25th INFORUM World Conference
August 28 - September 2, 2017 at Riga, Latvia

The Economic and Industrial Forecast of Japan 2013-2030 By revised model JIDEA9

March 2017

Institute of International Trade and Investment

Preface

23 years have passed since we started the construction of INFORUM type model[1] (JIDEA; Japan Inter-industry Dynamic Econometric Analysis). Year by year, we revised the model following the new I-O table published by Japanese government. The Government changes the base year of I-O table every 5 year, then we construct totally new model re-organizing the industrial sectors adding new mechanism of calculation. The revision of 2016 demands us a lot of work as the base year is changed from 2005 to 2011[2] and the sector number is increased from 73 to 85.

The model is based on observed data, that is to say, I-O table from1995 to 2013 and estimates future I-O table from 2014 to 2030 by regression equations sector by sector. For the final demand side, the household consumption, private investment, exports and imports, and for the value added side, wages, profits, depreciations, taxes and subsidies, we estimate each function sector by sector. All these components are summed up to macroeconomic variables. Through this model, Input and Output of each industry is calculated with perfect consistency, we can analyze future economic situation from various aspects.

In this report, we analyzed how Japanese economy would develop from 2014 until 2030 based on Japanese historical data from 1995 to 2013 by JIDEA9 model.

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[1] The model structure is explained in ITI web page http://www.iti.or.jp/jidea.model.pdf"
[2] The publishing of I-O table was delayed and the base year was 2011 instead of 2010

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Chapter 1: Shrinking Japanese Economy and Industries

Introduction; The assumption of the Simulation

The revised model Jidea9[3] is based on the observed data expressed in 2011 price from 1995 to 2013 and we changed sector number 73 to 85. The number of manufacturing industry sectors is increased from 44 to 51 and service industry sectors from 29 to 34. The model is based on I-O table published by Japanese statistical office[4] and Japanese National Account.

The sectoral employment data is based on attached table of National Account (SNA) published in 2017 which contains 23 sectors. The 23 sectors are spread to 85 sectors using sectoral employment data attached to Basic I-O table which is published every 5 years. The labor input coefficient is extended by the assumption that the growth rate of labor input coefficient from 2000 to 2015 is same as from 2016 to 2030.

The gross fixed capital formation of I-O table expressed as selling side industries of capital goods, are converted to purchasing side industries by the fixed capital matrix of 2011 prepared by Basic I-O table of the same year The fixed capital matrix is only obtained by every 5 years, so, in JIDEA9 model, we converted the investment flow of selling side to purchasing side by only one table in 2011.

Main source of I-O table is based on I-O linked table made 2000, 2005 and 2011 I-O table with same definition and same base year[5]. We complement the missing year table by extended I-O table prepared by Ministry of Economy, Trade and Industry. The historical data base itself contains the effect of Lehman Brothers Bankruptcy, Great East Japan Earthquake and its recovery process. The estimation for 2014 is adjusted by macro-economic indicators of SNA. Accordingly the result purely estimated by the model started from 2015.

The main assumption of the simulation are summarized as follows.

Base line assumption of JIDEA9 model

- Recent year (2014) simulation result is controlled by actual or provisional data of SNA.
- The additional government investment and consumption in 2014-2015 spent for East Japan Earthquake is included.
- The programmed increase of the consumer tax in 2014 (from 5% to 8%) and in Oct. 2019 (from 8% to 10%) are included.
- The intermediate input coefficient matrix is extended by historical trend (1995 - 2013)

[3] The basic software of this model based on INFORUM (http://www.inforum.umd.edu/)
[4] The details are shown in attached data source table at the end of this report.
[5] Refer to Additional Table at the end of this report.

until 2030.

The main exogenous variable

- The population forecasted by National Institute of Population and Social Securities Research on Jan. 2012 with medium mortality assumption.
- The labor participation rate[6] and labor productivity are extended by historical growth rate.
- The exchange rate is fixed by monthly average rate 2016; 1 dollar=108.837 yen.
- The fossil fuel price is assumed as 2% increase from 2017 to 2030.
- World import demand from Japan and Japanese import price from the world are prepared by BTM[7].
- Government investment is extended by one year lagged value.

Considering the UK's leaving EU, "America first" policy by US President Trump, the economic stagnation of China, the world economy is increasing instability and turning into new stage. With the OPEC's agreement with reducing oil production, the world material prices anticipated to hike up, instability of exchange rate and the stock market, the prospect of world economy is opaque. "Abenomics" which consists of three objects; bold monetary easing, flexible fiscal policy, an economic growth strategy to encourage private investment started from 2013, achieved limited result in financial and monetary aspect such as rising the stock price and weaker Yen. It has not shown evident recovery because of the delay of implementation of the policy to encourage growth.

In 2016, Abe cabinet presented a new policy named "Japan Revival Strategy" targeting to pull up the size of Japanese GDP up to six hundred trillion yen but the detailed strategy was not announced. It is almost an abstract explanation without statistical data. On the other hand, the statistical office was planning the revision of SNA statistical system and definition, for example, private R & D payment to be included as investment. As the result, the object of pulling up the size of GDP to six hundred trillion was almost fulfilled. Anyway, Abe's strategy are not included to JIDEA9.

The special procurement of Tokyo Olympic Games in 2020 may bring effect such as new construction of game venues, the game management cost and traveling and sightseeing. The total amounts of these effects should be estimated outside the model. Therefore the effects of Tokyo Olympic Games is not included in the model.

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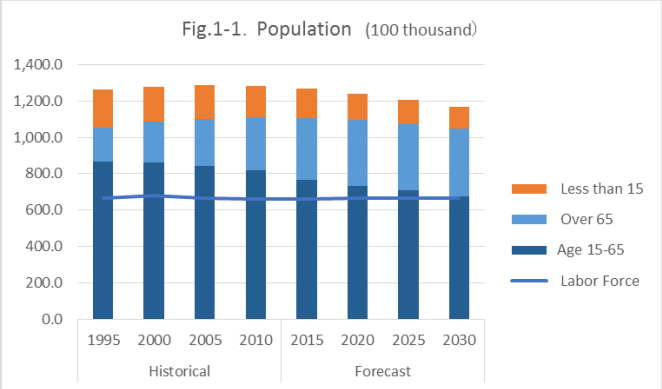
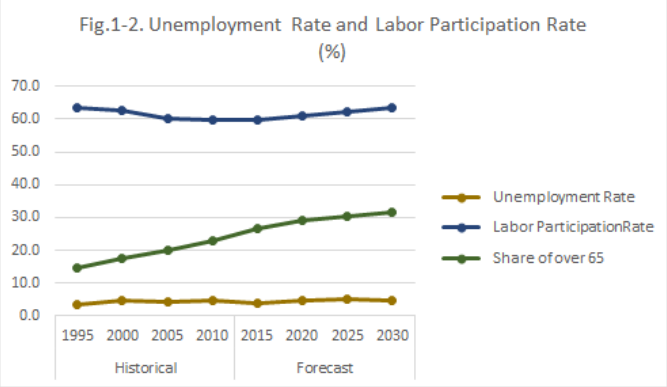
[6] The labor participation rate increases from 59.3% in 2013 to 63.5% in 2030. Labor participation rate is calculated as labor force divided by working age population.

[7] Bi-lateral Trade Model of INFORUM

This model intended to forecast the economy in real term, so the fiscal or monetary policy such as significant monetary easing by Mr. Kuroda, the Governor of Bank of Japan, are not included in the model. Even though these fiscal and monetary policy effects are thought to be included in the historical data such as in 2014 and 2015 when the "Abenomics" implemented in Japanese economy. As the model assumption, the world economy grows gradually, though the exchange rate fixed as 108.837 per dollar of 2016 level. The fuel price in 2016 is 41.6 dollar per barrel and after 2017, we assumed the fuel price grows by 2% annually until 2030.





In these assumptions, the most significant effect is caused by shrinking population. Japanese population reached its peak in 2005 and began to shrink. The weight of population over 65 increases and the population over 15 to 65, the working age population, decreases (Fig. 1-1). In 2025, the baby boom generation reaches the group of elderly age, we encounter the risk of rapid increase of Medicare costs. As this model does not include financial or fiscal sub-model, it cannot make estimation on budget deficit or bankruptcy of pension fund.

1-1. Decreasing GDP and Consumption

GDP in real term decrease after the peak in 2016 (Tab. 1-1). From 2015 to 2030, the consumption decrease especially house hold consumption which occupied 60% of GDP. The Private investment peak out in 2015 but government investment continue to increase, accordingly total investment reaches the peak in 2020-21. Exports reaches the peak in 2015 and imports in 2018 and both gradually decrease. Because of the transfer of the production base in Japan to the overseas countries, the exports decrease more than imports, and the deficit of foreign trade gradually increase.

Table 1-1. Long term Economic Forecast of Japan (Unit:2011price Trillion Yen, 100 thousand*)

Year	GDP	Consumption	Investment	Export	Import	Output	Wages	Inflation	Employment *	Growth rate GDP %
2013	471.1	385.2	101.3	72.1	87.4	934.9	255.3	0.53	633.8	0.67
2014	471.7	380.7	105.1	74.7	88.8	937.6	256.3	1.38	633.6	0.14
2015	476.6	375.7	112.8	76.8	88.8	953.6	260.6	0.26	634.6	1.02
2016	479.5	377.4	114.9	76.7	89.5	961.3	261.0	-0.87	635.0	0.61
2017	479.4	376.9	115.6	76.5	89.5	962.5	260.3	-0.05	635.0	-0.01
2018	479.3	376.6	116.0	76.2	89.6	963.4	259.4	-0.24	635.0	-0.03
2019	479.1	376.1	116.3	75.9	89.3	964.6	258.5	0.07	634.9	-0.04
2020	478.7	375.6	116.5	75.8	89.2	965.4	257.5	-0.13	634.9	-0.09
2021	478.2	375.2	116.5	75.7	89.1	966.2	256.5	-0.12	634.8	-0.10
2022	477.5	374.6	116.4	75.5	89.0	966.8	255.4	-0.09	634.8	-0.14
2023	476.8	374.0	116.2	75.5	88.9	967.4	254.3	-0.08	634.7	-0.15
2024	475.9	373.3	116.0	75.4	88.8	967.8	253.1	-0.06	634.6	-0.19
2025	474.9	372.6	115.7	75.3	88.6	968.2	251.9	-0.05	634.4	-0.20
2026	473.6	371.8	115.2	75.3	88.7	968.0	250.5	-0.02	634.3	-0.27
2027	472.2	370.9	114.6	75.2	88.6	967.5	249.2	0.01	634.1	-0.31
2028	470.6	370.0	114.0	75.1	88.5	967.0	247.8	0.03	633.8	-0.33
2029	468.9	368.9	113.4	75.1	88.5	966.4	246.4	0.05	633.6	-0.35
2030	467.1	367.8	112.7	75.0	88.4	965.7	244.9	0.07	633.4	-0.38
2013-2030 Average CAGR (%)	-0.05	-0.27	0.63	0.23	0.07	0.19	-0.24	..	0.00	..

Note: Figures are all in real term except Wages.

Source: Forecasted by JIDEA、Hereafter the source is same except otherwice indicated.

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2018	479.3	376.6	116.0	76.2	89.6	963.4	259.4	-0.24	635.0	-0.03
2019	479.1	376.1	116.3	75.9	89.3	964.6	258.5	0.07	634.9	-0.04
2020	478.7	375.6	116.5	75.8	89.2	965.4	257.5	-0.13	634.9	-0.09
2021	478.2	375.2	116.5	75.7	89.1	966.2	256.5	-0.12	634.8	-0.10
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2025	474.9	372.6	115.7	75.3	88.6	968.2	251.9	-0.05	634.4	-0.20
2026	473.6	371.8	115.2	75.3	88.7	968.0	250.5	-0.02	634.3	-0.27
2027	472.2	370.9	114.6	75.2	88.6	967.5	249.2	0.01	634.1	-0.31
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2029	468.9	368.9	113.4	75.1	88.5	966.4	246.4	0.05	633.6	-0.35
2030	467.1	367.8	112.7	75.0	88.4	965.7	244.9	0.07	633.4	-0.38
2013-2030 Average CAGR (%)	-0.05	-0.27	0.63	0.23	0.07	0.19	-0.24	..	0.00	..

Note: Figures are all in real term except Wages.

Source: Forecasted by JIDEA、Hereafter the source is same except otherwice indicated.

Table1-2. GDP by Expenditure (Unit; 2011 Price、 Trillion Yen)

	Historical data				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
GDP	476.5	489.4	500.8	461.2	476.6	478.7	474.9	467.1	−0.18	−0.13
Total Expenditure	364.5	383.2	393.6	370.4	375.7	375.6	372.6	367.8	−0.13	−0.14
Outside Household	19.9	18.9	16.7	15.1	12.9	11.2	9.5	7.7	−2.49	−3.39
Household	271.0	281.2	283.5	276.3	275.8	278.6	278.3	276.5	−0.13	0.02
government	73.6	83.1	93.4	79.0	87.0	85.8	84.8	83.6	0.31	−0.26
Total Investment	137.2	127.3	116.3	96.8	112.8	116.5	115.7	112.7	−0.80	−0.01
Private Sector	94.4	89.8	89.5	74.7	85.6	84.7	81.5	76.6	−0.32	−0.74
Government	40.9	37.6	25.1	21.1	27.9	32.4	34.8	36.7	−1.98	1.85
Inventry Change	1.9	−0.2	1.7	1.1	−0.7	−0.7	−0.7	−0.7	10.4	0.0
Export	43.1	53.8	73.5	73.1	76.8	75.8	75.3	75.0	2.4	−0.2
Import	−68.3	−74.9	−82.5	−79.2	−88.8	−89.2	−88.6	−88.4	1.1	0.0
Trade Balance	−25.2	−21.1	−9.0	−6.1	−12.0	−13.5	−13.3	−13.4	n.a.	n.a.

Note：Forecasted figures of Inventry change are fixed at 2013 level.

Tab. 1-3. GDP by Value Added (Unit; Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total Output	937.1	950.3	967.0	894.3	981.5	947.5	942.2	934.5	0.22	−0.33
Intermediate Input	431.9	424.2	452.0	428.3	496.1	465.9	466.3	465.6	1.05	−0.42
Value added Total（GDP）	505.2	526.0	515.0	466.0	485.4	481.6	475.9	468.8	−0.53	−0.23
Wages	273.2	279.3	260.6	243.7	260.6	257.5	251.9	244.9	−0.46	−0.41
Profit	99.7	94.7	108.5	92.0	89.9	89.5	89.7	89.9	−0.35	0.00
Depreciation	80.8	102.1	99.8	82.6	85.7	86.2	86.7	87.1	−1.16	0.11
Taxes	36.5	35.9	32.7	35.8	39.1	39.5	39.9	40.2	0.57	0.19
Outside Household	19.4	19.1	16.8	15.2	13.9	12.7	11.7	10.6	−2.09	−1.81
Subsidy (deduction)	−4.3	−5.2	−3.5	−3.3	−3.9	−3.9	−3.9	−3.9	−1.91	0.04
Wages per Employment(10 thousand ye	125.4	158.0	157.2	130.9	135.0	135.8	136.7	137.5	−1.04	0.12
Value Added Rate (%)	53.9	55.4	53.3	52.1	49.5	50.8	50.5	50.2	−	−
Labor Share (%)	54.1	53.1	50.6	52.3	53.7	53.5	52.9	52.2	−	−

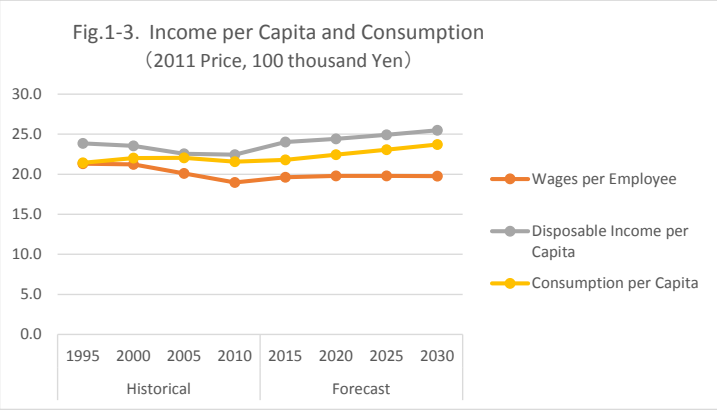
The number of employment and wages per employment both decrease, and the total wages which are calculated by multiplying these two factors, decrease. As a result, the disposable income which is estimated from total wages and the profit of small business, decrease (Tab. 1-4).

Tab. 1-4. Disposable Income and Saving (Unit; 2011 Price, Trillion Yen, 100 Thousand Yen*)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Wages (in Real)	269.4	271.2	258.8	243.0	248.5	245.5	238.7	230.4	−0.68	−0.50
Disposable Income (in Nominal)	301.7	300.7	290.0	287.5	304.0	303.1	300.9	297.3	−0.32	−0.15
Saving (in Nominal)	32.5	20.7	4.2	5.7	15.0	17.5	14.6	10.4	−10.98	−2.41
Saving Rate (%)	10.634	6.816	1.445	1.987	4.973	5.833	4.909	3.547	−10.58	−2.23
Household Consumption (in No	272.9	282.8	285.3	279.8	286.1	281.8	282.2	282.6	0.17	−0.08
Disposable Income (in Real)	300.9	296.9	287.4	288.9	289.2	296.8	293.8	288.0	−0.27	−0.03
Saving (in Real)	32.4	20.4	4.1	5.7	14.2	17.1	14.2	10.1	−10.93	−2.29
Household Consumption (in Re	271.0	281.2	283.5	276.3	275.8	278.6	278.3	276.5	0.13	0.02
Wages per Employment* (in Real)	21.3	21.2	20.1	19.0	19.6	19.8	19.8	19.8	−0.77	0.04
Disposable Income per Capita* (in Rea	23.9	23.5	22.5	22.5	24.0	24.4	24.9	25.5	−0.41	0.40
Consumption per Capita* (in Re	21.4	22.0	22.0	21.6	21.8	22.4	23.1	23.7	0.04	0.57

Note：Wages and Wages per Capita converted in Real term by C.P.I..

Looking at this effect from the total population, total wages per capita remain flat under the condition of decreased population, the disposable income per capita slightly increase (Fig. 1-3). The decrease of total wage caused by the increase of non-full time employment (or irregular employment) who are not paid same as the full employed workers, leads the labor share decrease (Tab.1-3). The increase of aged person who do



not work bring the decrease of income but they withdraw saving including pension fund, accordingly the household consumption keep the same level. As the result, household consumption per capita increase slightly.

The household consumption decreases gradually from 2015 to 2030 and the decrease of tangible goods more rapid than service goods (Tab.1-5).

The Chemical/Petro/Rubber/Ceramic sectors increase because the large weight sector “Pharmacy” included in the Chemical sector increase, but the Petro refinery sector which is also has large weight decreases, as the result, total of this sector’s weight slightly decreases. The Transportation equipment sector, in which the Automobile occupies the largest part, shows stagnant, however the weight of Transportation equipment in the total consumption keeps almost the same (Tab. 1-6). The communication equipment, such as prevailing Smart-phone is rapidly enlarging the market. The emerging this net society causes the rapid increase of the communication or information services. On the contrary, the consumption of Transportation service diminishes, though the total consumption of Communication, Information and Transportation keep almost the same level. The increase of aged population causes the expansion of consumption of the Medical and Nursing Services.

Tab. 1−5. Household Consumption (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	271.0	281.2	283.5	276.3	275.8	278.6	278.3	276.5	−0.13	0.02
Agriculture/Forestry/Fisherie/Mining	4.1	3.7	3.7	3.7	3.0	2.8	2.7	2.6	−1.53	−0.93
Manufacturing total	73.4	70.0	67.0	64.5	61.9	62.9	62.9	62.4	−0.82	0.06
Food/Beverage	31.9	29.9	28.0	26.4	23.9	23.4	22.6	21.7	−1.49	−0.63
Textile/Pulp/Wooden products	7.1	6.4	4.6	3.7	3.7	3.6	3.4	3.3	−3.52	−0.87
Petro/Chemical/Rubber/Ceramic	11.4	11.9	11.4	10.7	9.3	9.2	8.9	8.6	−1.62	−0.54
Ferrous/Non-Ferrous/Metal Prod.	0.9	0.6	0.5	0.4	0.4	0.4	0.4	0.4	−2.92	0.45
Machinery	4.2	4.5	5.4	6.8	7.0	8.5	9.6	10.6	3.01	2.80
Transp. Equip.	5.8	4.7	5.5	4.8	7.0	7.0	6.9	6.8	2.68	−0.16
Other Manufacturing	3.9	3.3	2.9	2.2	2.3	2.6	2.7	2.8	−2.40	1.16
Construction/Civil Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.	n.a.
Electricity/Gas/Water	8.1	8.8	8.7	9.4	8.3	8.3	8.3	8.3	−0.37	0.03
Service Industry Total	193.6	207.5	212.9	208.1	211.0	212.8	212.7	211.5	0.11	0.02
Commerce/Finance/Real estate	107.4	111.2	115.2	112.5	116.0	116.8	116.8	116.2	0.28	0.02
Transportation/communication/Information	19.3	22.8	23.9	26.7	25.1	25.6	25.7	25.6	0.65	0.13
Administration/Education/Medical service	20.9	20.4	23.6	26.2	26.6	28.0	29.0	29.7	1.80	0.72
Business Service	3.3	4.3	4.0	4.6	4.0	3.9	3.9	3.8	−0.48	−0.19
Personal Service	42.7	48.9	46.1	38.0	39.3	38.5	37.4	36.1	−1.44	−0.57

Note 1: The model estimate 85 sectors but here we agregate them into 15 sectors..

Note 2: The sector construction/Civil Engineering and the Electricity/Gas/Water are included in Manufacturing.

Tab. 1-6. The Structure of Household Consumption (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	1.5	1.3	1.3	1.3	1.1	1.0	1.0	0.9
Manufacturing total	27.1	24.9	23.6	23.3	22.4	22.6	22.6	22.6
Food/Beverage	11.8	10.6	9.9	9.6	8.7	8.4	8.1	7.9
Textile/Pulp/Wooden products	2.6	2.3	1.6	1.3	1.3	1.3	1.2	1.2
Petro/Chemical/Rubber/Ceramic	4.2	4.2	4.0	3.9	3.4	3.3	3.2	3.1
Ferrous/Non-Ferrous/Metal Prod.	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.2
Machinery	1.6	1.6	1.9	2.5	2.5	3.0	3.4	3.8
Transp. Equip.	2.2	1.7	1.9	1.7	2.5	2.5	2.5	2.5
Other Manufacturing	1.4	1.2	1.0	0.8	0.8	0.9	1.0	1.0
Construction/Civil Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity/Gas/Water	3.0	3.1	3.1	3.4	3.0	3.0	3.0	3.0
Service Industry Total	71.4	73.8	75.1	75.3	76.5	76.4	76.4	76.5
Commerce/Finance/Real estate	39.6	39.5	40.6	40.7	42.0	41.9	42.0	42.0
Transportation/communication/Information	7.1	8.1	8.4	9.7	9.1	9.2	9.2	9.3
Administration/Education/Medical service	7.7	7.2	8.3	9.5	9.7	10.1	10.4	10.7
Business Service	1.2	1.5	1.4	1.7	1.4	1.4	1.4	1.4
Personal Service	15.8	17.4	16.3	13.8	14.3	13.8	13.4	13.1

1-2. Output and Employment; Stagnation of Labor Productivity

As the structure of this model, the demand side is determined first, the components of GDP expenditure such as Consumption, Investment, and Exports estimated at the first place, then the total of these demands and the Intermediate demand determine Output and Imports. The stagnation of Output is caused by decrease of Household consumption and finally the decrease of Household consumption caused by diminution of population and increase of aged population. The diminution of Output is apparent

Tab.1-7. Output by Sectors (Unit; 2011 Price, Trillion Yen)

	Historical				Forecast				2000～15	2015～30
	1995	2000	2005	2010	2015	2020	2025	2030	CAGR (%)	CAGR (%)
Total	936.8	940.9	972.7	900.0	953.6	965.4	968.2	965.7	0.09	0.08
Agriculture/Forestry/Fisherie/Mining	16.3	15.4	14.2	14.0	12.2	12.0	11.6	11.0	-1.55	-0.64
Manufacturing total	445.2	429.2	419.9	376.7	393.1	392.6	386.3	376.6	-0.58	-0.28
Food/Beverage	43.1	41.4	38.4	36.1	33.0	32.1	30.9	29.5	-1.51	-0.74
Textile/Pulp/Wooden products	35.6	30.2	25.0	19.9	19.4	17.9	16.5	15.2	-2.91	-1.62
Petro/Chemical/Rubber/Ceramic	74.6	76.0	74.6	69.9	69.8	70.7	70.5	69.9	-0.57	0.01
Ferrous/Non-Ferrous/Metal Prod.	64.1	57.2	57.2	51.8	53.1	50.9	48.2	45.2	-0.49	-1.07
Machinery	60.6	64.6	69.0	63.3	68.1	70.2	71.3	71.5	0.35	0.33
Transp. Equip.	40.5	41.0	54.0	51.1	50.4	49.3	48.3	47.1	1.39	-0.46
Other Manufacturing	6.2	5.6	4.7	4.5	4.7	4.7	4.6	4.5	-1.22	-0.32
Construction/Civil Engineering	92.2	83.0	67.1	52.0	65.8	67.5	66.5	64.4	-1.54	-0.15
Electricity/Gas/Water	28.4	30.2	30.0	28.1	28.9	29.2	29.4	29.5	-0.30	0.13
Service Industry Total	475.3	496.3	538.6	509.3	548.3	560.8	570.4	578.1	0.67	0.35
Commerce/Finance/Real estate	189.1	186.5	203.6	193.3	200.4	203.2	204.6	205.0	0.48	0.15
Transportation/communication/Information	72.8	75.2	82.1	83.5	88.0	91.5	94.2	96.7	1.05	0.64
Administration/Education/Medical service	104.9	115.5	130.8	119.5	130.9	132.4	133.5	134.1	0.84	0.16
Business Service	45.0	50.1	58.1	58.6	71.5	78.5	85.2	92.2	2.39	1.71
Personal Service	63.4	69.0	63.9	54.3	57.5	55.3	52.8	50.0	-1.21	-0.92

Tab.1-8. Output Share by Sectors (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	1.7	1.6	1.5	1.6	1.3	1.2	1.2	1.1
Manufacturing total	47.5	45.6	43.2	41.9	41.2	40.7	39.9	39.0
Food/Beverage	4.6	4.4	3.9	4.0	3.5	3.3	3.2	3.1
Textile/Pulp/Wooden products	3.8	3.2	2.6	2.2	2.0	1.9	1.7	1.6
Petro/Chemical/Rubber/Ceramic	8.0	8.1	7.7	7.8	7.3	7.3	7.3	7.2
Ferrous/Non-Ferrous/Metal Prod.	6.8	6.1	5.9	5.8	5.6	5.3	5.0	4.7
Machinery	6.5	6.9	7.1	7.0	7.1	7.3	7.4	7.4
Transp. Equip.	4.3	4.4	5.6	5.7	5.3	5.1	5.0	4.9
Other Manufacturing	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Construction/Civil Engineering	9.8	8.8	6.9	5.8	6.9	7.0	6.9	6.7
Electricity/Gas/Water	3.0	3.2	3.1	3.1	3.0	3.0	3.0	3.0
Service Industry Total	50.7	52.8	55.4	56.6	57.5	58.1	58.9	59.9
Commerce/Finance/Real estate	20.2	19.8	20.9	21.5	21.0	21.0	21.1	21.2
Transportation/communication/Information	7.8	8.0	8.4	9.3	9.2	9.5	9.7	10.0
Administration/Education/Medical service	11.2	12.3	13.4	13.3	13.7	13.7	13.8	13.9
Business Service	4.8	5.3	6.0	6.5	7.5	8.1	8.8	9.5
Personal Service	6.8	7.3	6.6	6.0	6.0	5.7	5.5	5.2

Tab.1-9. Index of Labor Productivity (=Value added/Employment) (2015=100)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total Industry	97.4	102.5	105.1	98.3	100.0	99.9	99.9	99.8	-0.17	-0.01
Agriculture/Forestry/Fishery	84.7	91.1	86.1	94.5	100.0	106.2	113.8	122.9	0.63	1.38
Mining	91.6	88.9	88.5	91.7	100.0	92.6	112.4	99.1	0.79	-0.06
Total Manufacturing	87.4	92.1	95.8	98.2	100.0	102.2	104.6	107.4	0.55	0.48
Food/Beverage	79.2	85.3	83.4	90.7	100.0	102.0	104.7	109.1	1.07	0.58
Textile	110.0	95.3	83.6	92.1	100.0	103.5	109.8	110.9	0.32	0.69
Wood/Pulp	106.1	107.4	108.7	111.5	100.0	97.9	94.8	92.8	-0.47	-0.50
Printing/Book binding	102.8	103.6	103.2	106.2	100.0	102.2	102.9	104.7	-0.23	0.31
Chemical	101.4	104.5	120.0	111.7	100.0	102.5	99.2	106.9	-0.30	0.44
Pharmaceutical	68.3	77.7	82.7	97.1	100.0	103.1	131.3	132.5	1.69	1.89
Petro/Coal products	64.2	85.1	83.8	98.7	100.0	105.4	109.0	111.8	1.08	0.75
Rubber/Plastics	122.6	113.3	105.4	108.9	100.0	96.2	93.0	90.8	-0.83	-0.64
Glass/Cement/Ceramics	81.8	83.1	94.5	94.4	100.0	98.5	95.1	93.4	1.24	-0.45
Iron & Steel	76.1	76.4	105.2	93.8	100.0	106.1	117.2	125.8	1.81	1.54
Non-ferrous Metal	81.6	106.6	108.2	121.2	100.0	94.9	88.4	84.4	-0.43	-1.12
Metal Products	119.3	115.8	114.0	104.3	100.0	89.9	79.3	67.6	-0.97	-2.57
General/Special Machines	98.7	95.3	97.2	90.1	100.0	100.4	100.8	101.3	0.32	0.09
Office/Service Machines	90.6	103.6	113.4	94.9	100.0	108.7	117.3	124.1	-0.23	1.45
Electronic Parts	126.3	157.8	117.6	91.4	100.0	108.3	117.0	133.1	-2.99	1.92
Heavy Electric	103.9	86.4	81.8	86.6	100.0	104.5	113.9	126.3	0.98	1.57
Household Electric	97.9	92.5	93.1	104.9	100.0	97.7	99.5	99.6	0.52	-0.02
Computer/Communication	144.8	173.7	177.8	122.4	100.0	93.6	84.9	73.4	-3.62	-2.04
Transportation Equip.	96.7	99.1	101.4	98.0	100.0	103.7	106.8	110.3	0.06	0.65
Automobile	104.1	98.3	99.3	93.7	100.0	105.0	109.5	113.4	0.12	0.84
Miscellaneous Manufacturing	62.2	67.1	71.3	92.1	100.0	112.2	130.2	152.0	2.70	2.83
Construction/Civil Engineerin	98.3	95.2	86.5	82.6	100.0	103.1	105.1	106.3	0.33	0.41
Electricity/Gas/Warter	182.7	179.4	168.2	153.3	100.0	91.8	82.3	73.4	-3.82	-2.04
Total Service Industry	103.3	107.6	110.4	99.1	100.0	99.1	98.3	97.5	-0.49	-0.17
Commerce	113.3	112.1	120.2	101.8	100.0	93.3	87.1	80.9	-0.76	-1.40
Finance/Insurance	82.4	90.4	104.8	87.3	100.0	110.8	123.2	139.0	0.67	2.22
Real Estate/Imputed rent	92.2	82.8	97.8	95.7	100.0	103.3	106.5	110.1	1.27	0.64
Transport Service	110.2	105.0	112.6	101.7	100.0	97.5	96.2	95.5	-0.33	-0.31
Communication/Information	83.6	115.2	112.9	105.6	100.0	98.4	96.9	96.2	-0.94	-0.26
Public Administration	118.4	168.9	171.9	112.3	100.0	98.9	97.9	96.3	-3.43	-0.25
Education/Research	114.5	125.0	125.1	108.6	100.0	96.3	92.7	89.7	-1.48	-0.72
Medical/Nursery	77.3	83.5	88.1	93.6	100.0	101.7	102.5	102.8	1.21	0.18
Business Service	128.1	118.5	109.2	95.2	100.0	95.9	91.3	86.4	-1.13	-0.97
Personal Service	106.0	112.2	109.6	98.4	100.0	100.7	102.3	104.6	-0.77	0.30
N.E.C.	52.2	73.5	141.5	-39.6	100.0	103.8	135.3	152.6	2.08	2.86

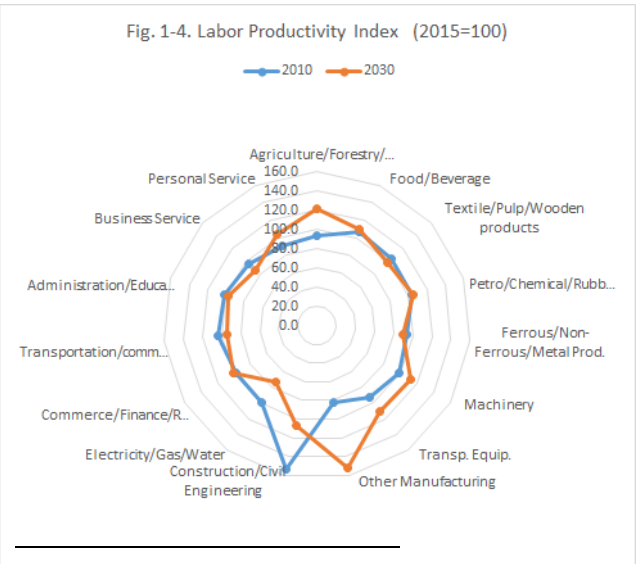
Note 1: Value added figures are transformed in real term by GDP deflator.
Note 2: The 85 sector's result of estimation aggregated in 35 sectors.

in the sector of "Agriculture/Forestry/Fishery". The total Manufacturing industry decreases but on the other hand Service industry increases slightly (Tab. 1-6). The

diminution of Manufacturing industry may be caused by the transfer of production facilities[8] overseas. The augmentation of service industry is basically explained by the immobility of service industry, that is to say, the service itself produced and consumed at the same place is difficult to transfer overseas. Looking at the weight of output amount, from 2015 to 2030 Manufacturing industry diminishes from 41.2% to 39.0% while Service industry increases from 57.5% to 59.9% (Tab.1-8). The shift towards Service industry continues. Rapidly increasing industries such as IoT, or Big Data, the business based on the Internet society emerges one after another and the related industry or production are expected to increase significantly.

The employed population in this model is calculated by multiplying output by labor input coefficient (=inverse of labor productivity coefficient). The labor productivity coefficient is difficult to estimate. It is affected by the economic cycle and also affected by the capital equipment rate by employment. It depends whether the industry is labor intensive or capital intensive. The most influential factor for labor productivity is the technical innovation which occurs non-consecutively and unexpectedly. Each industry is in different level of development, one is stagnant, the others are rapidly confronting new technical innovation. The labor productivity of each industry reflects these stage of development, accordingly we tried many types of productivity equations to make it endogenous but finally we assume that labor productivity is determined by the growth rate of past 15 years which continues further 15 years at same level (Tab.1-9). The number of labor force required for each industry is calculated by multiplying this labor productivity and output estimated in the model. The following tables and graphs express the 34 sectors' labor force aggregated from 85 sectors.

Fig. 1-4. Labor Productivity Index (2015=100)



Comparing the increase rate of production, the manufacturing industry is lower than the service industry but the labor productivity of manufacturing industry is higher than the service industry (Tab1-9). It is because the service industry is much more labor intensive than the manufacturing and also the technical innovation tends to occur much easier in the manufacturing than the service

[8] In 2013 fiscal year the overseas production rate in manufacturing industry reached at 22.9% which is higher than the preceding year by 2.6% and it is the historical highest level.

industry. Looking at the changes of labor productivity by the index of 2010 and 2030, the Machinery, the Transportation equipment and Miscellaneous manufacturing are relatively high, on the other hand, Electricity/Water/Gas and Construction are stagnant and the Service industry is almost decreasing (Fig.1-4). The Japanese economy is driven by high productivity of the large scale industry. However, we should not forget that relatively low level labor productivity sector such as Service industry absorb the workers unemployed who lost the job at shrinking manufacturing industry. Also the growth of the Service economy in Japan tends to keep low labor productivity.

Tab. 1-10. Employed Population by Sectors (Unit: 100 Thousannd)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	672.1	656.1	654.8	644.9	655.0	658.4	653.7	643.2	-0.01	-0.12
Agriculture/Forestry/Fisherie/Mining	48.6	39.4	36.6	32.7	27.3	25.2	22.7	20.2	-2.42	-1.99
Manufacturing total	224.3	204.3	185.8	169.2	170.1	168.5	163.5	156.5	-1.21	-0.55
Food/Beverage	16.6	16.0	15.6	14.7	12.8	12.4	11.9	11.2	-1.48	-0.89
Textile/Pulp/Wooden products	32.5	26.9	21.9	17.2	16.0	14.8	13.7	12.6	-3.40	-1.58
Petro/Chemical/Rubber/Ceramic	12.6	11.6	10.6	9.9	9.9	9.7	9.5	8.9	-1.05	-0.71
Ferrous/Non-Ferrous/Metal Prod.	17.0	15.1	14.0	13.4	14.1	14.1	13.7	13.1	-0.46	-0.49
Machinery	37.9	35.3	31.2	29.8	30.2	29.0	27.3	25.2	-1.03	-1.20
Transp. Equip.	11.3	10.5	11.8	12.3	12.6	12.2	11.8	11.3	1.22	-0.72
Other Manufacturing	7.9	6.6	5.3	4.2	3.7	3.4	2.9	2.4	-3.78	-2.84
Construction/Civil Engineering	82.5	76.4	69.6	61.9	64.8	66.8	66.6	65.4	-1.09	0.06
Electricity/Gas/Water	5.8	5.9	5.7	5.9	6.0	6.1	6.2	6.2	0.11	0.22
Service Industry Total	399.2	412.4	432.4	443.0	457.7	464.8	467.4	466.6	0.70	0.13
Commerce/Finance/Real estate	148.5	142.4	146.4	146.3	147.5	147.4	146.2	144.1	0.23	-0.16
Transportation/communication/Information	49.6	50.8	53.2	55.6	55.4	57.6	58.9	59.5	0.58	0.48
Administration/Education/Medical service	86.8	93.2	99.8	103.4	109.4	112.7	115.6	118.0	1.07	0.51
Business Service	37.3	46.9	54.7	58.5	65.8	69.1	71.5	73.4	2.28	0.73
Personal Service	77.2	79.1	78.3	79.2	79.6	77.9	75.1	71.6	0.04	-0.70

Tab. 1-11. Index of Employed Population (2010 = 100)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	104.2	101.7	101.5	100.0	101.6	102.1	101.4	99.7
Agriculture/Forestry/Fisherie/Mining	148.6	120.5	111.9	100.0	83.5	77.1	69.4	61.8
Manufacturing total	132.6	120.7	109.8	100.0	100.5	99.6	96.6	92.5
Food/Beverage	112.9	108.8	106.1	100.0	87.1	84.4	81.0	76.2
Textile/Pulp/Wooden products	189.0	156.4	127.3	100.0	93.0	86.0	79.7	73.3
Petro/Chemical/Rubber/Ceramic	127.3	117.2	107.1	100.0	100.0	98.0	96.0	89.9
Ferrous/Non-Ferrous/Metal Prod.	126.9	112.7	104.5	100.0	105.2	105.2	102.2	97.8
Machinery	127.2	118.5	104.7	100.0	101.3	97.3	91.6	84.6
Transp. Equip.	91.9	85.4	95.9	100.0	102.4	99.2	95.9	91.9
Other Manufacturing	188.1	157.1	126.2	100.0	88.1	81.0	69.0	57.1
Construction/Civil Engineering	133.3	123.4	112.4	100.0	104.7	107.9	107.6	105.7
Electricity/Gas/Water	98.3	100.0	96.6	100.0	101.7	103.4	105.1	105.1
Service Industry Total	90.1	93.1	97.6	100.0	103.3	104.9	105.5	105.3
Commerce/Finance/Real estate	101.5	97.3	100.1	100.0	100.8	100.8	99.9	98.5
Transportation/communication/Information	89.2	91.4	95.7	100.0	99.6	103.6	105.9	107.0
Administration/Education/Medical service	83.9	90.1	96.5	100.0	105.8	109.0	111.8	114.1
Business Service	63.8	80.2	93.5	100.0	112.5	118.1	122.2	125.5
Personal Service	97.5	99.9	98.9	100.0	100.5	98.4	94.8	90.4

The labor participation rate depends not only on the vital statistics but also on the social situation such as the school attendance rate, the retirement system, the labor participation of house-wife and the economic growth rate or business cycle. The economic growth without sufficient labor participation rate will cause the labor shortage but in this model it doesn't happen because our model forecasts shrinking

economy and increased labor productivity occur at the same time. If the economy grows much higher than our projection, we fear the labor shortage will emerge. The workers are encouraged to work after the legal retirement age of 65 and the local governments are encouraged to make house-wife easy to participate in the labor market with preparing child care supports or expanding child nursing facilities.

Looking at the trend of employment, it gradually increased from the bottom in 2011 and reached at its peak in 2016-17 (Tab.1-10). From 2015 to 2030, the employment of Manufacturing industry will decrease, on the other hand Service industry slightly increase.

Looking at sectoral employment index, the consumer goods sectors such as Agriculture, Forestry and Fisheries, Foods, Beverage, Textile, and Papers will decrease much more than Iron & Steel, Non-Ferrous metal, Machinery and Transport equipment (Tab.1-11). The capital intensive sectors are already so rationalized that it is difficult to reduce the labor anymore. On the service sectors, except Commerce/Finance/Real estate and Personal service, the index will go up. The public sectors such as Public administration, Education and Medical service will show relatively high increase in employment except Public administration.

1-3. Private investment

Someone discuss we need no more economic growth[9]. Arrival of high interest age means decrease of investment demand and disappearance of new economic frontier. As we cannot expect new enlargement of the market, the global capital market is confronting the crisis of continuous stagnation. Japan is now stepping into the stage of matured economy keeping the highest position in the world from the environmental, the health and the securities viewpoints. The key factor under the population decrease is the increase of labor productivity. To exploit the new demand, new technical innovation, aggressive investment is inevitable to increase the productivity.

Under the shrinking working age population, to enforce economic viability and international competitiveness, increasing the labor productivity is pressing issue.

[9] Kazuo Mizuno, Eisuke Sakakibara(2015) “The End of Capitalism and the World After” (In Japanese), Sisousha-shinsho

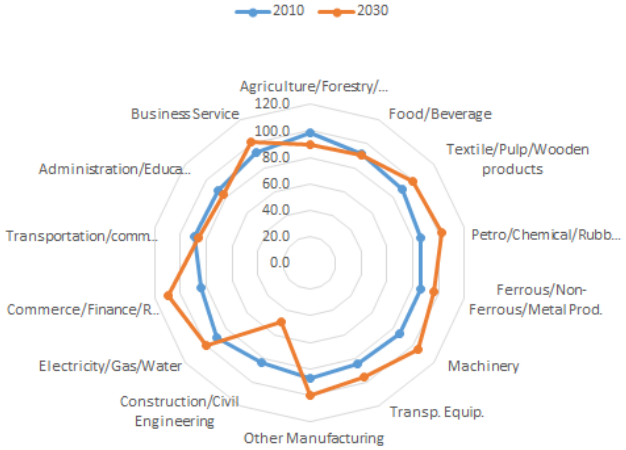
Tab. 1-12. Private Investment by Purchasing Side (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	94.593	89.919	89.711	74.852	85.600	84.724	81.513	76.631	-0.33	-0.74
Agriculture/Forestry/Fisherie/Mining	2.011	1.851	2.072	1.674	1.701	1.777	1.755	1.661	-0.56	-0.16
Manufacturing total	47.908	44.670	43.454	35.071	40.861	39.118	36.424	32.987	-0.59	-1.42
Food/Beverage	1.844	1.720	1.769	1.564	1.718	1.724	1.665	1.562	-0.01	-0.63
Textile/Pulp/Wooden products	1.659	1.619	1.687	1.462	1.637	1.687	1.677	1.625	0.07	-0.05
Petro/Chemical/Rubber/Ceramic	3.941	3.820	4.086	3.474	4.033	4.188	4.197	4.110	0.36	0.13
Ferrous/Non-Ferrous/Metal Prod.	2.273	2.151	2.169	1.846	2.135	2.183	2.148	2.055	-0.05	-0.25
Machinery	6.850	7.001	7.528	6.395	7.397	7.738	7.821	7.737	0.37	0.30
Transp. Equip.	2.822	2.778	2.989	2.376	2.811	2.876	2.822	2.684	0.08	-0.31
Other Manufacturing	0.638	0.638	0.657	0.559	0.641	0.662	0.659	0.640	0.03	-0.01
Construction/Civil Engineering	22.018	19.739	18.073	12.934	15.532	13.034	10.406	7.609	-1.59	-4.65
Electricity/Gas/Water	5.862	5.204	4.497	4.460	4.957	5.027	5.029	4.966	-0.32	0.01
Service Industry Total	44.674	43.399	44.187	38.106	43.038	43.829	43.335	41.983	-0.06	-0.17
Commerce/Finance/Real estate	13.770	13.804	13.922	11.581	13.759	14.567	14.919	15.020	-0.02	0.59
Transportation/communication/Information	10.925	9.744	9.158	8.600	9.694	9.486	9.026	8.381	-0.03	-0.97
Administration/Education/Medical service	7.949	7.470	7.444	5.943	6.735	6.537	6.131	5.574	-0.69	-1.25
Business Service	7.597	7.870	8.763	7.662	8.245	8.566	8.592	8.382	0.31	0.11
Personal Service	4.435	4.510	4.901	4.319	4.605	4.672	4.667	4.626	0.14	0.03

Tab. 1-13. The Share of Private Investment (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	2.1	2.1	2.3	2.2	2.0	2.1	2.2	2.2
Manufacturing total	50.6	49.7	48.4	46.9	47.7	46.2	44.7	43.0
Food/Beverage	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0
Textile/Pulp/Wooden products	1.8	1.8	1.9	2.0	1.9	2.0	2.1	2.1
Petro/Chemical/Rubber/Ceramic	4.2	4.2	4.6	4.6	4.7	4.9	5.1	5.4
Ferrous/Non-Ferrous/Metal Prod.	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.7
Machinery	7.2	7.8	8.4	8.5	8.6	9.1	9.6	10.1
Transp. Equip.	3.0	3.1	3.3	3.2	3.3	3.4	3.5	3.5
Other Manufacturing	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Construction/Civil Engineering	23.3	22.0	20.1	17.3	18.1	15.4	12.8	9.9
Electricity/Gas/Water	6.2	5.8	5.0	6.0	5.8	5.9	6.2	6.5
Service Industry Total	47.2	48.3	49.3	50.9	50.3	51.7	53.2	54.8
Commerce/Finance/Real estate	14.6	15.4	15.5	15.5	16.1	17.2	18.3	19.6
Transportation/communication/Information	11.5	10.8	10.2	11.5	11.3	11.2	11.1	10.9
Administration/Education/Medical service	8.4	8.3	8.3	7.9	7.9	7.7	7.5	7.3
Business Service	8.0	8.8	9.8	10.2	9.6	10.1	10.5	10.9
Personal Service	4.7	5.0	5.5	5.8	5.4	5.5	5.7	6.0

Fig. 1-5. Private Investment Index (2015=100)



To increase labor productivity, it is indispensable for the increase of private investment but under the shrinking population, the Japanese entrepreneurs cannot keep the willingness to invest. In the age of globalization economy, if the businessperson insist old production system, resting on old market share and refusing innovative changes, the market will be deprived immediately by the competitor. While expecting the effort of private sectors, the government should

remove improper regulations or irrational system of market control which distort free market mechanism and prevent investment so as to improve the efficiency of Japanese society as a whole.

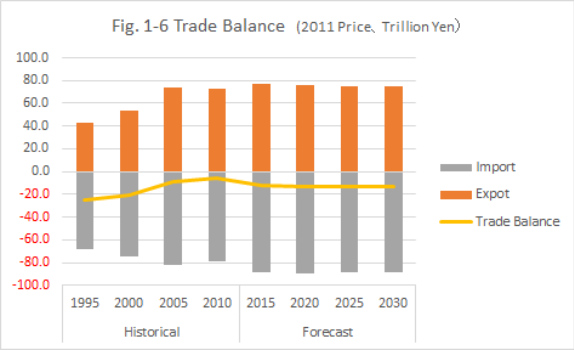
Total private investment amount reached the bottom in 2011 and gradually increased until 2015 but after that it gradually decreased (Tab. 1-12). From 2015 to 2030, the investment by Manufacturing industry will decrease much more than Service.

We have not put any assumption such as innovative industries invest much more than traditional ones but only the historical investment trend of each sector continues in future as same. Therefore the sector which is expected high growth does not increase so much. If the government does not take new policy such as deregulation of economic activity or preferential treatment for new investment, the weak investment forecasted by this model will be realized.

Looking at the change of investment by sectors from 2015 to 2030, it attracts attention that the Manufacturing sector will lose its share but the Service sector enlarges its weight. Food/beverage, Textile/Paper/Furniture, keep its level but Chemical/Petroleum/ Rubber/Ceramic and Machinery sectors will increase their weight (Tab.1-13). Iron & Steel/Non-Ferrous metal, Transport equipment and Miscellaneous manufacturing sectors will increase slightly. Construction/Civil engineering will decrease apparently. In the service sector, Commerce/Finance/Real estate will enlarge the share significantly but on the contrary Transportation/Communication/Information and Public administration/ Education/Medical service sectors will reduce their shares.

In summary, Manufacturing industry except Food/Beverage keep its investment level from2010 to 2030 but Construction/Civil engineering apparently will decrease and in the Service sectors, total investment will reduced except Commerce/Finance /Real estate.

1-4. Export and Import



The total real export of Japan reached its peak in 2015 and will gradually decrease. The rate of decrease of Service industry is much larger than Manufacturing. From 2015 to 2030, many sectors in Manufacturing industry will enlarge their shares but only Transportation sector will reduce (Tab1-15). In the Service sector, export of the Commerce/Finance/Real estate sector which occupies large share will lose gradually its weight,

Tab. 1-14. Export Value by Sectors (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	43.066	53.838	73.508	73.101	76.823	75.766	75.301	74.980	2.40	−0.16
Agriculture/Forestry/Fisherie/Mining	0.038	0.065	0.080	0.107	0.101	0.106	0.110	0.118	2.98	1.04
Manufacturing total	34.238	42.468	56.531	56.554	57.226	56.585	56.295	56.111	2.01	−0.13
Food/Beverage	0.199	0.231	0.310	0.336	0.483	0.524	0.559	0.602	5.04	1.48
Textile/Pulp/Wooden products	0.874	0.984	1.069	0.915	0.989	0.950	0.928	0.913	0.03	−0.53
Petro/Chemical/Rubber/Ceramic	5.347	6.349	9.587	10.255	10.704	11.080	11.247	11.400	3.54	0.42
Ferrous/Non-Ferrous/Metal Prod.	4.405	5.105	6.342	6.571	6.641	6.728	6.797	6.899	1.77	0.25
Machinery	13.897	17.765	22.396	22.707	22.967	22.660	22.560	22.413	1.73	−0.16
Transp. Equip.	8.945	11.325	16.003	14.758	14.943	14.187	13.772	13.476	1.87	−0.69
Other Manufacturing	0.543	0.676	0.779	0.973	0.460	0.422	0.396	0.377	−2.53	−1.32
Construction/Civil Engineering	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	n.a.	n.a.
Electricity/Gas/Water	0.029	0.032	0.046	0.040	0.038	0.035	0.034	0.032	1.15	−1.14
Service Industry Total	8.790	11.305	16.897	16.440	19.496	19.075	18.897	18.751	3.70	−0.26
Commerce/Finance/Real estate	3.358	5.120	9.672	9.213	9.917	9.322	8.946	8.614	4.51	−0.93
Transportation/communication/Information	4.375	5.042	5.584	4.892	7.057	7.203	7.356	7.507	2.27	0.41
Administration/Education/Medical service	0.066	0.067	0.063	0.399	0.125	0.129	0.133	0.137	4.25	0.61
Business Service	0.548	0.637	0.600	1.038	1.498	1.492	1.498	1.497	5.87	0.00
Personal Service	0.442	0.439	0.976	0.898	0.900	0.928	0.964	0.996	4.90	0.68

Tab. 1-15. Share of Export Value by Sectors (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Manufacturing total	79.5	78.9	76.9	77.4	74.5	74.7	74.8	74.8
Food/Beverage	0.5	0.4	0.4	0.5	0.6	0.7	0.7	0.8
Textile/Pulp/Wooden products	2.0	1.8	1.5	1.3	1.3	1.3	1.2	1.2
Petro/Chemical/Rubber/Ceramic	12.4	11.8	13.0	14.0	13.9	14.6	14.9	15.2
Ferrous/Non-Ferrous/Metal Prod.	10.2	9.5	8.6	9.0	8.6	8.9	9.0	9.2
Machinery	32.3	33.0	30.5	31.1	29.9	29.9	30.0	29.9
Transp. Equip.	20.8	21.0	21.8	20.2	19.5	18.7	18.3	18.0
Other Manufacturing	1.3	1.3	1.1	1.3	0.6	0.6	0.5	0.5
Construction/Civil Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity/Gas/Water	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Service Industry Total	20.4	21.0	23.0	22.5	25.4	25.2	25.1	25.0
Commerce/Finance/Real estate	7.8	9.5	13.2	12.6	12.9	12.3	11.9	11.5
Transportation/communication/Information	10.2	9.4	7.6	6.7	9.2	9.5	9.8	10.0
Administration/Education/Medical service	0.2	0.1	0.1	0.5	0.2	0.2	0.2	0.2
Business Service	1.3	1.2	0.8	1.4	1.9	2.0	2.0	2.0
Personal Service	1.0	0.8	1.3	1.2	1.2	1.2	1.3	1.3

From 2015 to 2030, total real import slightly will decrease (Tab.1-16). In this same period, the import of Manufacturing industry will shrink a little but Service industry almost keeps same level. The import of Agriculture/Forestry/Fishery, Textile/Paper/Furniture which are mainly classified as consumer goods or that of Iron & Steel/Non-Ferrous metal classified as raw materials will decrease. The decrease of Petro/Coal/Natural Gas is very little. The import of Machinery which includes electronics and communication equipment will increase but the import of Transportation equipment will decrease. The import share of Manufacturing goods and Service will enlarge but Agriculture/Forestry/Fishery will reduce (Tab.1-17). The trade balance has changed into deficit since 2015 and the amount of deficit is increasing. (Fig.16).

Tab. 1-16. Import Value by Sectors (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	68.29	74.93	82.52	79.18	88.79	89.23	88.64	88.35	1.14	-0.03
Agriculture/Forestry/Fisherie/Mining	27.87	27.86	27.93	26.16	26.84	26.50	25.91	25.25	-0.25	-0.40
Petro/Coal/Natural Gas	21.36	21.06	21.59	20.28	21.21	21.13	20.82	20.40	0.05	-0.26
Manufacturing total	31.15	37.20	44.18	42.96	51.33	51.90	51.82	52.03	2.17	0.09
Food/Beverage	5.80	6.64	6.71	5.41	5.97	5.72	5.42	5.17	-0.71	-0.95
Textile/Pulp/Wooden products	4.63	5.54	6.12	5.45	5.81	5.62	5.32	5.04	0.31	-0.94
Petro/Chemical/Rubber/Ceramic	8.04	9.35	9.75	9.88	12.04	12.14	12.20	12.42	1.70	0.21
Ferrous/Non-Ferrous/Metal Prod.	4.84	4.84	5.60	4.56	4.96	4.68	4.35	4.06	0.15	-1.31
Machinery	3.86	6.82	10.94	13.27	17.11	18.26	19.06	19.83	6.32	0.99
Transp. Equip.	1.99	1.95	2.63	2.29	2.89	2.74	2.60	2.48	2.67	-1.02
Other Manufacturing	1.99	2.05	2.43	2.10	2.56	2.74	2.87	3.02	1.48	1.12
Construction/Civil Engineering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.
Electricity/Gas/Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.67	2.74
Service Industry Total	9.27	9.87	10.41	10.06	10.63	10.83	10.91	11.07	0.50	0.27
Commerce/Finance/Real estate	1.12	1.35	1.37	1.81	2.15	2.10	2.03	1.98	3.14	-0.56
Transportation/communication/Information	3.59	4.29	4.43	3.97	4.78	4.77	4.67	4.62	0.71	-0.22
Administration/Education/Medical service	0.07	0.12	0.13	0.75	0.26	0.28	0.30	0.31	5.38	1.23
Business Service	1.05	1.24	0.92	1.15	2.39	2.68	2.98	3.29	4.45	2.17
Personal Service	3.45	2.86	3.57	2.39	1.06	1.00	0.93	0.87	-6.43	-1.30

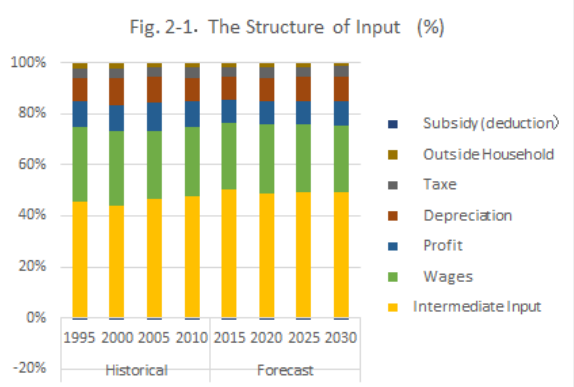
Tab. 1-17. The Share of Import Value by Sectors (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	40.8	37.2	33.8	33.0	30.2	29.7	29.2	28.6
Petro/Coal/Natural Gas	31.3	28.1	26.2	25.6	23.9	23.7	23.5	23.1
Manufacturing total	45.6	49.7	53.5	54.3	57.8	58.2	58.5	58.9
Food/Beverage	8.5	8.9	8.1	6.8	6.7	6.4	6.1	5.9
Textile/Pulp/Wooden products	6.8	7.4	7.4	6.9	6.5	6.3	6.0	5.7
Petro/Chemical/Rubber/Ceramic	11.8	12.5	11.8	12.5	13.6	13.6	13.8	14.1
Ferrous/Non-Ferrous/Metal Prod.	7.1	6.5	6.8	5.8	5.6	5.2	4.9	4.6
Machinery	5.6	9.1	13.3	16.8	19.3	20.5	21.5	22.4
Transp. Equip.	2.9	2.6	3.2	2.9	3.3	3.1	2.9	2.8
Other Manufacturing	2.9	2.7	2.9	2.7	2.9	3.1	3.2	3.4
Construction/Civil Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity/Gas/Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service Industry Total	13.6	13.2	12.6	12.7	12.0	12.1	12.3	12.5
Commerce/Finance/Real estate	1.6	1.8	1.7	2.3	2.4	2.4	2.3	2.2
Transportation/communication/Information	5.3	5.7	5.4	5.0	5.4	5.3	5.3	5.2
Administration/Education/Medical service	0.1	0.2	0.2	0.9	0.3	0.3	0.3	0.4
Business Service	1.5	1.7	1.1	1.5	2.7	3.0	3.4	3.7
Personal Service	5.0	3.8	4.3	3.0	1.2	1.1	1.1	1.0

Chapter 2. Changing Input-structure

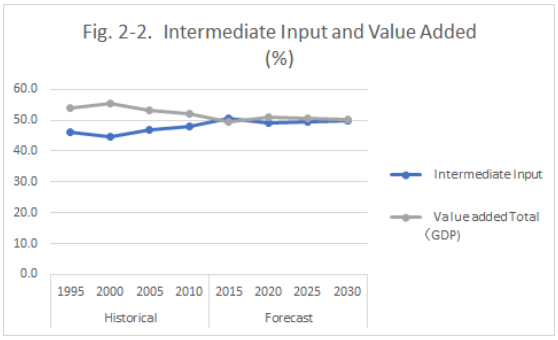
2-1. Input Structure

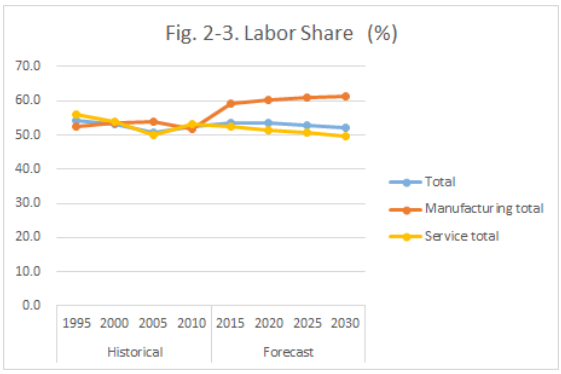
Looking at the Japanese input structure, the share of intermediate input gradually increases and that of value-added decreases (Fig.2-1, Tab.2-1). Theoretically, sophistication of the industry means the increase in the share of value-added but in reality, Japanese value-added had a tendency of decrease from 1995 to 2010. The main cause of industrial sophistication or industrial complication increase the procurement from other industry products or service, that is to say, the increase of external procurement. The industrial sophistication means the closely related inter-industry network. This tendency still continues except the epoch of reconstruction after the East Japan Great Earthquake disaster. Concerning to the details of value added structure, the share of wages decrease gradually. It means the decrease of labor share in value added but the detail will be explained later.



Tab. 2-1. The Structure of Input (Unit; Trillion Yen)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total Output	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Intermediate Input	46.1	44.6	46.7	47.9	50.5	49.2	49.5	49.8
Value added Total (GDP)	53.9	55.4	53.3	52.1	49.5	50.8	50.5	50.2
Wages	29.1	29.4	26.9	27.3	26.6	27.2	26.7	26.2
Profit	10.6	10.0	11.2	10.3	9.2	9.4	9.5	9.6
Depreciation	8.6	10.7	10.3	9.2	8.7	9.1	9.2	9.3
Taxe	3.9	3.8	3.4	4.0	4.0	4.2	4.2	4.3
Outside Household	2.1	2.0	1.7	1.7	1.4	1.3	1.2	1.1
Subsidy (deduction)	−0.5	−0.5	−0.4	−0.4	−0.4	−0.4	−0.4	−0.4





2-2. Wages

The model calculates wages per employment at first, then multiply it by the number of employee and get total wages. From 2015 to 2030, total wages will gradually decrease and the wages of Service industry will much more decrease than Manufacturing. In Manufacturing sector, the sectors such as Textile/Pulp/Wooden products, Chemicals/Petroleum/Rubber /Ceramics, Electricity/Gas/Water will decrease much more than others.

Tab. 2-2. Wages by Sectors (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	273.2	279.3	260.6	243.7	260.6	257.5	251.9	244.9	−0.46	−0.41
Agriculture/Forestry/Fisherie/Mining	1.8	1.6	1.5	1.5	1.5	1.5	1.4	1.3	−0.63	−0.87
Manufacturing total	86.7	84.0	74.1	64.1	75.1	75.7	74.7	72.8	−0.75	−0.21
Food/Beverage	5.2	5.0	4.6	4.6	4.8	4.8	4.8	4.8	−0.16	−0.11
Textile/Pulp/Wooden products	8.2	7.0	5.4	4.5	4.6	4.3	3.9	3.6	−2.68	−1.64
Petro/Chemical/Rubber/Ceramic	8.5	8.0	7.5	6.9	7.1	6.9	6.6	6.2	−0.81	−0.85
Ferrous/Non-Ferrous/Metal Prod.	7.8	7.2	6.8	5.9	6.5	6.5	6.4	6.2	−0.63	−0.37
Machinery	15.9	17.1	14.9	11.8	14.5	14.4	13.9	13.3	−1.07	−0.61
Transp. Equip.	6.0	6.4	6.5	6.4	7.7	7.6	7.5	7.3	1.26	−0.37
Other Manufacturing	1.3	1.3	1.0	1.2	1.3	1.3	1.3	1.2	−0.40	−0.13
Construction/Civil Engineering	29.3	27.3	22.4	18.4	24.6	26.4	27.0	27.1	−0.70	0.64
Electricity/Gas/Water	4.6	4.7	4.7	4.3	3.8	3.6	3.3	3.1	−1.41	−1.45
Service Industry Total	184.6	193.7	185.0	178.2	184.1	180.3	175.8	170.9	−0.34	−0.50
Commerce/Finance/Real estate	66.4	62.4	55.7	48.3	50.8	47.0	43.1	39.3	−1.36	−1.70
Transportation/communication/Information	26.3	28.7	27.5	26.5	24.1	24.2	24.2	24.2	−1.14	0.03
Administration/Education/Medical service	58.7	65.1	65.0	67.8	69.9	70.2	70.4	70.5	0.47	0.06
Business Service	17.1	19.2	20.7	21.3	24.1	24.1	23.7	22.9	1.54	−0.35
Personal Service	16.1	18.3	16.1	14.4	15.1	14.8	14.3	13.9	−1.26	−0.56

Note: Wages are converted in Real term by CPI.

Tab. 2-3. The Share of Wages by Sectors (Unit; %)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Manufacturing total	31.7	30.1	28.4	26.3	28.8	29.4	29.7	29.7
Food/Beverage	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9
Textile/Pulp/Wooden products	3.0	2.5	2.1	1.8	1.8	1.7	1.6	1.5
Petro/Chemical/Rubber/Ceramic	3.1	2.9	2.9	2.8	2.7	2.7	2.6	2.5
Ferrous/Non-Ferrous/Metal Prod.	2.8	2.6	2.6	2.4	2.5	2.5	2.5	2.5
Machinery	5.8	6.1	5.7	4.9	5.6	5.6	5.5	5.4
Transp. Equip.	2.2	2.3	2.5	2.6	3.0	3.0	3.0	3.0
Other Manufacturing	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5
Construction/Civil Engineering	10.7	9.8	8.6	7.5	9.4	10.2	10.7	11.0
Electricity/Gas/Water	1.7	1.7	1.8	1.8	1.5	1.4	1.3	1.3
Service Industry Total	67.6	69.3	71.0	73.1	70.6	70.0	69.8	69.8
Commerce/Finance/Real estate	24.3	22.3	21.4	19.8	19.5	18.3	17.1	16.0
Transportation/communication/Information	9.6	10.3	10.6	10.9	9.3	9.4	9.6	9.9
Administration/Education/Medical service	21.5	23.3	24.9	27.8	26.8	27.3	28.0	28.8
Business Service	6.3	6.9	7.9	8.7	9.3	9.4	9.4	9.3
Personal Service	5.9	6.6	6.2	5.9	5.8	5.7	5.7	5.7

In the service sectors, decrease of Commerce/Finance/Real estate sector is apparent. The Public administration and Education reduce the share but Medical/Nursing are to be expanding (Tab.2-2, 2-3).

The labor share decrease may be due to the wage level per regular employment which does not shrink but the number of non-regular employment whose wage level is

relatively lower than regular one will increase significantly[10]. The number of workers in manufacturing sector will diminish and that of the workers in service sector whose wage level is relatively low, will increased. This is also the cause of shrinking the labor share in total.

Tab. 2-4. The Labor Share by Sectors (Unit; %)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	54.1	53.1	50.6	52.3	53.7	53.5	52.9	52.2	1.01	0.97
Agriculture/Forestry/Fisherie/Mining	18.6	19.1	21.3	21.7	24.3	24.7	24.5	24.1	1.27	0.99
Manufacturing total	52.5	53.5	54.1	51.6	59.0	60.3	60.9	61.4	1.10	1.04
Food/Beverage	36.2	33.0	33.7	33.3	36.2	36.9	37.4	37.9	1.10	1.05
Textile/Pulp/Wooden products	56.0	57.2	56.0	56.1	65.9	66.3	66.7	67.5	1.15	1.02
Petro/Chemical/Rubber/Ceramic	36.8	36.4	36.8	34.1	36.1	35.9	35.1	34.2	0.99	0.95
Ferrous/Non-Ferrous/Metal Prod.	53.0	54.0	50.4	47.6	51.3	54.2	56.8	59.5	0.95	1.16
Machinery	53.0	56.5	61.1	58.4	65.9	66.2	66.0	65.6	1.17	1.00
Transp. Equip.	59.5	66.1	61.2	61.0	69.6	69.0	68.3	67.5	1.05	0.97
Other Manufacturing	55.2	60.8	58.2	63.6	72.3	73.2	73.3	73.0	1.19	1.01
Construction/Civil Engineering	72.0	74.0	76.6	75.2	78.8	80.5	81.4	82.0	1.07	1.04
Electricity/Gas/Water	29.8	30.5	35.2	34.7	45.9	46.9	48.0	49.3	1.50	1.07
Service Industry Total	55.9	53.8	49.9	53.2	52.3	51.5	50.6	49.5	0.97	0.95
Commerce/Finance/Real estate	43.2	41.6	35.5	33.8	34.4	32.2	29.9	27.6	0.83	0.80
Transportation/communication/Information	61.7	57.2	52.4	53.1	50.0	50.1	50.1	50.1	0.87	1.00
Administration/Education/Medical service	86.2	75.7	73.0	86.1	84.8	84.2	83.4	82.7	1.12	0.98
Business Service	53.4	50.6	53.0	59.6	56.8	57.0	57.1	56.8	1.12	1.00
Personal Service	47.8	50.2	48.1	51.7	48.5	48.8	48.8	48.8	0.97	1.01

Note: Labor Share = Wages/Value Added of respective sector

Tab. 2-5. Wages per Employee by Sectors (Unit; 2011Price, Trillion Yen)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	4.064	4.258	3.980	3.780	3.979	3.911	3.853	3.808	−0.45	−0.29
Agriculture/Forestry/Fisherie/Mining	0.378	0.417	0.417	0.453	0.547	0.581	0.615	0.649	1.83	1.14
Manufacturing total	3.866	4.113	3.986	3.786	4.412	4.493	4.568	4.649	0.47	0.35
Food/Beverage	3.121	3.103	2.967	3.136	3.787	3.890	4.031	4.258	1.34	0.79
Textile/Pulp/Wooden products	2.515	2.593	2.481	2.602	2.899	2.874	2.867	2.871	0.75	−0.06
Petro/Chemical/Rubber/Ceramic	6.774	6.871	7.080	6.975	7.123	7.071	6.906	6.976	0.24	−0.14
Ferrous/Non-Ferrous/Metal Prod.	4.563	4.768	4.878	4.429	4.642	4.638	4.669	4.724	−0.18	0.12
Machinery	4.199	4.837	4.786	3.976	4.815	4.948	5.091	5.268	−0.03	0.60
Transp. Equip.	5.295	6.115	5.536	5.243	6.149	6.244	6.341	6.483	0.04	0.35
Other Manufacturing	1.689	2.033	1.977	2.745	3.416	3.835	4.434	5.167	3.52	2.80
Construction/Civil Engineering	3.549	3.579	3.221	2.966	3.796	3.947	4.052	4.137	0.39	0.58
Electricity/Gas/Water	7.864	8.024	8.304	7.331	6.372	5.905	5.400	4.952	−1.53	−1.67
Service Industry Total	4.625	4.696	4.278	4.022	4.022	3.880	3.761	3.662	−1.03	−0.62
Commerce/Finance/Real estate	4.471	4.381	3.804	3.300	3.445	3.189	2.949	2.724	−1.59	−1.55
Transportation/communication/Information	5.306	5.648	5.169	4.762	4.358	4.207	4.116	4.073	−1.71	−0.45
Administration/Education/Medical service	6.757	6.985	6.515	6.559	6.387	6.229	6.092	5.978	−0.59	−0.44
Business Service	4.597	4.088	3.776	3.635	3.665	3.492	3.311	3.120	−0.73	−1.07
Personal Service	2.086	2.316	2.062	1.813	1.902	1.895	1.910	1.943	−1.30	0.14

2-3. Profit

The forecast of profit is relatively difficult. The deficit in profit is possible only for the short period and impossible for the long period to continue business. However in reality, since 2011 in the observed data, considerable number of sectors (Mining, Textile, Furniture, Petro and Coal products, Plastic, Rubber, Metal products, Computer/Communication equipment, Heavy electric, Motor vehicle parts, Other transport equipment, Electricity) registered deficit. When the last observed data in

[10] The variable of non-regular employment is not endogenous in this model, though.

2014 is deficit, we assumed the sector continue the deficit afterward (Tab.2-6). In the last forecasted year 2030, there are 15 deficit sectors and the total amount of these sectors' output account for 7% of the total.

In spite of long term deficit, the reason why the business can continue could be explained as follows. The deficit of head office may be covered by overseas surplus. As the model is based on I-O table, the data are constructed by GDP concept and the profit data does not include the transfer from overseas profits.

Tab. 2-6. Profit by Sectors (Unit; %)

	Historical				Forecast				2000～15 CAGR (%)	2015～30 CAGR (%)
	1995	2000	2005	2010	2015	2020	2025	2030		
Total	99.7	94.7	108.5	92.0	89.9	89.5	89.7	89.9	−0.35	0.00
Agriculture/Forestry/Fisherie/Mining	5.4	4.3	3.3	3.5	2.6	2.5	2.4	2.3	−3.26	−0.83
Manufacturing total	26.4	20.9	16.1	15.7	7.5	7.0	6.6	6.2	−6.58	−1.28
Food/Beverage	2.8	4.2	4.1	4.4	3.1	3.2	3.2	3.3	−1.94	0.33
Textile/Pulp/Wooden products	3.0	2.2	1.7	1.3	0.3	0.2	0.1	0.0	−12.98	n.a.
Petro/Chemical/Rubber/Ceramic	4.2	3.0	2.5	2.5	1.4	1.3	1.2	1.0	−4.79	−2.13
Ferrous/Non-Ferrous/Metal Prod.	2.4	2.1	2.8	1.6	2.8	2.5	2.2	2.0	1.84	−2.27
Machinery	5.6	4.0	1.3	1.9	0.6	0.8	1.0	1.2	−11.67	4.48
Transp. Equip.	1.2	−0.1	0.7	1.0	0.3	0.3	0.3	0.3	n.a.	0.54
Other Manufacturing	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.0	n.a.	n.a.
Construction/Civil Engineering	3.1	2.5	1.8	0.6	1.7	1.6	1.5	1.4	−2.85	−1.17
Electricity/Gas/Water	3.6	2.5	1.0	2.3	−2.6	−2.7	−2.8	−3.0	n.a.	n.a.
Service Industry Total	67.9	69.5	89.1	72.7	79.8	80.0	80.6	81.3	0.92	0.13
Commerce/Finance/Real estate	45.7	46.2	61.1	51.8	54.4	55.5	56.8	58.2	1.10	0.44
Transportation/communication/Information	5.3	6.8	9.6	6.7	9.8	9.6	9.4	9.3	2.47	−0.39
Administration/Education/Medical service	2.4	1.4	2.6	3.1	3.0	3.1	3.2	3.3	5.11	0.49
Business Service	5.2	6.7	7.5	5.6	5.9	5.8	5.6	5.5	−0.84	−0.46
Personal Service	9.4	8.3	8.3	5.4	6.5	6.0	5.5	5.1	−1.62	−1.60

Note: The profits are converted in real term by GDP deflator.

Tab. 2-7. The Share of Profits by Sectors (Unit; 2011Price, Trillion Yen)

	Historical				Forecast			
	1995	2000	2005	2010	2015	2020	2025	2030
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture/Forestry/Fisherie/Mining	5.5	4.6	3.1	3.9	2.9	2.8	2.7	2.6
Manufacturing total	26.5	22.0	14.9	17.1	8.4	7.8	7.4	6.9
Food/Beverage	2.8	4.4	3.7	4.8	3.5	3.5	3.6	3.7
Textile/Pulp/Wooden products	3.0	2.4	1.6	1.5	0.3	0.2	0.1	0.0
Petro/Chemical/Rubber/Ceramic	4.2	3.2	2.3	2.7	1.6	1.4	1.3	1.2
Ferrous/Non-Ferrous/Metal Prod.	2.4	2.2	2.5	1.7	3.1	2.8	2.5	2.2
Machinery	5.6	4.2	1.2	2.0	0.7	0.9	1.1	1.3
Transp. Equip.	1.2	−0.1	0.6	1.1	0.3	0.3	0.3	0.3
Other Manufacturing	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.0
Construction/Civil Engineering	3.1	2.7	1.7	0.6	1.8	1.7	1.6	1.5
Electricity/Gas/Water	3.6	2.7	0.9	2.5	−2.9	−3.0	−3.2	−3.3
Service Industry Total	68.1	73.4	82.1	79.0	88.7	89.3	89.9	90.5
Commerce/Finance/Real estate	45.8	48.8	56.3	56.4	60.6	62.0	63.4	64.7
Transportation/communication/Information	5.3	7.2	8.8	7.3	10.9	10.7	10.5	10.3
Administration/Education/Medical service	2.4	1.5	2.4	3.4	3.4	3.5	3.6	3.7
Business Service	5.2	7.1	6.9	6.1	6.6	6.4	6.3	6.1
Personal Service	9.4	8.8	7.6	5.9	7.3	6.7	6.2	5.7

From 2015 to 2030, the total profit will continue the same level but Service industry grows by 0.13% and Manufacturing falls by 1.28% (Tab.2-6). Since the disaster of East Japan Earthquake, the electricity turned into big deficit and it will continue until 2030.

The total profit share of Manufacturing sector accounted for 26.5% in 1995

decreased seriously to 8.4% in 2015 (Tab. 2-7). On the contrary, the share of the Service sector increased from 68.1% to 88.7% in the same period. In Manufacturing, many sectors decreased the share but only the Machinery sector increased and in Service sector the Commerce/Finance/Real estate and the Public Administration/Education/Medical sector significantly increased.

3. Conclusion: Future subjects of the model

With these forecasts, we can clarify how the service economy of Japan affects on employment and wages. As the implication of these changes we can glimpse how the feature of Japanese economy is in 2030.

The labor shortage becomes more and more evident and the measure to avoid the shortage is urgently needed. The main measure might be to raise the labor productivity. In this model, the future labor productivity is assumed to grow by same rate as in the past 15 years. Accordingly, it requires the attention that as the several industrial sectors' productivity are so low that the severe labor shortage appears for these sectors.

The labor productivity is the integrated result of economic situation, such as economic cycle, result of technical innovations and the capital investment. To raise the labor productivity in Japan, it is necessary to increase the efficiency of whole economy, that is to say, promote business activities by improving the institutional system or deregulation of outdated business control. Especially now the spread of network society caused by IT and communication technologies creates new industries and new services which should be actively integrated with the future Japanese industries. To promote technical innovation, the measures to enrich the support of the fundamental research and also of the applied research should be taken. Adding these direct measures, the indirect measures such as increasing sophisticated human resources also needed for raising the labor productivity in the long run.

In the process of forecasts, we found several tasks to improve the model; to endogenize the labor productivity, to improve the profit equation, to add the compact finance and budget system in the model. And also, following the advancement of Japanese globalization, the Japanese economy expressed by GDP concept does not cover the incomes from abroad, we should find some measures to integrate income from abroad with domestic economy, that is to say the way to approach Gross National Income.

Additional Table: The Original Sources of I-O Table used by JIDEA9

	Basic Table	2000 Linked Table	2005 Linked Table	2011 Linked Table	Exteded Table		Extended Table by ITI	
	Sectors	Sectors	Sectors	Sectors	Base year	Sectors	Base year	Sectors
1995	519×402	498×399	514×401		1990	526×413		
1996					1995	517×401		
1997					1995	517×401		
1998					1995	517×401		
1999					1995	517×401		
2000	517×405	498×399	514×401	510×389			1995	517×403
2001							1995	517×403
2002							1995	517×403
2003							2000	517×403
2004					2000	515×403		
2005	520×407		514×401	510×389	2000	515×403		
2006					2000	515×403		
2007					2000	515×403		
2008					2005	520×407		
2009					2005	520×407		
2010					2005	520×407		
2011	518×397			510×389	2005	520×407		
2012					2010	516×395		
2013					2010	516×396		

Note: METI did not published the full scale extended table from 2000 to 2003.