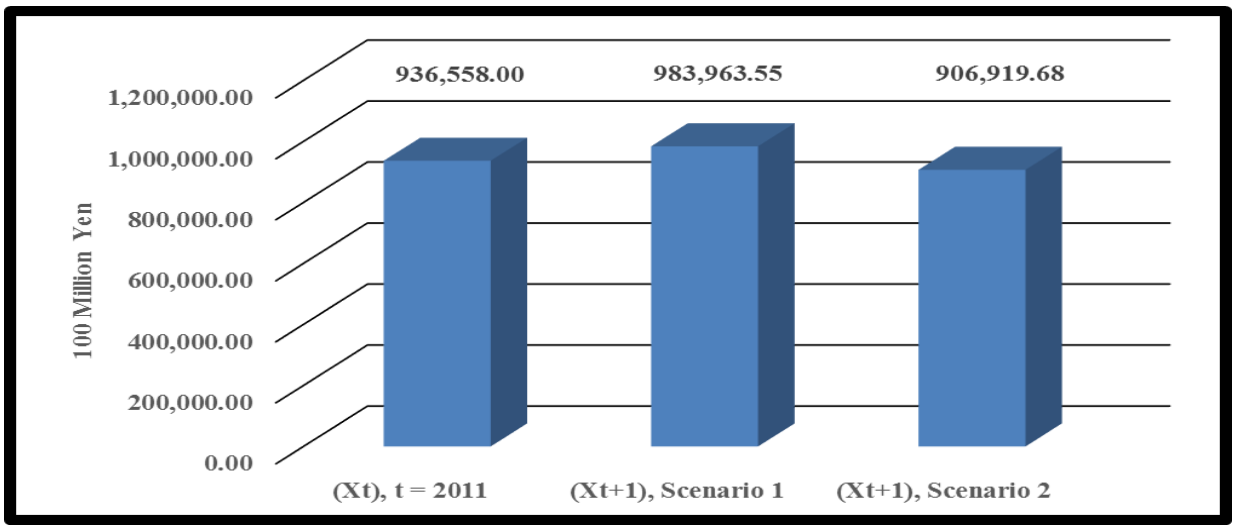

Figure 6. The dynamics of the total output of the commerce sector.

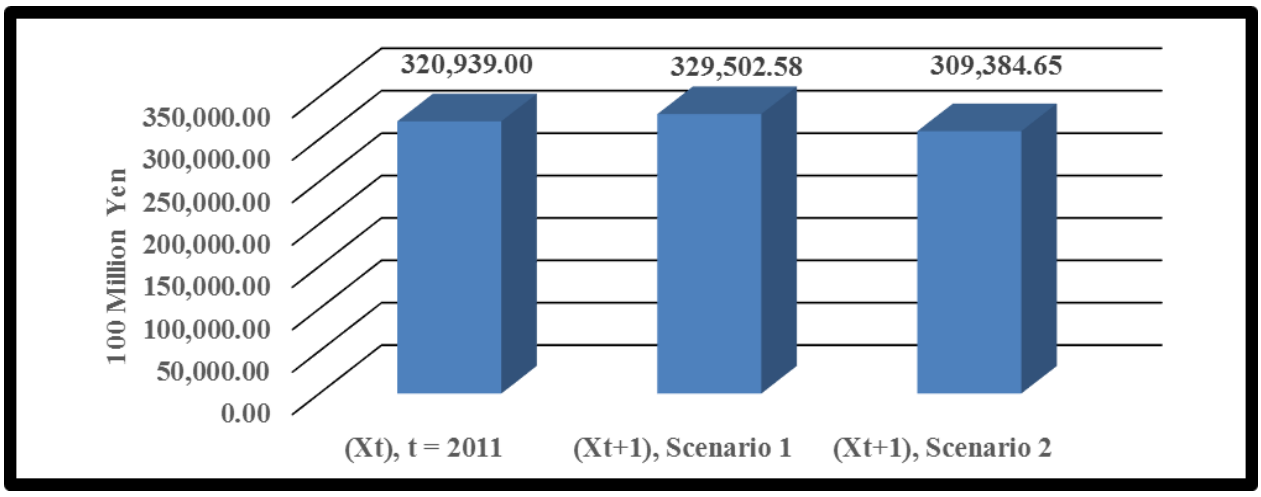

Figure 7. The dynamics of the total output of the finance and insurance sector.

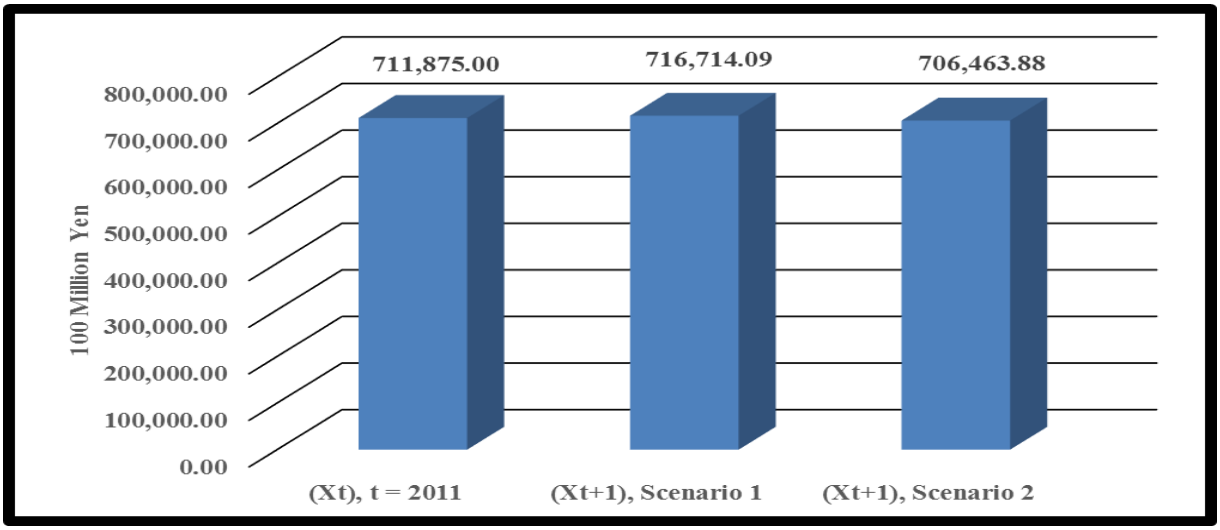

Figure 8. The dynamics of the total output of the real estate sector.

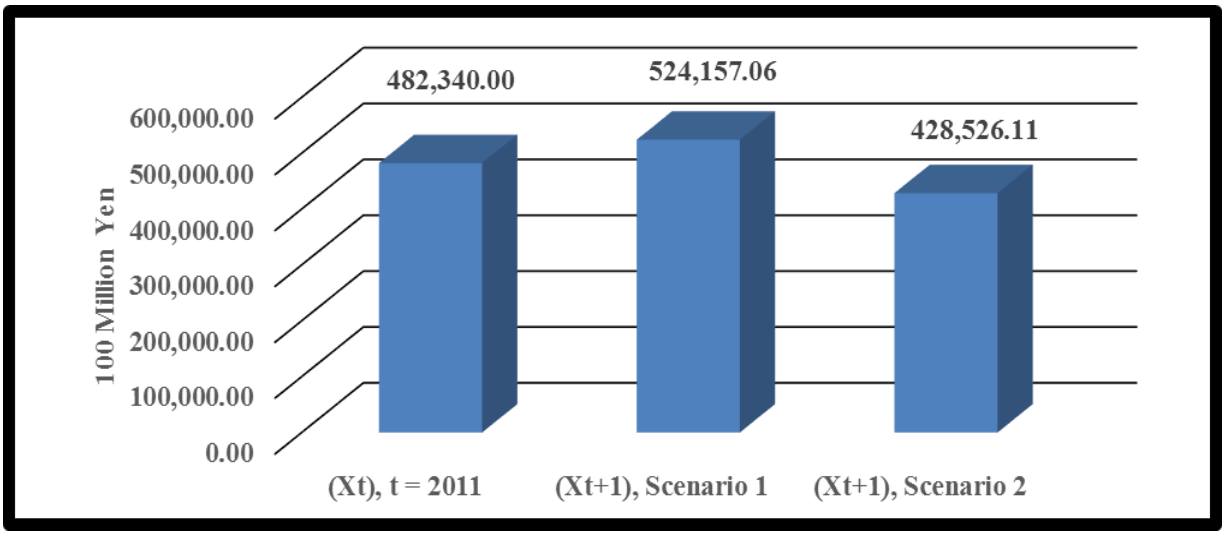

Figure 9. The dynamics of the total output of the transport and postal services sector.

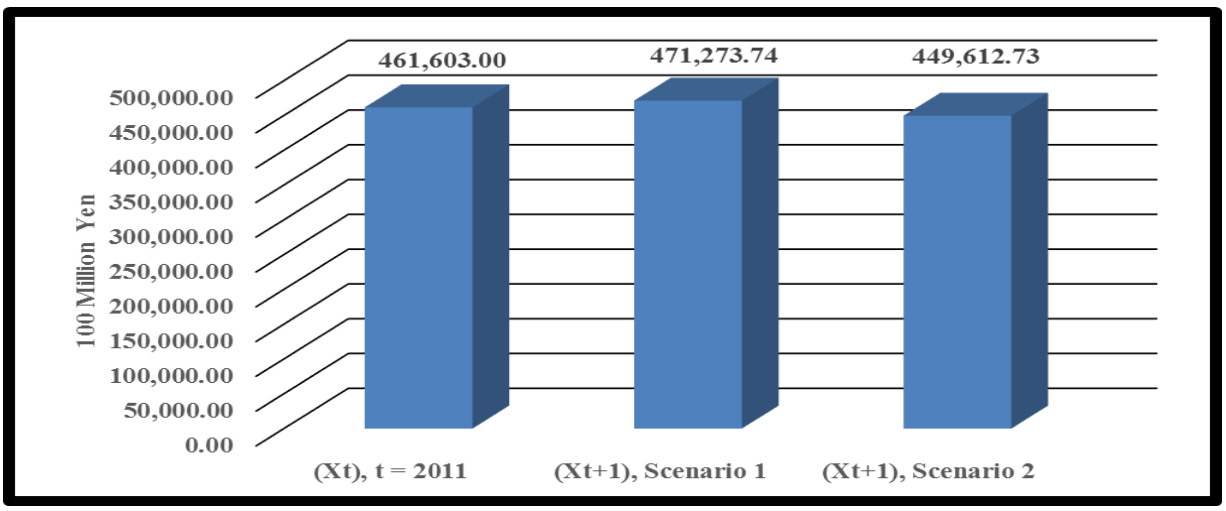

Figure 10. The dynamics of the total output of the information and communications sector.

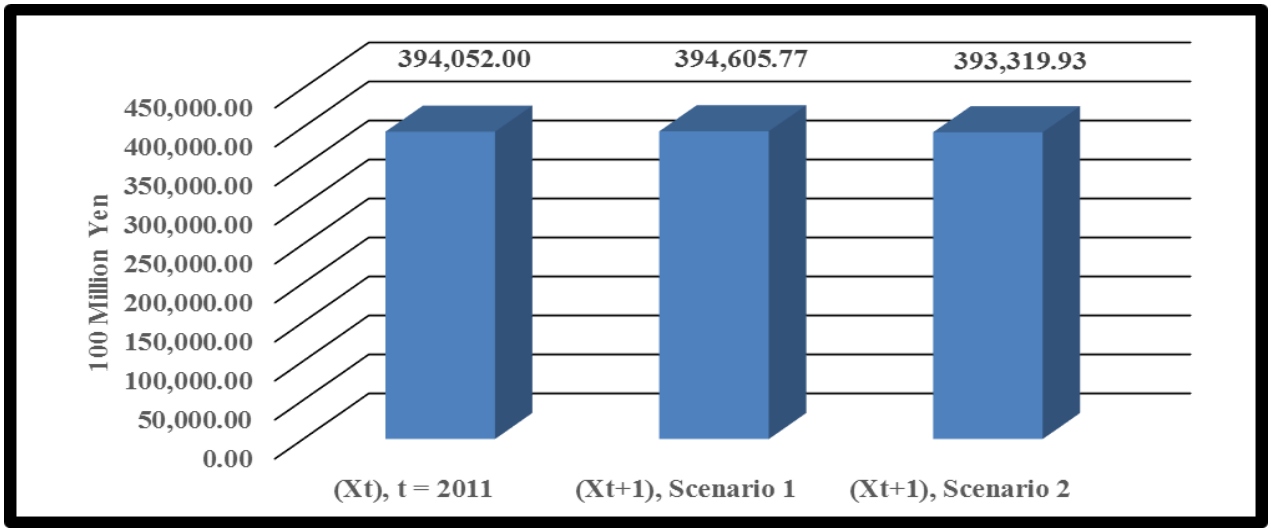

Figure 11. The dynamics of the total output of the public administration sector.

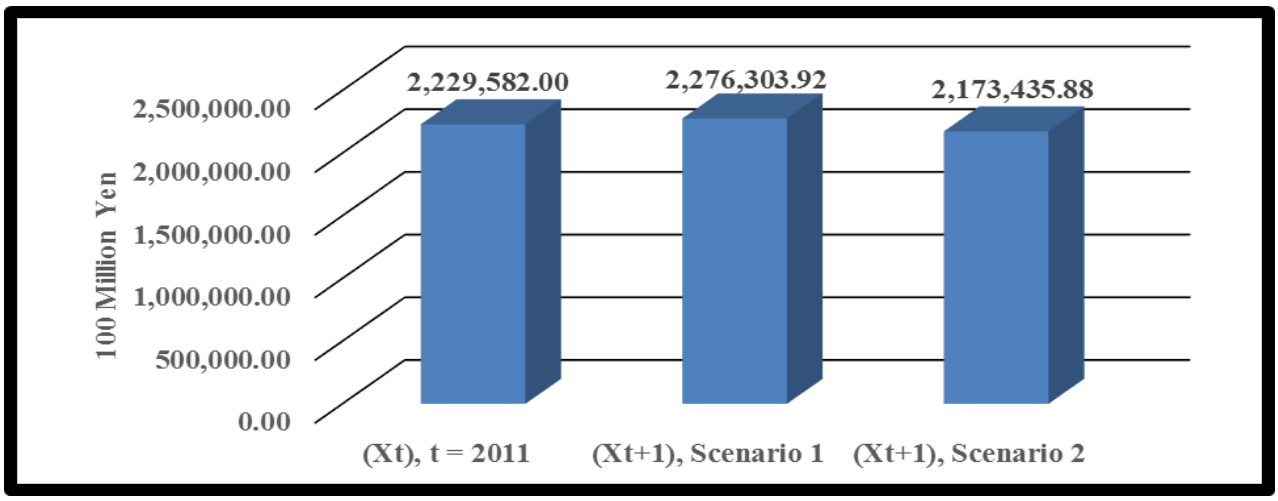

Figure 12. The dynamics of the total output of the services sector.

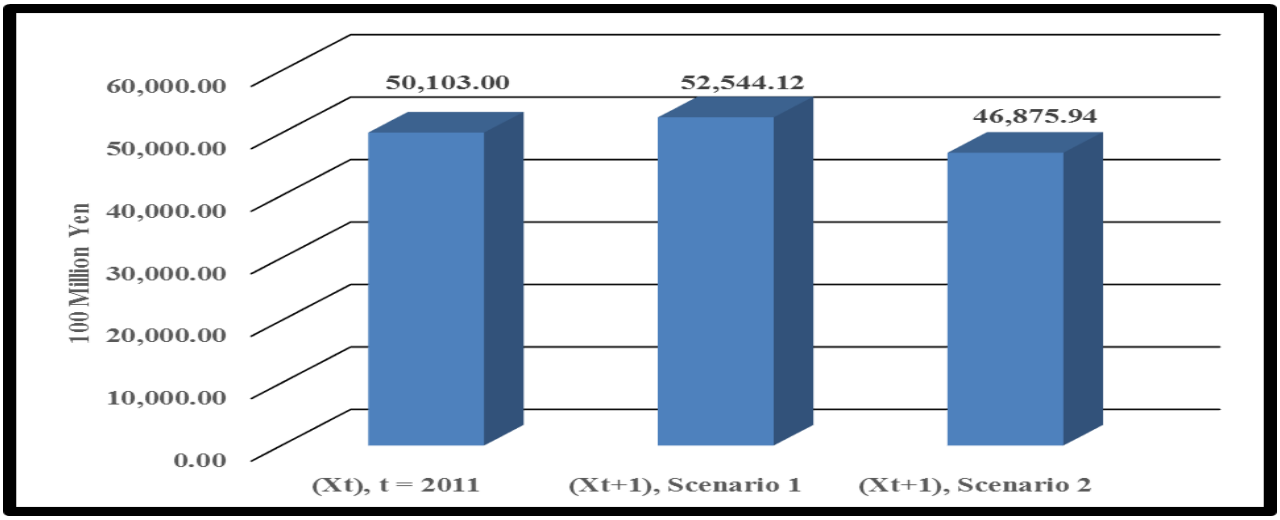

Figure 13. The dynamics of the total output of the activities not elsewhere classified sector.

4. Conclusions and further researches

This study, as a continuation study of previous ones, conducts the analysis regarding the impacts of the modifications of final 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.

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