

## Section 1 Introduction

This study uses an economic model to simulate changes in the labor force and the number of persons in employment up to the year 2030, in line with projected market scale in growth sectors as well as measures to promote women's employment and other employment policies envisioned in the "Japan Revitalization Strategy Amendment 2015," the government's growth strategy (decided by the Cabinet on June 30, 2015). Simulations are based on "Population Projections for Japan" by the National Institute of Population and Social Security Research in Japan (IPSS) in January 2012 (Medium Fertility and Mortality Projections), and are designed to contribute to the planning and proposal of future employment policies. Simulations were conducted by gender and age group, as well as by industry for employed persons. They also assume a scenario in which the market scale, women's employment promotion measures and others envisioned in the "Japan Revitalization Strategy" are not achieved. In addition, as initiatives aimed at local creativity in regional areas take firm shape, the labor force and numbers of employed persons by prefecture are estimated on the assumption of the prefectural populations in the IPSS "Population Projection by Prefecture (March 2013 estimate)," based on the results of the aforementioned simulations.

The Japan Institute for Labour Policy and Training (JILPT) has conducted similar simulations several times since 2004. The last one was based on the "Japan Revitalization Strategy" (decided by the Cabinet on June 14, 2013), the results being published in JILPT Research Material Series No. 129 "Labor Supply and Demand Estimates – Policy Simulations Based on the Labor Supply and Demand Model (FY2013)." This time, the latest actual data have been incorporated in simulations based on the government's revised growth strategy.

This study is part of "Research on Labor Supply

and Demand Estimates," a subtheme of the JILPT Project Research "Survey Research on Directions for Employment and Labor in Response to Changes in Japan's Economic and Social Environments." It was conducted in response to a request from the Employment Policy Division of the Employment Security Bureau, Ministry of Health, Labour and Welfare (MHLW).

## Section 2 Labor Supply and Demand Model

### 1. Estimates of national labor supply and demand

In this study, simulations based on the attainment targets of the "Japan Revitalization Strategy Amendment 2015" (decided by the Cabinet on June 30, 2015) are used to estimate the labor force by gender and age group, the number of employees by gender and age group, and the number of employees by industry, up to the year 2030. Simulations are conducted using an economic model (the Labor Supply and Demand Model) consisting of a labor demand block, a labor supply block and a labor supply and demand adjustment block. The relationship between the blocks is shown in the flowchart in Figure IV-1.

To obtain labor demand in the labor demand block, the nominal output, hourly wage and working hours in a given industry are substituted into a labor demand function based on an error correction model estimated for each industry. Of these, the nominal output is calculated by exogenously multiplying the economic growth rate, the item composition of final demand and composition of goods and services by item, inverse coefficient of input-output tables, and the output deflator. Working hours are calculated by applying the rate of change in all industry working hours (calculated from full- and part-time working hours and future projections of the part-time worker ratio) to each industry. Hourly wages are calculated by applying rates of change estimated in each labor

supply and demand adjustment block to each industry. The labor demand function used in the estimation is as follows.

$$\Delta \ln L(t) = \text{const.} + a \Delta \ln Z(t) + b \ln Z(t-1) + c \ln L(t-1) + \varepsilon(t)$$

where,  $L$ : employed persons,  $Z = \frac{pX}{wH}$  ( $p$ : output deflator,  $X$ : real output,  $w$ : hourly wage and  $H$ : total actual working hours), and  $\varepsilon$ : error term.

In the labor supply block, the labor force ratio is sought by substituting the educational advancement rate, fertility rate, part-time worker ratio, nursery and kindergarten enrollment rate, the ratio of companies offering all employees employment to age 65, and other factors thought to contribute to the labor force ratio, into the labor force ratio function estimated by gender and age group. For females, these are further divided into two subcategories (“with spouse” and “without spouse and others”) depending on the spousal situation. Next, the size of the labor force is calculated by multiplying the obtained labor force ratio by the projected future population. Factors determining the labor force ratio vary by gender and age group. Future projections for these are given exogenously, with the exception of the unemployment rate and real wages. The unemployment rate is the rate estimated in the previous term. Real wages are taken as one of the determinants for the labor force ratio of females without spouse and others, but their value is calculated using the rate of change in wages determined in the labor supply and demand adjustment block. The labor force ratio function used for the estimation is as follows.

$$r(t) = \text{const.} + \sum_{i=1} d_i V_i(t) + \varepsilon(t)$$

where,  $r = \ln(R/(100-R))$  ( $R$ : labor force ratio (%)),  $V$ : explanatory variable of behavioral factors, policy factors and others determining the labor force ratio, and  $\varepsilon$ : error term.

In the labor supply and demand adjustment block, the rationale of the Phillips curve is applied to calculate the rate of rise in wages from the active job

openings-to-applicants ratio, the rate of change in the consumer price index, and terms of trade (the ratio of the export price index to the import price index). Meanwhile, the conversion equation for calculating the unemployment rate by gender and age group from the active job openings-to-applicants ratio is estimated based on past performance, and the unemployment rate by gender and age group thus obtained. The active job openings-to-applicants ratio is obtained by using a conversion equation estimated from past performance to convert the total labor demand for each industry, calculated in the labor demand block, and the total labor force for each gender and age group, calculated in the labor supply block (labor supply and demand multiple). The rate of change in the consumer price index and terms of trade are given exogenously.

The rate of change in wages in the labor supply and demand adjustment block is calculated from the labor demand and labor force calculated in the labor demand and labor supply blocks. This is fed back to the labor demand and labor supply blocks (the future rate of change in wages by industry is collectively based on the industry total), and the labor demand and labor force are calculated using a new wage standard. The figures before and after feeding back are compared, and the model calculation is judged complete (labor demand, labor force and various other estimates determined) at the point when the rates of change in wages appear to converge. Numbers of employed persons by gender and age group are calculated from the unemployment rate and labor force at the point of convergence. Next, the gender and age group totals for these employed persons are divided by industry, based on the industry composition of labor demand, and the resultant figure is taken as the number of employees by industry.

## 2. Estimates of prefectural labor supply and demand

Prefectural data are estimated using the following method, to ensure consistency with the future national labor force and the number of persons in employment by gender and age group, and the number of persons in employment by industry.

Prefectural component ratios of the future number of persons in employment by industry are estimated

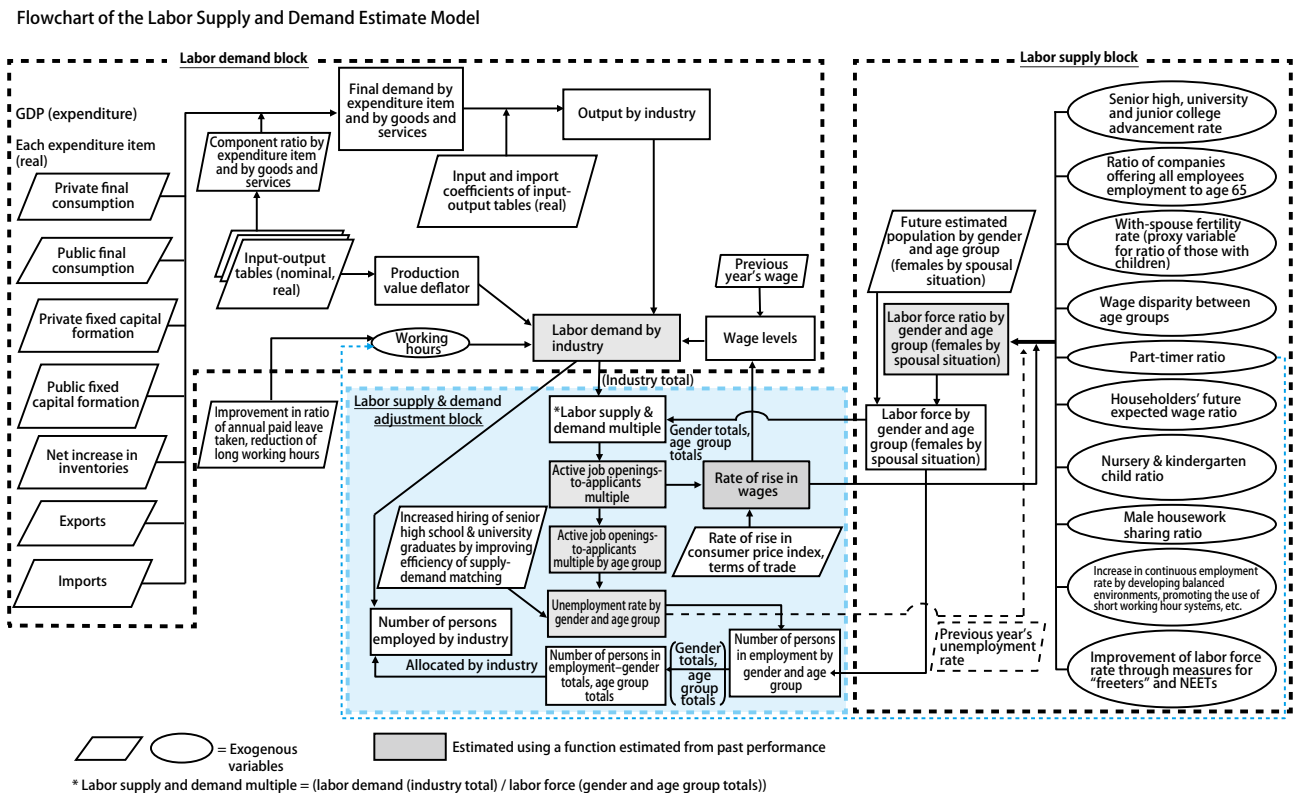
in line with trends over the past 10 years in prefectural component ratios of the number of persons in employment (“persons engaged in work”) by industry in the Ministry of Internal Affairs and Communications (MIC) “Employment Status Survey.” The future national number of persons in employment by industry is then allocated by prefecture (“tentative prefectural number of persons in employment by industry”). The future prefectural component ratios of the number of persons in employment in medical, health care and welfare are based on a simple estimate of prefectures’ future medical and nursing care costs. The estimate is made by multiplying the per capita medical and nursing care costs calculated from the Ministry of Health, Labour and Welfare (MHLW) “Iryo Kyufu Jittai Chosa [Medical Benefits Survey]” and “Survey of Long-term Care Benefit Expenditures” by the estimated future population.

The future prefectural labor force ratios by gender and age group are estimated by applying the national

growth in labor force ratios by gender and age group across all prefectures. Then, the labor force is obtained by multiplying these by the projected future population.

The prefectural unemployment rate by gender and age group is estimated via the active job openings-to-applicants ratio, by calculating the ratios of industry totals for the number of persons in employment (tentative) and gender and age group totals in the labor force in each prefecture, using the equations used in national estimates. The number of persons in employment by gender and age group is calculated from the labor force by gender and age group and the unemployment rate by gender and age group. The “tentative prefectural number of persons in employment by industry” is set as the initial value, and the RAS method is used to reach the definitive prefectural number of persons in employment by industry, to ensure consistency with the prefectural gender and age group totals of the number of persons in employment

Figure IV-1 Flowchart of the Labor Supply and Demand Model



Note: Of the exogenous variables, those shown in parallelograms are mainly related to the labor demand block and the supply and demand adjustment block, while those in the ellipsoids mainly involve the labor supply block.

and the national number of persons in employment by industry.

## Section 3 Simulation Scenarios

### 1. Outline of scenarios

In this study, simulations will be made to show how the future image of labor supply and demand would appear until the year 2030 if economic and employment policies indicated in the “Japan Revitalization Strategy Amendment 2015” and elsewhere are properly implemented and the economic growth rate targets cited in the “Japan Revitalization Strategy Amendment 2015” are met. In this study, this shall be called the “economic revival / progressive labor participation scenario”. The “Japan Revitalization Strategy Amendment 2015” not only specifies numerical targets for new market scale in sectors where growth is anticipated in future, but also sets the aim of medium- to long-term growth of about 2% in real terms. These points are incorporated in the assumption of labor demand in the economic revival / progressive labor participation scenario. On the other hand, to achieve a real growth rate of around 2%, demand for goods would have to be stimulated, participation in the labor market promoted and constraints on the supply of goods eased. Thus, the case in which economic and employment policies are properly implemented and participation in the labor market progresses will be projected as the economic revival / progressive labor participation scenario on the labor supply side.

To compare and contrast with this scenario, in which economic and employment policies are properly implemented, i.e. the economic revival / progressive labor participation scenario, the following scenarios have been prepared in this study. The first is a scenario in which the necessary economic and employment policies are not implemented and risks of a downturn materialize, causing an economic situation close to zero growth in real terms (lower than the average growth rate over the last ten years or so) to be projected, while participation in the labor market does not improve from present levels (2014). In this study, this will be called the “zero growth / unchanged labor participation scenario.” The other is a reference

scenario prepared by JILPT from an independent standpoint, in which economic and employment policies projected in the economic revival / progressive labor participation scenario are partially implemented, a real growth rate of about 1% is achieved (i.e. about half the growth rate target stated in the “Japan Revitalization Strategy”), and labor market participation progresses to a degree. In this study, this will be called the “baseline / gradual labor participation scenario.”

The characteristics of the economic revival / progressive labor participation, zero growth / unchanged labor participation and baseline / gradual labor participation scenarios are as follows. Assumptions on the labor demand side will be called the economic revival scenario, the zero growth scenario, and the baseline scenario, respectively. Meanwhile, assumptions regarding labor market participation on the labor supply side will be called the progressive labor participation case, the unchanged labor participation case, and the gradual labor participation case, respectively.

#### (1) The economic revival / progressive labor participation scenario

In this scenario, economic growth and labor market participation by young people, women, the elderly and others progress through proper implementation of various economic and employment policies (the case in which economic growth and labor participation progress properly).

- 1 Annual economic growth of around 2% in real terms is achieved (in the “Japan Revitalization Strategy,” the target is real growth of around 2% in the medium to long term).
- 2 Additional demand based on growth sector attainment targets in the “Japan Revitalization Strategy Amendment 2015 is taken into account.
- 3 Medical and nursing care costs after reforms in “Revised Future Estimate of Costs Related to Social Security” (March 2012) are taken into account.
- 4 The labor force ratio and employment rate of young people are raised through measures for freeters and NEETs, as well as improved matching efficiency for senior high school and university graduate employment rates.

- 5 Labor market participation by young people progresses by reducing wage disparity among young people compared to the all-age average.
- 6 The ratio of companies offering all employees employment to age 65 rises to 100% by 2025, and working environments for the elderly are developed.
- 7 Nursery and kindergarten enrollment rates rise, and female participation in the labor market progresses.
- 8 The continuous employment rate for women is improved by developing the WLB environment.
- 9 The continuous employment rate for the elderly is improved by promoting the use of short working hour systems, among other measures.
- 10 The ratio of housework sharing by men increases.
- 11 While the part-time worker ratio rises as channels for diverse forms of employment are developed, average working hours decrease with the reduction of long working hours, etc.

## (2) The zero growth / unchanged labor participation scenario

In this scenario, economic growth is posited close to zero growth, and the labor force ratios by gender and age group remain at the same level as at present (2014) (the case in which economic growth and labor participation do not progress properly).

- 1 An economic situation close to zero growth is projected (same economic growth rate as in the reference / gradual labor participation scenario until 2015, zero growth from 2016 onwards).
- 2 Additional demand based on growth sector attainment targets in the “Japan Revitalization Strategy Amendment 2015” is not taken into account.
- 3 Medical and nursing care costs after reforms in “Revised Future Estimate of Costs Related to Social Security” are taken into account in line with an economic situation close to zero growth.
- 4 Current (2014) labor force ratios by gender and age group do not change in future. This means that the current labor force ratio is applied to the estimated future population. The female labor force ratio is seen in terms of the spousal situation (i.e. with spouse or without spouse).

Reference) The baseline / gradual labor participation

scenario

In this scenario, economic growth and labor market participation by young people, women, the elderly and others progress to a degree through partial implementation of various economic and employment policies (the case in which economic growth and labor participation progress to a degree).

- 1 Annual economic growth of around 1% in real terms is achieved (about half the growth rate targeted in the “Japan Revitalization Strategy”).
- 2 About half the additional demand based on growth sector attainment targets in the “Japan Revitalization Strategy Amendment 2015” is taken into account.
- 3 Medical and nursing care costs after reforms in “Revised Future Estimate of Costs Related to Social Security” are taken into account.
- 4 Shrinkage of wage disparity among age groups is about half that in the economic revival / progressive labor participation scenario.
- 5 The ratio of companies offering all employees employment to age 65 rises to 100% by 2025, and working environments for the elderly are developed.
- 6 Nursery and kindergarten enrollment rates grow by about half compared to those in the economic revival / progressive labor participation scenario.

## 2. Assumptions in the labor demand block

### (1) Numbers of employees

Numbers of employees by industry are defined by taking data from the MIC “Labour Force Survey” and recombining them into the industrial category notation used for the Labor Supply and Demand Model. Basically, industrial categories are recombined using simple aggregation, but for recombinations up to 2002, the “National Census” is used. In the Labor Supply and Demand Model, meanwhile, dispatched workers from temporary labor agencies are classified under “Miscellaneous business services,” the industry to which the agencies belong; they are not included in other industries. The rate of change in numbers of employees is obtained and future values determined using the labor demand function.

## (2) Real output

Future real output by industry are estimated using the input-output model. That is, an inverse matrix is calculated from the future input and import coefficients assumed in e. below, and this is multiplied by the final demand estimated in a. to d. to obtain the real output by industry for each scenario.

### a. Assumptions of macroeconomic growth rate and rate of change in commodity prices

The macroeconomic growth rate and rate of change in commodity prices are assumed for each scenario (divided into the two periods 2014-2017 and 2017-2023, annual average values applied for each period). The assumptions use estimates for the real economic growth rate, the rate of change in the corporate goods price index and the rate of change in the consumer price index in the economic revival and baseline scenario of the Cabinet Office “Calculations concerning Medium- to Long-Term Economic and Fiscal Administration” (submitted by the Council on Economic and Fiscal Policy, July 22nd, 2015), as shown in Table IV-2.<sup>1,2</sup>

As Cabinet Office calculations for both economic revival and the baseline scenario cover the period until FY2023, figures from 2024 are assumptions by this study. As for the macroeconomic growth rate for 2024-2030, it is assumed that the per capita economic growth rate (annual average) in 2019-2023 based on Cabinet Office calculations for 2024-2030 will be maintained, and that the macroeconomic growth rate (annual average) will only decrease to the extent of population decline, compared to that for 2019-2023. On the rate of change in consumer prices in 2024-2030, it is assumed that the annual average rate of change for 2019-2023 based on Cabinet Office calculations will also be maintained in 2024-2030.

Finally, the zero growth scenario is a assumption unique to this study. In anticipation of reconstruction

demand, the same macroeconomic growth rate as in the baseline scenario is assumed until 2015, but the growth rate in 2016-2020 will be around the same as the annual average fiscal scale in “Scale and Funding Sources for Recovery and Reconstruction Work during the Reconstruction Period including the Five-Year Period Starting in FY2016” (decided by the Cabinet on June 30, 2015). From 2021 on, meanwhile, the macroeconomic growth rate is assumed to be zero. Moreover, the rate of change in consumer prices is set to be zero from 2017 onwards, under the same assumptions as in the baseline scenario up to 2017, taking account of consumption tax hikes.

### b. Assumptions of final demand component ratio by expenditure item

Although results for the macroeconomic growth rate are shown in the Cabinet Office calculations, the final demand composition by expenditure item is not published. Therefore, the annual average rate of change in estimates for 2005-2020 and 2020-2025 in the Japan Center for Economic Research (March 2015) “41st Medium-Term Economic Forecast” is used for the final demand composition by GDP expenditure item (expenditure side), and real values converted from the 2007 “SNA Input-Output Tables” are extended to obtain figures for this.

### c. Assumptions of the final demand composition of goods and services by expenditure item

On the future final demand composition of goods and services by expenditure item, as with the final demand composition by GDP expenditure item (expenditure side), the average rate of change in estimates until 2025 in the Japan Center for Economic Research (March 2013) “41st Medium-Term Economic Forecast” is used, and real values converted from the 2007 “SNA Input-Output Tables” are extended to obtain figures for this.

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1 The real economic growth rate is based on the chain-linking method.

2 The Cabinet Office calculations are based on fiscal years, but in this study, fiscal years are replaced by calendar years. Also, the growth rate in fiscal year  $t$  in the Cabinet Office calculations is projected as the growth rate from year  $t - 1$  to year  $t$  in this study. As such, the average growth rate for FY2015-2023 in the Cabinet Office calculations is projected as the annual average growth rate for 2014-2023 in this study.

**d. Additional demand in growth sectors in the “Japan Revitalization Strategy” and medical and nursing care costs in “Revised Future Estimate of Costs Related to Social Security”**

In this study, to obtain the final demand, real GDP assumed for each scenario in a. is divided by the final demand composition of GDP (expenditure side)

calculated from the Japan Center for Economic Research “Medium-Term Economic Forecast” in b., and this further divided by goods and services, using the composition of final demand by expenditure item and by goods and services in c. By adding in additional demand by growth sector to this final demand, the final demand corresponding to attainment targets in the

**Table IV-2 Assumptions of Macroeconomic Growth Rate & Rate of Change in Consumer Prices**

Real economic growth rate (% , annual average)

	Actual	Period covered by Cabinet Office calculations			JILPT assumption	2014-20	2020-30	2014-30
	2005-14	2014-17	2017-23	2019-23	2023-30			
Economic revival scenario		1.3	2.3	2.3	2.2	1.8	2.2	2.1
Zero growth scenario	0.4	1.1	0.5	0.1	0.1	0.5	0.0	0.2
(Reference) Baseline scenario		1.1	0.9	0.9	0.8	1.0	0.8	0.9

Per capita real economic growth rate (% , annual average)

	Actual	Period covered by Cabinet Office calculations			JILPT assumption	2014-20	2020-30	2014-30
	2005-14	2014-17	2017-23	2019-23	2023-30			
Economic revival scenario		1.6	2.8	2.9	2.9	2.2	2.9	2.6
Zero growth scenario	0.5	1.4	0.8	0.6	0.6	0.8	0.6	0.7
(Reference) Baseline scenario		1.4	1.4	1.5	1.5	1.4	1.5	1.4

Rate of change in consumer price index (% , annual average)

	Actual	Period covered by Cabinet Office calculations			JILPT assumption	2014-20	2020-30	2014-30
	2005-14	2014-17	2017-23	2019-23	2023-30			
Economic revival scenario		1.8	2.0	2.0	2.0	1.9	2.0	2.0
Zero growth scenario	0.3	1.6	0.0	0.0	0.0	0.8	0.0	0.3
(Reference) Baseline scenario		1.6	1.2	1.2	1.2	1.4	1.2	1.3

Rate of change in corporate goods price index (% , annual average)

	Actual	Period covered by Cabinet Office calculations			JILPT assumption	2014-20	2020-30	2014-30
	2005-14	2014-17	2017-23	2019-23	2023-30			
Economic revival scenario		1.0	1.1	1.2	1.2	1.1	1.2	1.1
Zero growth scenario	0.8	0.9	0.0	0.0	0.0	0.4	0.0	0.2
(Reference) Baseline scenario		0.9	0.4	0.5	0.5	0.6	0.5	0.5

Note: Actual values (in 2014, value calculated by the Cabinet Office) and Cabinet Office calculations (economic revival / baseline scenario) are computed from the Cabinet Office “Calculations concerning Medium- to Long-Term Economic and Fiscal Administration” (submitted by the Council on Economic and Fiscal Policy, July 22, 2015), the MIC “Population Estimates”, and the IPSS “Population Projections for Japan (January 2012 Medium Fertility and Mortality Projections)”. For 2024 onwards, it is assumed that the per capita real economic growth rate, the rate of change in the consumer price index and the rate of change in the corporate goods price index in 2019-2023 will all trend in accordance with their annual average values. The zero growth scenario presents figures assumed for this study.

“Japan Revitalization Strategy” and medical and nursing care costs in “Revised Future Estimate of Costs Related to Social Security” is produced.

In the main text of the “Japan Revitalization Strategy,” attainment targets for each main policy are indicated in I. Overview 5. Examples of Necessary Key Measures in Line with the “Roadmap to Growth.” As attainment targets related to future market scale by industry, the following will be used in this study:

Of “(1) Unleashing the power of the private sector to the fullest extent,” the figures included in “4. Creating and developing a good health and longevity industry,” “5. Turning agriculture, forestry and fishery industries into growth industries” and “6. Developing the energy industry and acquiring global market share”; and of “(3) Creating new frontiers,” those included in “3. Through public-private sector joint efforts, capturing a share of the world’s infrastructure market that is expected to grow” and “4. Promoting globalization by advancing Cool Japan and increasing the number of foreign visitors to Japan and encouraging foreign direct investment in Japan.”<sup>3</sup>

In the debate on comprehensive reform of tax and social security, the “Future Estimate of Costs Related to Social Security” has been revised (March 2012) and estimates of social security costs estimated using new assumptions. Assumptions of additional medical and nursing care costs will be based on these estimates.

The attainment targets in the “Japan Revitalization Strategy” and medical and nursing care costs taken into account in this study are as follows<sup>4</sup> (below, in the case of the economic revival scenario).

1 Expand markets for health promotion, preventive care and living assistance industries to 10 trillion yen by 2020 (6 trillion yen up from 2011).

2 Expand markets for pharmaceuticals, medical devices, and regenerative medicine-related industries to 16 trillion yen by 2020 (4 trillion yen up from 2011).

3 Japanese companies to capture domestic and international market shares of energy-related industries amounting to 26 trillion yen by 2020 (18 trillion yen up from 2012). Of which, domestic share 10 trillion yen (6 trillion yen up from 2012), overseas share 16 trillion yen (12 trillion yen up from 2012). Domestic market scale 11 trillion yen in 2030 (7 trillion yen up from 2012).

4 Expand overseas orders for infrastructure sales to 19.5 trillion yen by 2020 (13.6 trillion yen up from 2010). Of which, orders in the medical sector 1.5 trillion yen (1 trillion yen up from 2010). Moreover, orders in the medical sector 5 trillion yen in 2030. Domestic market scale 16 trillion yen in 2020 (14 trillion yen up from 2010), 33 trillion yen in 2030 (31 trillion yen up from 2010).

5 Expand markets for “6th industries” to 10 trillion yen by 2020 (9 trillion yen up from 2010), 3 trillion yen by 2015 (2 trillion yen up from 2010).

6 Expand total exports by agricultural and food manufacturing industries to 1 trillion yen by 2020, to a total of 5 trillion yen by 2030.

7 Achieve 20 million foreign visitors to Japan by 2017 and 30 million or more by 2028. Increase total travel expenditure to 4 trillion yen at the point when foreign visitors to Japan reach 20 million.

8 Increase total medical and nursing care costs borne by households and government contributions to 57.1 trillion yen after reform by 2015, 69.9 trillion yen after reform by 2020, and 83.1 trillion yen after reform by 2025.<sup>5</sup>

\*1 As detailed attainment targets for 2030 are

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3 In “(1) Unleashing the power of the private sector to the fullest extent,” the attainment target of expanding the PPP/PFI program scale from the current 4.1 trillion yen to 12 trillion yen over the next 10 years is stated in “7. Establishing, managing, and updating social infrastructure by making use of private funds and know-how (PPP/PFI).” In this study, however, this is seen as a means of attaining targets in other sectors (such as stimulating infrastructure investment markets), and is not directly included in the calculation of final demand.

4 Although the “Japan Revitalization Strategy” sets specific targets, it should be noted that some sectors have no targets in this study. For example, by promoting “Cool Japan,” overseas sales of broadcast contents are to be tripled from the current level (6.3 billion yen) by 2018. Such targets are not explicitly mentioned in this study, as it would have been difficult to estimate the portion of additional demand arising from policy implementation.

5 Medical and nursing care costs are calculated by combining amounts in the Future Estimate of Costs Related to Social Security with individual contributions.



not necessarily shown by sector, some are estimated.

- \*2 Overseas orders for infrastructure sales in 2020 consist of the target of 30 trillion yen minus amounts for energy and medical costs.

#### e. Assumptions of input and import coefficients

The future industry and technology composition (input coefficient) and import ratio (import coefficient) are assumed as constants, based on real converted values in the 2007 “SNA Input-Output Tables.” This means that the 2007 industry and technology composition and import coefficient will also be projected in future. However, the import coefficient is adjusted to be consistent with the gross import value, obtained by dividing the real GDP assumed for each scenario by the final demand composition of GDP (expenditure side) calculated from the Japan Center for Economic Research “Medium-Term Economic Forecast.”

#### (3) Output deflator

The future value of the output deflator by industry is basically obtained by means of an extended estimate based on trends using the 2000-2007 “SNA Input-Output Tables.”

#### (4) Wages and working hours

Working hours by industry are based on total actual working hours, obtained by adding the actual number of scheduled hours worked by ordinary workers in the MHLW “Basic Survey on Wage Structure” to the actual number of overtime hours worked. Wages by industry are obtained by dividing the contractual cash earnings of ordinary workers in the MHLW “Basic Survey on Wage Structure” by total actual working hours. In both cases, the figures refer to private businesses with 10 or more workers. As no data for agriculture, forestry and fisheries can be obtained from the “Basic Survey on Wage Structure,” industry total figures are used for these. Again, no data can be obtained for “government” and “industries unable to classify,” and so figures for other service industries are used for government, compound services, and industries unable to classify.

Future values for wages by industry are sought by multiplying the rate of rise in wages determined in the labor supply and demand adjustment block for each industry (the rate of rise in wages function estimated from the rate of change in hourly wages, obtained by dividing the contractual cash earnings (monthly) of ordinary workers (industry total) by working hours (monthly)) by the previous term’s hourly wage. For each industry, the weighted average (industry total) of full-time workers and part-time workers is used, and working hours are assumed for each case in line with the degree of future labor market participation. Future estimates of working hours in the progressive labor participation case take account of reduction due to improvement in the ratio of annual paid leave taken and reduction of long working hours, based on the rising ratio of part-time workers and policy targets deliberated by the working groups of the Labour Policy Council.

### 3. Assumptions in the labor supply block

#### (1) 3 cases in line with progress in labor market participation

Future assumptions of explanatory variables for the labor force ratio function are divided into the following three cases, depending on the degree of progress in labor market participation. Future projections of each explanatory variable in the progressive labor participation case and the gradual labor participation case are as shown in Table IV-3. The labor force ratio in the unchanged labor participation case is unchanged from the situation in 2014.

- (a) Progressive labor participation case: Various employment policies are properly implemented and labor market participation progresses (the case in which labor market participation progresses).
  - (b) Unchanged labor participation case: The 2014 labor force ratios by gender and age group remain constant in future (the case in which labor market participation does not progress).
- (Reference) Gradual labor participation case: Various employment policies are partially implemented and labor market participation progresses to a degree (the case in which labor

market participation progresses to a degree).

Of the explanatory variables, the previous term's unemployment rate and real wages are not included in Table IV-3, but these are determined endogenously within the model. Future values for real wages (contractual cash earnings (industry total, ordinary workers) / consumer price index (General Index)) are obtained from the rate of change in ordinary workers' contractual cash earnings (male-female total), as determined in the labor supply and demand adjustment block. However, the consumer price index as the denominator of real wages is based on the assumptions in Table IV-2.

## (2) Labor force ratio and population aged 15 and over

The source for the labor force ratio by age group (labor force / population aged 15 and over) is the MIC "Labour Force Survey" (for both the labor force and the population aged 15 and over). However, data by spousal situation for the over 65s are not published in the Labour Force Survey, and so figures obtained by estimating in this study are used as actual figures.<sup>6</sup> Meanwhile, figures for 2005-2010 are compatible time-series data based on the (revised) Census-based population for 2010 in the "Labour Force Survey," while those for 2011 are supplementary estimates affected by the Great East Japan Earthquake (based on the (revised) Census-based population for 2010). For those aged 70 and over in 2005-2011, similarly, no

Census-based population figures have been published. Instead, this study uses figures obtained in reference to the method of interpolation correction accompanying the switch in the basis for benchmark population by the Ministry of Internal Affairs and Communications. As for the data by spousal situation, for which supplementary estimates have not been published, figures obtained by dividing the post-supplement data for females based on the pre-supplement component ratio by spousal situation are used.

Future values for the labor force ratio are obtained using the labor force ratio function, but there are exceptions in some age groups. That is, for males aged 70 and over, females (with spouse) aged 60 and over, and females (without spouse and others) aged 55 and over, estimates are not made using the labor force ratio function, but future estimates are made on the assumption that they will trend in accordance with a fixed survival rate (cohort<sup>7</sup> survival rate) from the closest age group.<sup>8</sup> Specifically, the labor force ratio for each relevant age group is estimated from the 2014 actual figure for the rate at which it decreased from the labor force ratio for the age group 5 years younger at a point 5 years previously ( $1 - \text{survival rate}$ ), or from the average of actual figures for 2010-2014. Also, since the absolute number of "females (with spouse)" aged 15-19 in the labor force is small and the 2014 labor force ratio would be calculated as zero, the average labor force ratio for 2000-2012 is adopted. For the "females (with spouse)" 20-24 age group, similarly, the absolute number of the labor force is small, and so the 2014

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6 Concerning the elderly portion of the female population, information on the labor force ratio by 5-year age groups cannot be obtained by spousal situation from the "Labour Force Survey." Instead, the population aged 15 and over and the labor force composition by 5-year age group and by spousal situation obtained from the "National Census" are taken as initial values, and the RAS method is used to estimate the population aged 15 and over and the labor force by 5-year age group and by spousal situation. This is to ensure consistency with the population aged 15 and over and labor force by 5-year age group and the population aged 15 and over and labor force by spousal situation in the "Labour Force Survey." The labor force ratio is calculated from the estimated population aged 15 and over as well as the labor force by 5-year age group and by spousal situation.

7 A cohort (age group population) is a single collection of people belonging to a given age group at a given point in time.

8 According to the 2010 National Census, non-marriage accounted for a higher ratio than widowhood among women (no spouse and others) in age groups up to 55-59 compared to the population of each age group, but the opposite was true in age groups 60-64 or higher. Therefore, changes in the labor force ratio in ages 60-64 and over are thought to be impacted relatively strongly not only by the same cohort but also by the change from females (with spouse). Because of this, no survival rate by spousal situation is projected for women aged 60 and over, but the total female survival rate is used equally for those with spouse, without spouse and others.

**Table IV-3 Settings in Cases of Labor Market Participation**

		Progressive labor participation	(Reference) Gradual labor participation	Unchanged labor participation	
		Case in which participation in the labor market progresses	Case in which participation in the labor market progresses to a degree	Case in which participation in the labor market does not progress (2014 labor force ratio fixed case)	
Basic trend change variables	Senior high school advancement rate (males)	Logistic curve applied to extend until 2030			
	Senior high school advancement rate (females)				
	University and junior college advancement rate (males)				
	University and junior college advancement rate (females)				
With-spouse fertility rate		For 2014 onwards, the fertility rate (medium, 5-yearly) in the IPSS "Population Projections for Japan (January 2012 Estimates)" is used (linear interpolation for intermediate years).			
Measures for young persons	Improvement of labor force ratio by freeter measures and employment or other career decisions by NEETs	On the assumption that labor market participation by younger age groups will be encouraged by freeter measures and employment or other career decisions by NEETs, the labor force ratio for males and females aged 15-19, 20-24, 25-29, and 30-34 is projected to be 0.01-0.17 points higher in 2020 (linear interpolation for intermediate years; from 2021 onwards, linear extrapolated estimates).	None		
	Increase in senior high school & university graduate employment rates by improving the efficiency of supply-demand matching	On the assumption that employment in younger age groups will be encouraged by the improvement in supply and demand matching efficiency, the employment rate for the 15-19 age group is projected to rise by 0.35 points (males) and 0.47 points (females) in 2020 and by 0.35 points (males) and 0.42 points (females) in 2030. The employment rate for the 20-24 age group is projected to rise by 0.62 points (males) and 0.74 points (females) in 2020 and by 0.62 points (males) and 0.78 points (females) in 2030.	None		
M-curve measures for women	Improvement of continuous employment rate by developing WLB environment	On the assumption that job leaving on grounds of childbirth and childcare will decrease with the development of the WLB environment, a rise in the continuous employment rate is projected to result in the labor force ratio of females (with spouse) aged 30-34 rising by 2.0 points in 2020 and 1.5 points in 2030.	None		
	Ratio of housework sharing by men	With an increase in the share of housework by men due to a reduction of working hours, wives' conversion to regular employment, changes in husbands' awareness, and other factors, the share of housework by men is set to rise from 13.2% in 2011 to around 37.2% in 2030 via linear interpolation. By contrast, the wife's share of housework is projected to decrease commensurately with this effect.	Fixed at the 2014 estimate value (14.5%) in the projection for the progressive labor participation case		
	Nursery and kindergarten enrollment rate	Trend extension from 54.2% in 2014 (65.2% in 2030), taking account of the reduction in waiting lists by expanding childcare arrangements until 2017.	Set at about half the rate of increase from the actual figure in 2014 to the progressive labor participation case in 2030		
Measures for the elderly	Improvement of continuous employment rate by promoting the use of short working hour systems, etc.	The labor force ratio for both males and females aged 65-69 is projected to rise by 0.8 points (males) and 0.4 points (females) in 2030, due to promoting the use of short working hour systems, among others (linear interpolation for intermediate years).	None		
	Ratio of companies offering employment to age 65	Extended at a constant rate until the ratio of companies rises to 100% in 2025.	As on left		
Work-life balance related measures and other explanatory variables	Average working hours	Weighted average of full- and part-time workers	To decrease from 154.9 hours per month in 2014 to 150.0 hours in 2030.	Remains fixed in future at the 2014 monthly figure of 154.9 hours	As on left
		Full-time	To decrease from 177 hours per month in 2014 to 175.5 hours in 2020 and 171.9 hours in 2030 (linear interpolation for intermediate years).	Fixed at the 2014 monthly figure of 177 hours	As on left
		Part-time	To increase from 88.5 hours per month in 2014 to 110.6 hours in 2030 (linear interpolation for intermediate years).	Fixed in future at the 2014 monthly figure of 88.5 hours	As on left
	Part-time worker ratio	To reach 40.3% (obtained by applying a logistic curve to the part-time worker ratio) in 2030 by linear interpolation.	Fixed at the 2014 part-time worker ratio (29.8%)	As on left	
	Reduction of age group wage disparity (in relation to age group totals) by conversion to regular employment, etc.	Disparity to shrink to 10% by 2030 for ages 15-19, 20-24, 25-29 and 30-34, by year-on-year linear interpolation.	Disparity to shrink to 10% by 2030 for ages 15-19 and by 5% for ages 20-24, 25-29 and 30-34, by year-on-year linear interpolation.		
Householders' future expected wage ratio (male age 45-49 wage / male age 20-24 wage)	Fixed at 2014 value (1.870).		As on left		

- Notes: 1. In the progressive labor participation case, the improvement of the labor force ratio through measures for freeters and NEETs takes account of targets in the "Japan Revitalization Strategy" (decided by the Cabinet on June 14, 2013) and policy targets deliberated by working groups of the Labour Policy Council. There are to be 1.24 million young freeters by 2020. The number of NEETs who will decide their career paths with help from the Local Youth-Support Station Project is to be 16,000 per year by 2020 (in the estimates, about 83% of these "career path deciders" are assumed to actually find employment).
2. In the progressive labor participation case, improvement of the continuous employment rate by developing the WLB environment takes account of the target stated in the "Japan Revitalization Strategy" of increasing the rate of continuous employment before and after the birth of the first child to 55%.
3. In the progressive labor participation case, the nursery and kindergarten enrollment rate takes account of the target stated in the "Japan Revitalization Strategy" of providing additional childcare arrangements for about 200,000 children in FY2013 and FY2014, and for about 400,000 and more in FY2013-2017.
4. In the progressive labor participation case, the reduction of average working hours takes account of policy targets deliberated by working groups of the Labour Policy Council. The ratio of annual paid leave taken is to be increased to 70% by 2020 (ratio projected by JILPT to reach 100% by 2030). The ratio of workers working 60 or more hours per week is to be cut to half the 2008 figure by 2020 (in 2008, 10%).

labor force ratio is simply extended.

Future values for the population aged 15 and over are obtained from “Population Projections for Japan (January 2012 Medium Fertility and Mortality Projections)” by the National Institute of Population and Social Security Research in Japan (IPSS). As future values for the population aged 15 and over by spousal situation, ratios by spousal situation are calculated from “Household Projections for Japan (Whole Country Estimate) (January 2013 Estimate),” and the future values are obtained by multiplying these by the population in “Population Projections for Japan (January 2012 Estimate).”

### **(3) Explanatory variables in the labor force ratio function**

#### **a. Assumptions of senior high school, university and junior college advancement rates**

As those enrolled in education have a lower labor force ratio than those not enrolled in education, the educational advancement rate is seen as a factor that reduces the labor force ratio. Although the university and junior college advancement rate is an explanatory variable of the labor force ratio function in the 20-24 age group, data going back two years are used, as advancement usually takes place at around age 18. In other words, the rise in the university and junior college advancement rate 2 terms previously (2 years previously) is seen as reducing the labor force ratio in the 20-24 age group in the term in question (year in question). Data are sourced from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) “School Basic Survey.” The senior high school advancement rate in 2014 was 96.1% for males and 96.9% for females, while the university and junior college advancement rate was 51.6% for males and 56.2% for females.

Future estimates of the advancement rate are based on trends over the past 20 years or so. Since the high rate of increase in recent years is thought unlikely to continue in future, future assumptions are basically estimated in accordance with a logistic curve based on past trends. Moreover, this assumption applies equally to the progressive labor participation and gradual labor participation cases.

#### **b. Assumptions of the with-spouse fertility rate**

The birth of a child is seen as a factor that reduces the labor force ratio until the start of compulsory education, in that it increases women’s burden of childcare. Sources for the with-spouse fertility rate (fertility rate of same cohort 5 years previously (per thousand female population) / with-spouse ratio of same cohort 5 years previously = number of births / population of females with spouse for same cohort 5 years previously) are the MHLW “Vital Statistics” and the MIC “Labour Force Survey.” The with-spouse fertility rate in 2013 was 238.2 in ages 25-29 and 162.4 in ages 30-34.

The fertility rate, as a numerator of the future with-spouse fertility rate, is based on estimates in the IPSS “Population Projection for Japan” (January 2012 Medium Fertility and Mortality Projections). However, since the fertility rate is published every 5 years, interpolation estimates are made linearly for the intermediate years. Meanwhile, a value calculated from the IPSS “Household Projections for Japan (Whole Country Estimates) (January 2013 Estimates)” is used for the denominator, i.e. the with-spouse female ratio. This assumption also applies equally to the progressive labor participation and gradual labor participation cases.

#### **c. Assumptions of the ratio of housework sharing by men**

An increase in housework hours by men is seen as a factor that raises the labor force ratio, in that it reduces women’s burden of housework and increases the female labor force. The source for the ratio of housework sharing by men (total average weekly hours spent on housework, caring and nursing, childcare and shopping by husbands as a whole, divided by the total average weekly hours spent on housework, caring and nursing, childcare and shopping by husbands as a whole and wives as a whole) is the MIC “Survey on Time Use and Leisure Activities,” with the intermediate years between surveys estimated by linear interpolation. The ratio of housework sharing by men in 2011 was 13.2%.

In the progressive labor participation case, the ratio of housework sharing by men is projected to rise as a result of reduced working hours, wives’

conversion to regular employment, changes in husbands' awareness, etc. The assumed value for the ratio of housework sharing by men in 2030 is taken as 37.2%. This assumption is at the same level as Sweden (37.7%), as found by an international comparison of the ratio of housework sharing by men in "International Comparison of the Social Environment regarding Declining Birthrates and Gender Equality" by the Special Committee on the Declining Birthrate and Gender Equality of the Council for Gender Equality (2005). This figure for the ratio of housework sharing by men in Sweden (calculated from housework and childcare hours by wives in full-time employment and total housework and childcare hours by husbands in couples with children under the age of 5) is from 1991.<sup>9</sup>

#### **d. Assumptions of the nursery and kindergarten enrollment rate**

If the ratio of children enrolled in nurseries and kindergartens increases, it leads to a reduced burden of childcare for women, and is therefore seen as a factor that raises the labor force ratio. Sources for the nursery and kindergarten enrollment rate (nursery and kindergarten enrollees / population aged 0-6) are, for nursery enrollees, the MHLW "Report on Social Welfare Administration and Services," and for kindergarten enrollees, the MEXT "School Basic Survey." The population aged 0-6 is from the MIC "Population Estimates." The nursery and kindergarten enrollment rate in 2014 was 54.2% (numbers of nursery enrollees are approximate).

The nursery and kindergarten enrollment rate in the progressive labor participation case is estimated on the basis of trends over the past 15 years or so, etc., on the assumption that nurseries and kindergartens will be developed. However, in the "Japan Revitalization Strategy," the stated target is to provide additional childcare arrangements for about 200,000 children in FY2013 and FY2014, and for about

400,000 more in FY2013-2017. As such, until 2017 the numerator of the nursery and kindergarten enrollment rate is only increased to the extent that waiting lists are reduced. Taking the reduction in waiting lists into account, the level of a simple trend extension estimate will be surpassed as of 2030. As a result, the nursery and kindergarten enrollment rate for 2030 in the progressive labor participation case is 65.2%. In the gradual labor participation case, the rate of rise in the fixed rate estimate is assumed to be half that in the progressive labor participation case.

#### **e. Assumptions of the ratio of companies offering all employees employment to age 65**

An increase in companies guaranteeing employment until age 65 leads to factors that expand the labor force, and is therefore seen as a factor that will raise the labor force ratio. The ratio of companies offering all employees employment to age 65 is in fact the total of three ratios: (1) the ratio of companies with no specified retirement age system, (2) the ratio of companies specifying a fixed retirement age of 65 and above, and (3) of companies specifying a fixed retirement age of less than 65, the ratio of those that have an employment extension system or re-employment system for those aged 65 and over or with no specified age, and which in principle offer these systems to all employees. Data are sourced from ratios of companies with a scale of 31 (or 30) or more employees in the MHLW "Status of Employment of Elderly Persons," "Survey on Employment Management" and "General Survey on Working Conditions." For years with no published data, however, the estimates in this study are used. In 2014, the ratio of companies offering all employees employment to age 65 was 71.0%.

The 2000 Amendment to the Employees Pension Insurance Act provides that, over the space of 12 years from FY2013 (i.e. by FY2025), the starting age

9 A direct comparison is not possible as the figures and subjects are different. However, according to the "Swedish Time Use Survey 2010/2011" by Statistics Sweden, among married males and females aged 20-64 with children aged less than 7, the husband's share of housework was 38.8% in 1990/91 but had risen to 44.7% in 2010/11 (whole week, participant average, from September to the following May).

for receiving old-age employees' pension (earnings-related component) is to be raised from 60 to 65, with an increase of one year every three years.<sup>10</sup> In 2004, the Act on Stabilization of Employment of Elderly Persons was amended in response to this, and the age for obligatory measures to guarantee employment for the elderly (raising the fixed retirement age, introducing systems of continuous employment (although, when standards have been specified by labor-management agreements, this need not be offered to all employees), and abolishing stipulations of a fixed retirement age) was to be raised to 65 from FY2013. Further, in the 2012 Amendment of the same Act, the arrangement allowing elderly persons subject to continuous employment systems to be limited based on standards specified by labor-management agreements was abolished. However, the transitional period in which standards may continue to be applied to those who have already reached the starting age for receiving old-age employees' pension (earnings-related component) is set at 12 years (until April 1st, 2025). Based on these trends in legal amendments, the ratio of companies offering all employees employment to age 65 is assumed to reach 100% in 2025. For intermediate years, the rate is estimated to grow at a fixed rate from the actual figure in 2014 (71.0%) until it reaches 100%. This assumption also applies equally to the progressive labor participation and gradual labor participation cases.

#### **f. Assumptions of the rate of reduction in age group wage disparity**

A relative rise in wages for males in a given age group compared to total wages for males in that age group could be expected to cause an increase in the labor force. As such, this is seen as a factor that increases the labor force ratio in young male age groups. The source for data on age group wage disparity (wages for males in a given age group / total wages for males in that age group) is the MHLW "Basic Survey on Wage Structure." Here, the male industry total, ordinary workers' age

group total, and contractual cash earnings by age group are used. Meanwhile, the wages and working hours in the "Basic Survey on Wage Structure" used for the labor supply block are figures referring to private businesses with 10 or more workers.

The wage disparity for age group totals in younger age groups is assumed to shrink in future. The rate of reduction in ages 20-34 in the gradual labor participation case is assumed to be half that of the progressive labor participation case.

#### **g. Assumptions of householders' future expected wage ratio**

The expectation by a core earner in a household that wages will rise in future is seen as a factor that reduces the labor force ratio among non-core earners. Normally, this explanation is made for the labor force ratio of non-core earners already sharing the same household, but here, the expectation that wages will rise by males who will become core earners in future is seen as reducing the labor force ratio among unmarried females who will become non-core earners in future. The source for this householders' future expected wage ratio (male age 45-49 wage / male age 20-24 wage) is the MHLW "Basic Survey on Wage Structure," using the male industry total and contractual cash earnings of ordinary workers by age group. The wage ratio in 2014 was 1.870.

No clear trend can be seen in the householders' future expected wage ratio in recent years, and the closest actual figure (in this study, 2014) is assumed to remain constant in future. This assumption also applies equally to the progressive labor participation and gradual labor participation cases.

#### **h. Assumptions of the part-time worker ratio**

An increase in part-time workers leads to an expansion of employment opportunities, and is therefore seen as a factor that increases the labor force ratio. The source for the part-time worker ratio (employed persons working less than 35 hours a week (industry

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10 This timing will be used to raise the payment age for men; for women, the change will be delayed by five years.

total) / total employed persons (industry total)) is the MIC “Labour Force Survey.”<sup>11</sup> In 2014, the part-time worker ratio was 29.8%.

In the progressive labor participation case, the part-time worker ratio is assumed to rise in future as channels for employment diversify. However, since the ratio is thought unlikely to grow linearly in future, figures obtained in accordance with a logistic curve based on trends over the past 15 years or so are taken as future values. As a result, the 2030 value in the progressive labor participation case is 40.3%, while for intermediate years, it is estimated by linear interpolation from the actual figure for 2014. Meanwhile, the part-time worker ratio in the gradual labor participation and unchanged labor participation case is fixed at the actual figure for 2014.

#### **i. Assumptions of working hours**

The future values for working hours listed in Table IV-3 are used as explanatory variables of the labor demand function. When estimating the labor demand function, the working hours of ordinary workers by industry (monthly) are used. However, future values of working hours in each industry are estimated as extensions, based on the rate of change in weighted averages for full-time workers and part-time workers as industry totals.<sup>12</sup>

In the gradual labor participation and unchanged labor participation cases, working hours are assumed to remain constant from the situation in 2014. On the other hand, the assumption of working hours in the progressive labor participation case takes account of policy targets deliberated by working groups of the Labour Policy Council, and is assumed to change as follows in future.

Future assumptions of monthly working hours by

full-time workers (progressive labor participation case) take into account, firstly, the reduction in working hours due to the increase in the ratio of annual paid leave taken. In the policy targets deliberated by working groups of the Labour Policy Council, the aim is to raise the ratio of annual paid leave taken to 70% by 2020. Thus, the assumption here is that the ratio will rise to 70% in 2020 and to 100% in 2030, as an independent assumption by this study. This includes linear interpolation for intermediate years. The reduction in working hours due to the increased ratio of annual paid leave taken is calculated using the number of scheduled working hours per day (industry total, company scale total, workers average) and the number of days of annual paid leave taken (industry total, company scale total) in the MHLW “General Survey on Working Conditions (2014).” As a result, monthly working hours are assumed to decrease by 2.5 hours in 2020 and 6.1 hours in 2030.

Although monthly working hours by part-time workers have been tending to decrease in recent years, workers who engage in diverse employment formats (i.e. ways of working that are mid-way towards full-time employment) are assumed to increase. In the process, 25% of the difference between working hours of full-time workers and part-time workers in 2014 will be eliminated, monthly working hours of the latter increasing to 110.6 hours by 2030 (progressive labor participation case).

If the working hours of full-time workers and part-time workers obtained in the assumptions outlined above<sup>13</sup> are converted to a weighted average based on the part-time worker ratio (as data on working hours are obtained from the MHLW “Basic Survey on Wage Structure” (industry total, male-female total), the

11 The figure for 2011 is estimated by interpolation as the average of 2010 and 2012.

12 The reason why the working hours of ordinary workers are estimated as extensions based on the rate of change in weighted averages for full-time workers and part-time workers is that ways of working by ordinary workers (of whom the majority are regular employees) are expected to change in future. In future, it is assumed that some part-time workers will work like part-time regular employees and that these will increase to a degree.

13 Total actual working hours of ordinary workers are used for the working hours of full-time workers. For part-time workers, on the other hand, working hours are calculated by multiplying the scheduled working hours of part-time workers by the number of days actually worked. It should be noted, therefore, that the working hours of part-time workers do not include unscheduled working hours.

part-time worker ratio in that survey is used, and is calculated to change at the same rate as the part-time worker ratio in h. above), the average monthly working hours will decrease from 154.9 hours in 2014 to 153.2 hours in 2020 and 151.2 hours in 2030 (progressive labor participation case).

Another policy target on working hours deliberated by working groups of the Labour Policy Council is that the ratio of employees working 60 hours or more each week should be reduced to half the 2008 figure (10%) by 2020. In response to this, the reduction in working hours assumed from the MIC “Labour Force Survey” is calculated on the assumption that average working hours will only decrease to reflect the 50% reduction in the ratio of employees working 60 or more hours per week. As a result, monthly working hours will decrease by 1.2 hours in 2020, and this is subtracted from the weighted averages of working hours by full-time workers and part-time workers. The decrease in intermediate years from 2014–2020 is obtained by linear interpolation, and remains fixed from 2020 onwards.

By carrying out this series of operations, ultimately, the average monthly working hours of workers as a whole are assumed to decrease from 154.9 hours in 2014 to 152.0 hours in 2020 and 150.0 hours in 2030 in the progressive labor participation case.

#### **j. Assumptions of direct policy effects**

For the progressive labor participation case in Table IV-3, no parameters have been estimated as explanatory variables of the labor force ratio function. Instead, some of the shift factors are seen as direct policy effects that increase the constant terms of said function.

One of these is the effect of improving the labor force ratio among young people through measures for freeters and NEETs. Others are the effect of raising

the continuous employment rate for females by developing the WLB environment, and improving the continuous employment rate for the elderly by promoting the use of short working hour systems, etc. Freeter measures are designed to convert freeters to regular employment, but they also have the effect of improving the labor force ratio.

In addition to these, the effect of improving the employment rate by promoting employment in younger age groups through improvement of matching efficiency (direct policy effects that reduce the constant terms of the unemployment rate function) are also taken into account.

#### **(a) Freeter measures**

The “Japan Revitalization Strategy” sets the target of reducing the number of young freeters to 1.24 million by 2020.<sup>14</sup> According to the MIC “Labour Force Survey”, the number of freeters peaked at 2.17 million in 2003, but was down to 1.79 million in 2014.

In future, the number of freeters is expected to decrease to a certain extent under the impact of population shrinkage, but is also estimated to fall further due to policy effects, as follows. Firstly, a ratio is calculated by dividing the number of freeters by gender and age group in 2014 by the population by gender and age group. Next, this ratio is multiplied by the population by gender and age group in 2020 (“Population Projections for Japan (January 2012 Medium Fertility and Mortality Projections),” “Household Projections for Japan (Whole Country Estimates) (January 2013 Estimates)”). This is taken as the number of freeters by gender and age group in 2020 if there are no policy effects. As a result, there will be 1.67 million freeters in 2020 if there are no policy effects; the difference of 0.44 million compared to the attainment target of 1.24 million would be the number of freeters additionally reduced as a result of policy

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14 The definition of “freeters” is based on the MHLW “Analysis of the Labor Economy in 2003,” where the term “freeter” refers to a graduate in the 15–34 age group who (1) is currently employed and whose employment format is called “part-time work” or “*arubaito*” (temporary work) in the place of work, or (2) is currently looking for work (completely unemployed) and wishes to work in a part-time job or “*arubaito*”, or (3) is not currently looking for work and is neither engaged in housework nor attending school, but who wishes to find employment and would prefer to work in a part-time job or “*arubaito*.” For females, freeters are limited to unmarried persons, in addition to conditions (1)–(3) above.



effects.

Further, the decrease in freeters by employment status, gender and age group due to policy effects is taken as the difference between the number of freeters by gender and age group in 2020 if there are no policy effects, as calculated above, and the attainment target of 1.24 million allocated according to the component ratio of freeters by gender and age group in 2014. The decrease in freeters by employment status, gender and age group, divided by the population by gender and age group in 2014, is taken as a policy effect of improving the labor force ratio in 2020.

However, as freeters in employment are already counted in the labor force ratio, they are not included in the improvement of the labor force ratio due to policy effects. The conversion of employed freeters to regular employment is seen as helping to reduce age group wage disparity. Similarly, the reduction in unemployed freeters is thought to be included in the effect of raising the labor force ratio through the labor force ratio function, due to the improvement in the unemployment rate (one term previously) as an explanatory variable. As such, this reduction is not included in the improvement of the labor force ratio due to policy effects. Therefore, only the improvement of the labor force ratio among freeters as a non-labor force element is taken as an additional policy effect.

Policy effects in the intermediate years until 2020 are estimated by linear interpolation. And from 2021 onwards, the same level of policy effects as in 2020 is envisaged, so the values for 2020 will remain constant.

#### (b) NEETs measures

One of the policy targets deliberated by working groups of the Labour Policy Council is to help a total of 100,000 NEETs to take up employment or otherwise decide their career paths through Local Youth-Support Stations in FY2011-2020. According to the MHLW Human Resources Development

Bureau, meanwhile, actual figures for 2013 showed 19,702 career path deciders, of whom about 83% had found employment. In this study, it is assumed that the level of those finding employment in FY2013 can be maintained to a degree until 2020, and it is assumed that 16,000 NEETs will find employment every year.

According to the MIC “Labour Force Survey,” the total number of NEETs (young people not in employment) in 2014 was 560,000.<sup>15</sup> This number has remained level in the 600,000 range since 2002, and no major variation is seen in the age composition of NEETs, either.

The composition of NEETs by gender and age group in 2014 is kept constant, and the number of employment finders assumed above for 2020 is divided by gender and age group. The number of employment finders by gender and age group is then divided by the 2014 population by gender and age group, and the result is taken as the policy effect of improving the labor force ratio in 2020.

For intermediate years until 2020, as it is expected that 16,000 NEETs will find employment every year, the trend will be at the same level as the policy effects in 2020. For policy effects from 2021 onwards, similarly, it is assumed that 16,000 NEETs will find employment every year, and thus it is assumed that the policy effects in 2020 will be maintained at the same level.

#### (c) Improving the continuous employment rate by developing the WLB environment

For females (with spouse) aged 30-34, the labor force ratio is assumed to increase merely as a result of the rise in the continuous employment rate, because job leaving for reasons of childbirth and childcare will be reduced by the development of the WLB environment.

In the MIC “Employment Status Survey (2012),” childbirth and childcare account for 47.9% of all reasons for leaving jobs among females aged 30-34 (i.e.

<sup>15</sup> Based on the Ministry of Health, Labour and Welfare, NEETs are defined as persons in the 15-34 age group in the MIC “Labour Force Survey” who are not in the labor force and are neither engaged in housework nor attending school.

those who were previously in employment but now are not in employment).<sup>16</sup> The ratio of previously employed females among females aged 30-34 not in employment is 57.1%. These ratios are assumed to remain fixed in future.

Meanwhile, according to the IPSS “14th Basic Survey of Birth Trends,” the ratio of continuous employment among females before and after the birth of their 1st, 2nd and 3rd child in the years 2005-2009 was, respectively, 38.0%, 72.8% and 82.9%. From this, the average ratio of continuous employment before and after childbirth, not taking account of the number of children, is calculated as 52.6%. Therefore, although an exact correspondence cannot be made owing to differences of definition and years between surveys, as well as the existence of 4th or more children, generally, if the ratio of continuous employment before and after childbirth is 52.6% (and the ratio of job leaving before and after childbirth is 47.4%), the ratio of those leaving jobs for reasons of childbirth and childcare compared to all job leavers would be 47.9% (*ibid.*, “Employment Status Survey (2012)”).

The “Japan Revitalization Strategy” sets the target of raising the ratio of continuous employment of females before and after the birth of the 1st child to 55% by 2020, and this ratio is assumed to be maintained after 2020. Based on this ratio, the ratio of continuous employment before and after the birth of the 2nd and 3rd child, calculated as an average ratio before and after childbirth among females after 2020 as a fixed rate based on actual figures in 2005-2009, would be 63.0% (job leaving ratio before and after childbirth 37.0%).<sup>17</sup> As such, the ratio of job leaving

before and after childbirth is projected to decrease from 47.4% to 37.0% in 2020, and to trend at a fixed rate from 2020 onwards.<sup>18</sup>

As a result, in the economic revival / progressive labor participation scenario, this will have the effect of increasing the labor force ratio by 1.9 percentage points in 2020 and 1.4 percentage points in 2030.<sup>19</sup>

(d) Improving the continuous employment ratio by promoting the use of short working hour systems, among others

For males and females (with spouse) aged 65-69, the labor force ratio is assumed to increase merely due to the rise in the continuous employment rate when job leaving caused by underdevelopment of systems will be eliminated by promoting the use of short working hour systems, etc. Short working hour systems are not the only means of developing employment environments for the 65-69 age group, but owing to constraints of data, this study only takes account of the increase in the labor force ratio due to promoting the use of short working hour systems by those previously employed as regular staff or employees.

In the JILPT “Follow-up Survey on the Baby-boomer Generation’s Work and Life Vision” (conducted in 2008), the ratio of respondents who replied that they would make it possible to work part-time as a necessary measure for continued employment at age 60 and over (regular employees employed by companies with a fixed retirement age of 60 at the time of the survey in 2006) was 11.0% for males and 14.1% for females. These are therefore taken as the ratios expected to leave their jobs if the use of short working hour

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16 Females previously in employment who quit their jobs in or after October 2007.

17 Here, it is assumed that the ratio of births of 1st, 2nd and 3rd children will not change in future, but in fact, the ratio of births of 1st children is predicted to rise compared to those of 2nd and 3rd children. To be more exact, therefore, the average ratio of continuous employment before and after childbirth is expected to be slightly higher than 63.0%.

18 The ratio of continuous employment before and after childbirth does not only concern females aged 25-29. Therefore, the reduction in the ratio of job leaving before and after childbirth is an average value including age groups other than 25-29.

19 Since the ratio of continuous employment among females before and after the birth of the 1st child is projected to trend at a fixed rate after 2020, the upward effect on the labor force ratio due to development of the WLB environment will not grow so greatly in 2030, when the labor force ratio will be larger if the upward effect of WLB environment development compared to 2020 is not taken into account.

systems or others is not promoted<sup>20</sup>. Meanwhile, of the total number of males and females aged 65-69 not in employment in the MIC “Employment Status Survey (2012),” the ratio of those previously employed as regular staff or employees was 21.4% for males and 4.1% for females. It is assumed that these ratios will remain fixed in future.

On the assumption that job leaving in the 65-69 age group due to underdevelopment of short working hour systems will no longer exist in 2030, the increase in the labor force ratio in 2030 will be 0.8 percentage points for males and 0.4 percentage points for females in the economic revival / progressive labor participation scenario.

- (e) Promoting employment in younger age groups by improving the efficiency of matching (increase in senior high school and university graduate employment rates)

It is assumed that senior high school and university graduate employment rates will be increased by improving the efficiency of matching, and that with this, employment rates in younger age groups (ages 15-19 and 20-24) will rise. This effect will be treated as one that does not convert to the labor force ratio, but reduces the unemployment rate among young people. In other words, rather than reducing the constant terms of the labor force ratio function, it is seen as a direct policy effect reducing the constant terms of the unemployment rate function in the labor supply and demand adjustment block.

It is assumed that the senior high school and university graduate rates and the ratio of population subject to advancement (the ratio of junior and senior high school graduates to the general population) will remain fixed in future. That is, if the product of these is made a constant, the future number of senior high school and university graduates in employment will be determined by the product of the senior high school and university graduate employment rates, the senior high school and university advancement rates, the

population aged 10-14 and 15-19, and the constant.

Although the senior high school and university advancement rates are also used as explanatory variables of the labor force ratio function, the latter is the currently active university and junior college advancement rate. As such, the future values cannot be applied as they are. Therefore, the university advancement rate (including senior high school graduates and others in past fiscal years) is assumed to be the scalar multiple (ratio of both in 2012) of the currently active university and junior college advancement rate. Figures from “Population Projections for Japan (January 2012 Medium Fertility and Mortality Projections)” are used for the population aged 10-14 and 15-19.

The employment rate of FY2013 senior high school and university graduates as of April 1st, 2014 was 21.1% and 13.9% for male and female senior high school graduates, respectively, and 64.9% and 75.8% for male and female university graduates, respectively (MEXT “School Basic Survey”). Meanwhile, considering the situation in the bubble era when employment rates were at high levels, employment rates are expected to rise to around 23.0% and 16.2% for male and female senior high school graduates, respectively, and 71.0% and 84.0% for male and female university graduates, respectively, in light of the future trends in educational advancement rates assumed in this research. Here, if policies to improve the matching efficiency of labor supply and demand were implemented, the degree of difference between the two points in time is assumed to have the potential to raise employment rates. Therefore, the improvement due to policy implementation would be 1.9 percentage points and 2.3 percentage points for males and females, respectively, in the senior high school graduate employment rate, and 6.1 percentage points and 8.2 percentage points, respectively, in the university graduate employment rate (with linear interpolation for intermediate years until 2020; from 2021 onwards, fixed at 2020 values).

20 Calculated by dividing the number of respondents who replied that they would make it possible to work part-time as a necessary measure for continued employment at age 60 and over, by the total number of respondents citing necessary measures for continued employment at age 60 and over. Because this was a multiple response question, the total number of respondents citing necessary measures for continued employment at age 60 and over exceeds the number of actual respondents.

As the whole increase in the number of senior high school and university graduates entering employment consists of persons in employment, the related increase in the employment rate is calculated by dividing this increase by the populations aged 15-19 and 20-24, respectively. As a result, the employment rate in ages 15-19 will be increased by 0.35 percentage points for males and 0.42 percentage points for females in 2020, and by 0.35 percentage points for males and 0.42 percentage points for females in 2030, respectively. Similarly, the employment rate in ages 20-24 will be increased by 0.62 percentage points for males and 0.74 percentage points for females in 2020 and by 0.62 percentage points for males and 0.78 percentage points for females in 2030, respectively. The operation in the Labor Supply and Demand Model is to divide the increase in the employment rate by the labor force ratio determined endogenously for ages 15-19 and 20-24, and subtract the results from the unemployment rates for ages 15-19 and 20-24.

#### **4. Assumptions in the labor supply and demand adjustment block**

##### **(1) Labor supply & demand multiple, active job openings-to-applicants ratio and unemployment rate**

The MIC “Labour Force Survey” provides the source for the labor demand (where actual figures relate to employed persons) and labor force used to calculate the labor supply and demand multiple, and unemployment rates. The active job openings-to-applicants ratio is based on data by age group, using the full-time employment opportunity accumulation method (including part-time) in the MHLW “Employment Referrals for General Workers (Employment Security Statistics).” Relational equations between these variables are estimated from past performance values, but in future they will all be resolved endogenously in the Labor Supply and Demand Model.

##### **(2) Rate of rise in wages**

The Labor Supply and Demand Model is structured such that the rate of rise in wages adjusts supply and demand in the labor force. To ascertain the relationship between the rate of rise in wages and labor

supply and demand, a rate of rise in wages function is estimated by applying the rationale of the Phillips curve. The rate of rise in wages (industry total) is taken as the explained variable, and the active job openings-to-applicants ratio (age group total), the rate of change in the consumer price index, and terms of trade (export price index / import price index) as explanatory variables. Data sources are contractual cash earnings (industry total, ordinary workers, private businesses with 10 or more workers) in the MHLW “Basic Survey on Wage Structure” for the rate of rise in wages; the MHLW “Employment Referrals for General Workers (Employment Security Statistics)” for the active job openings-to-applicants ratio; the General Index in the MIC “Consumer Price Index” for the rate of change in the consumer price index; and the Bank of Japan “Corporate Goods Price Index” for yen-denominated export and import price indices.

The future consumer price index is shown in Table IV-2. Future terms of trade are extended from the actual figure for 2014, based on the Japan Center for Economic Research “41st Medium-Term Economic Forecast.” Other variables are resolved endogenously in the Labor Supply and Demand Model.

## **Section 4 Simulation Results**

### **1. National labor force**

With zero growth and unchanged participation, the national labor force is forecast to decrease from 65.87 million persons in 2014 to 63.14 million in 2020, and to 58.00 million in 2030 (Table IV-4, IV-5). Conversely, if economic and employment policies are implemented and both economic growth and participation in the labor market progress, the respective figures could be 65.89 million in 2020 and 63.62 million in 2030 in the economic revival / participation progression scenario. The scale of decrease is smaller than in the zero growth / unchanged participation scenario.

### **2. National labor force ratio**

In the zero growth / unchanged participation scenario, the national labor force ratio is forecast to decrease from 59.4% in 2014 to 57.6% in 2020 and

**Table IV-4 Outline of the Labor Force by Gender and Age Group**

(10,000 Persons)

			2014	2020	2014 +/-	Zero growth scenario +/-	2030	2014 +/-	Zero growth scenario +/-
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Total	Total (age 15+)	6,587	6,314	-273	/	5,800	-787	/
		Ages 15-29	1,106	1,043	-63		947	-159	
		Ages 30-59	4,211	4,094	-117		3,685	-526	
		Age 60+	1,268	1,177	-91		1,168	-100	
	Males	Total (age 15+)	3,763	3,596	-167		3,312	-451	
		Ages 15-29	588	554	-34		502	-86	
		Ages 30-59	2,404	2,325	-79		2,099	-305	
		Age 60+	773	717	-56		711	-62	
	Females	Total (age 15+)	2,824	2,718	-106		2,488	-336	
		Ages 15-29	519	489	-30		445	-74	
		Ages 30-59	1,808	1,769	-39		1,586	-222	
		Age 60+	497	460	-37		457	-40	
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Total	Total (age 15+)	6,587	6,589	2	275	6,362	-225	562
		Ages 15-29	1,106	1,073	-33	30	1,027	-79	80
		Ages 30-59	4,211	4,205	-6	111	3,894	-317	209
		Age 60+	1,268	1,311	43	134	1,441	173	273
	Males	Total (age 15+)	3,763	3,706	-57	110	3,542	-221	230
		Ages 15-29	588	565	-23	11	549	-39	47
		Ages 30-59	2,404	2,335	-69	10	2,117	-287	18
		Age 60+	773	805	32	88	875	102	164
	Females	Total (age 15+)	2,824	2,883	59	165	2,820	-4	332
		Ages 15-29	519	507	-12	18	478	-41	33
		Ages 30-59	1,808	1,870	62	101	1,776	-32	190
		Age 60+	497	506	9	46	566	69	109

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree. Differences are calculated from the rounded-off figures.

**Table IV-5 Outline of the Labor Force by Gender and Age Group (Component Ratio)**

(%)

			2014			2020			2030		
			Total	Males	Females	Total	Males	Females	Total	Males	Females
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Gender ratio	Total (age 15+)	100.0	57.1	42.9	100.0	56.9	43.1	100.0	57.1	42.9
		Ages 15-29	100.0	53.1	46.9	100.0	53.1	46.9	100.0	53.0	47.0
		Ages 30-59	100.0	57.1	42.9	100.0	56.8	43.2	100.0	57.0	43.0
		Age 60+	100.0	60.9	39.1	100.0	60.9	39.1	100.0	60.9	39.1
	Age ratio	Total (age 15+)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Ages 15-29	16.8	15.6	18.4	16.5	15.4	18.0	16.3	15.2	17.9
		Ages 30-59	63.9	63.9	64.0	64.8	64.7	65.1	63.5	63.4	63.8
		Age 60+	19.3	20.5	17.6	18.6	19.9	16.9	20.1	21.5	18.4
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Gender ratio	Total (age 15+)	100.0	57.1	42.9	100.0	56.2	43.8	100.0	55.7	44.3
		Ages 15-29	100.0	53.1	46.9	100.0	52.7	47.3	100.0	53.5	46.5
		Ages 30-59	100.0	57.1	42.9	100.0	55.5	44.5	100.0	54.4	45.6
		Age 60+	100.0	60.9	39.1	100.0	61.4	38.6	100.0	60.7	39.3
	Age ratio	Total (age 15+)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Ages 15-29	16.8	15.6	18.4	16.3	15.3	17.6	16.1	15.5	16.9
		Ages 30-59	63.9	63.9	64.0	63.8	63.0	64.9	61.2	59.8	63.0
		Age 60+	19.3	20.5	17.6	19.9	21.7	17.5	22.7	24.7	20.1

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.

Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree.

55.5% in 2030 (Table IV-6). In the economic revival / participation progression scenario, it would rise to 60.2% in 2020 and 60.8% in 2030, thus exceeding the 2014 level. Viewing trends in the female labor force ratio by age, in the economic revival / participation progression scenario, the dip in the M-shaped curve would be shallower, while the labor force ratio is forecast to improve generally in all age groups (Figure IV-7).

### 3. National employed persons

In the zero growth / unchanged participation scenario, national employed persons are forecast to decrease from 63.51 million in 2014 to 60.46 million in 2020 and 55.61 million in 2030 (Table IV-8). In the economic revival / participation progression scenario, they are forecast to decrease to 63.81 million in 2020 and 61.69 million in 2030, the scale of decrease thus

being smaller than in the zero growth / unchanged participation scenario. In the zero growth / unchanged participation scenario, the composition of employed persons by gender in 2030 is more or less the same as in 2014 (males 57.0%, females 43.0%), but in the economic revival / participation progression scenario, in which female M-shaped curve measures and WLB related measures are enhanced, the component ratio of females rises by 1.4 points (Table IV-9). In the economic revival / participation progression scenario, employed females are forecast to increase from 27.29 million in 2014 to 27.42 million in 2030 (Table IV-8). As the composition by age in 2030, reflecting the aging of the population, the ratio of persons aged 60 and over is forecast to rise from 19.4% in 2014 to 20.3% in the zero growth / unchanged participation scenario and 22.8% in the economic revival / participation progression scenario (Table IV-9).

**Table IV-6 Outline of the Labor Force Ratio by Gender and Age Group**

(%)

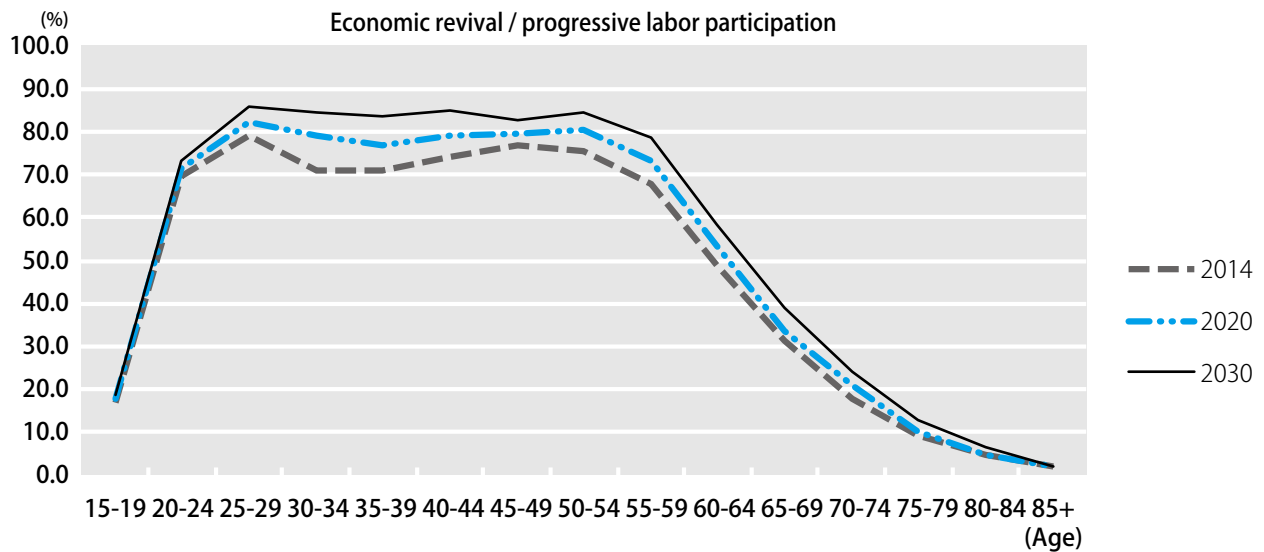
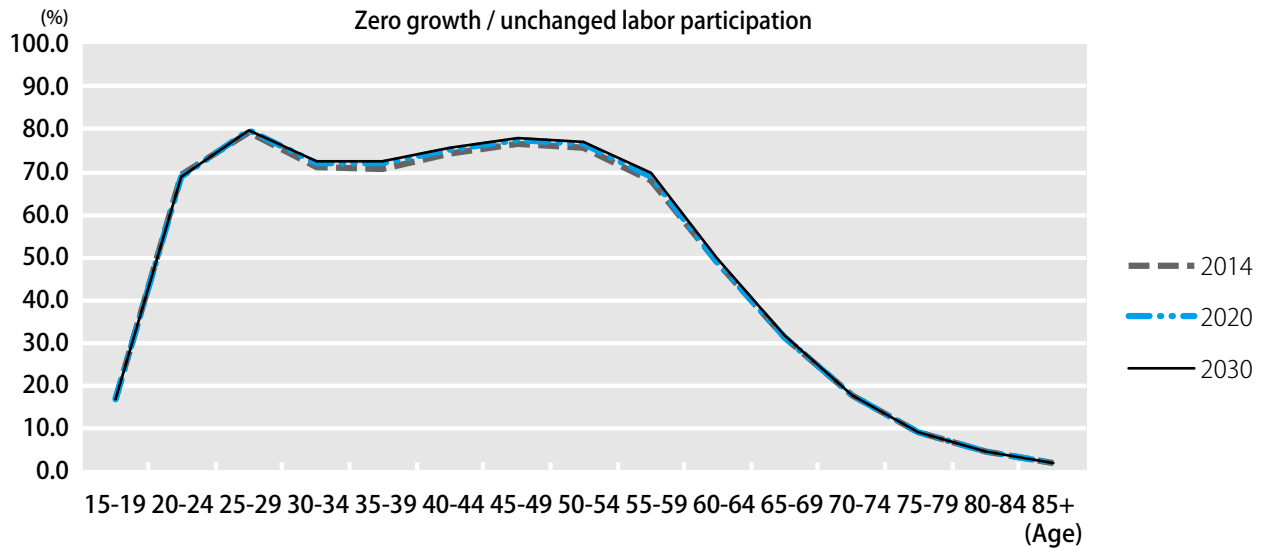
			2014	2020	2014 +/-	Zero growth scenario +/-	2030	2014 +/-	Zero growth scenario +/-
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Total	Total (age 15+)	59.4	57.6	-1.8	/	55.5	-3.9	/
		Ages 15-29	58.4	58.6	0.2		59.1	0.7	
		Ages 30-59	84.2	84.8	0.6		84.8	0.6	
		Age 60+	30.3	27.1	-3.2		25.9	-4.4	
	Males	Total (age 15+)	70.4	68.3	-2.1		66.1	-4.3	
		Ages 15-29	60.7	60.8	0.1		61.3	0.6	
		Ages 30-59	95.4	95.4	0.0		95.2	-0.2	
		Age 60+	41.6	37.3	-4.3		35.9	-5.7	
	Females	Total (age 15+)	49.2	47.8	-1.4		45.7	-3.5	
		Ages 15-29	56.2	56.3	0.1		56.8	0.6	
		Ages 30-59	72.8	74.0	1.2		74.1	1.3	
		Age 60+	21.3	19.0	-2.3		18.1	-3.2	
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Total	Total (age 15+)	59.4	60.2	0.8	2.6	60.8	1.4	5.3
		Ages 15-29	58.4	60.3	1.9	1.7	64.0	5.6	4.9
		Ages 30-59	84.2	87.1	2.9	2.3	89.6	5.4	4.8
		Age 60+	30.3	30.2	-0.1	3.1	32.0	1.7	6.1
	Males	Total (age 15+)	70.4	70.3	-0.1	2.0	70.7	0.3	4.6
		Ages 15-29	60.7	62.0	1.3	1.2	67.0	6.3	5.7
		Ages 30-59	95.4	95.8	0.4	0.4	96.0	0.6	0.8
		Age 60+	41.6	42.0	0.4	4.7	44.1	2.5	8.2
	Females	Total (age 15+)	49.2	50.7	1.5	2.9	51.7	2.5	6.0
		Ages 15-29	56.2	58.5	2.3	2.2	61.0	4.8	4.2
		Ages 30-59	72.8	78.2	5.4	4.2	82.9	10.1	8.8
		Age 60+	21.3	20.8	-0.5	1.8	22.4	1.1	4.3

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree. Differences are calculated from the rounded-off figures.

**Figure IV-7 Trends in the Female Labor Force Ratio**



Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.  
 2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

**Table IV-8 Outline of the Number of Employees by Gender and Age Group**

(10,000 Persons)

			2014	2020	2014 +/-	Zero growth scenario +/-	2030	2014 +/-	Zero growth scenario +/-
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Total	Total (age 15+)	6351	6046	-305	/	5561	-790	/
		Ages 15-29	1044	977	-67		888	-156	
		Ages 30-59	4074	3932	-142		3544	-530	
		Age 60+	1234	1138	-96		1129	-105	
	Males	Total (age 15+)	3621	3435	-186		3167	-454	
		Ages 15-29	551	515	-36		467	-84	
		Ages 30-59	2325	2232	-93		2017	-308	
		Age 60+	746	688	-58		683	-63	
	Females	Total (age 15+)	2729	2611	-118		2394	-335	
		Ages 15-29	493	462	-31		421	-72	
		Ages 30-59	1749	1699	-50		1527	-222	
		Age 60+	489	449	-40		446	-43	
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Total	Total (age 15+)	6351	6381	30	335	6169	-182	608
		Ages 15-29	1044	1020	-24	43	978	-66	90
		Ages 30-59	4074	4081	7	149	3783	-291	239
		Age 60+	1234	1279	45	141	1408	174	279
	Males	Total (age 15+)	3621	3582	-39	147	3427	-194	260
		Ages 15-29	551	535	-16	20	520	-31	53
		Ages 30-59	2325	2266	-59	34	2056	-269	39
		Age 60+	746	782	36	94	850	104	167
	Females	Total (age 15+)	2729	2799	70	188	2742	13	348
		Ages 15-29	493	486	-7	24	458	-35	37
		Ages 30-59	1749	1815	66	116	1727	-22	200
		Age 60+	489	498	9	49	558	69	112

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree. Differences are calculated from the rounded-off figures.

**Table IV-9 Outline of the Number of Employees by Gender and Age Group (Component Ratio)**

(%)

			2014			2020			2030		
			Total	Males	Females	Total	Males	Females	Total	Males	Females
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Gender ratio	Total (age 15+)	100.0	57.0	43.0	100.0	56.8	43.2	100.0	57.0	43.0
		Ages 15-29	100.0	52.8	47.2	100.0	52.7	47.3	100.0	52.6	47.4
		Ages 30-59	100.0	57.1	42.9	100.0	56.8	43.2	100.0	56.9	43.1
		Age 60+	100.0	60.4	39.6	100.0	60.5	39.5	100.0	60.5	39.5
	Age ratio	Total (age 15+)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Ages 15-29	16.4	15.2	18.1	16.2	15.0	17.7	16.0	14.7	17.6
		Ages 30-59	64.1	64.2	64.0	65.0	65.0	65.1	63.7	63.7	63.8
		Age 60+	19.4	20.6	17.9	18.8	20.0	17.2	20.3	21.6	18.6
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Gender ratio	Total (age 15+)	100.0	57.0	43.0	100.0	56.1	43.9	100.0	55.6	44.4
		Ages 15-29	100.0	52.8	47.2	100.0	52.4	47.6	100.0	53.2	46.8
		Ages 30-59	100.0	57.1	42.9	100.0	55.5	44.5	100.0	54.4	45.6
		Age 60+	100.0	60.4	39.6	100.0	61.1	38.9	100.0	60.4	39.6
	Age ratio	Total (age 15+)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Ages 15-29	16.4	15.2	18.1	16.0	14.9	17.4	15.9	15.2	16.7
		Ages 30-59	64.1	64.2	64.0	64.0	63.3	64.9	61.3	60.0	63.0
		Age 60+	19.4	20.6	17.9	20.1	21.8	17.8	22.8	24.8	20.3

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey". Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.

Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree.



#### 4. National employment rate

In the zero growth / unchanged participation scenario, the national employment rate is forecast to decrease from 57.3% in 2014 to 55.2% in 2020 and 53.2% in 2030 (Table IV-10). In the economic revival / participation progression scenario, conversely, it is expected to rise to 58.3% in 2020 and 59.0% in 2030.

#### 5. Comparison with national employment rate targets in the “Japan Revitalization Strategy”

Viewing national employment rates for which specific attainment targets have been stated in the government’s growth strategy (Table IV-11), in the “Japan Revitalization Strategy”, an employment rate of 80% in ages 20-64, 78% in ages 20-34, 65% in ages 60-64, and 73% for females aged 25-44 are set as targets for 2020. In the economic revival / participation progression

scenario, the situation is forecast to attain the employment rate targets stated in the “Japan Revitalization Strategy.”

#### 6. National number of employees by industry

In the economic revival / participation progression scenario, the number of employees by industry in 2020, compared to 2014, is forecast to increase in growth sectors in the “Japan Revitalization Strategy,” namely agriculture, forestry and fisheries (140,000 increase), general and precision machinery (40,000 increase), electrical machinery (90,000 increase), transportation equipment (20,000 increase), other manufacturing (110,000 increase), information and communications (250,000 increase), and miscellaneous services (70,000 increase), as well as in medical, health care and welfare (1.11 million increase), where demand is expanding with population aging

**Table IV-10 Outline of the Employment Rate by Gender and Age Group**

			2014	2020	2014 +/-	Zero growth scenario +/-	2030	2014 +/-	Zero growth scenario +/-
Scenario with zero growth and no progress in labor market participation (zero growth / unchanged labor participation scenario)	Total	Total (age 15+)	57.3	55.2	-2.1	/	53.2	-4.1	/
		Ages 15-29	55.2	54.9	-0.3		55.4	0.2	
		Ages 30-59	81.5	81.4	-0.1		81.5	0.0	
		Age 60+	29.5	26.2	-3.3		25.0	-4.5	
	Males	Total (age 15+)	67.7	65.2	-2.5		63.2	-4.5	
		Ages 15-29	56.9	56.5	-0.4		57.0	0.1	
		Ages 30-59	92.3	91.6	-0.7		91.5	-0.8	
		Age 60+	40.1	35.9	-4.2		34.4	-5.7	
	Females	Total (age 15+)	47.6	45.9	-1.7		43.9	-3.7	
		Ages 15-29	53.4	53.2	-0.2		53.7	0.3	
		Ages 30-59	70.5	71.1	0.6		71.3	0.8	
		Age 60+	21.0	18.5	-2.5		17.7	-3.3	
Scenario with economic growth and progress in labor market participation (economic revival / progressive labor participation scenario)	Total	Total (age 15+)	57.3	58.3	1.0	3.1	59.0	1.7	5.8
		Ages 15-29	55.2	57.4	2.2	2.5	61.0	5.8	5.6
		Ages 30-59	81.5	84.5	3.0	3.1	87.0	5.5	5.5
		Age 60+	29.5	29.4	-0.1	3.2	31.2	1.7	6.2
	Males	Total (age 15+)	67.7	68.0	0.3	2.8	68.4	0.7	5.2
		Ages 15-29	56.9	58.7	1.8	2.2	63.4	6.5	6.4
		Ages 30-59	92.3	92.9	0.6	1.3	93.3	1.0	1.8
		Age 60+	40.1	40.7	0.6	4.8	42.9	2.8	8.5
	Females	Total (age 15+)	47.6	49.2	1.6	3.3	50.3	2.7	6.4
		Ages 15-29	53.4	55.9	2.5	2.7	58.4	5.0	4.7
		Ages 30-59	70.5	75.9	5.4	4.8	80.6	10.1	9.3
		Age 60+	21.0	20.5	-0.5	2.0	22.1	1.1	4.4

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC “Labour Force Survey”. Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress. Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 level.

3. As figures in the Table have been rounded up or down to the nearest notational unit, the grand totals and breakdown totals may not agree. Differences are calculated from the rounded-off figures.

**Table IV-11 Comparison with Employment Rate Targets in the “Japan Revitalization Strategy”**

(%)

Gender / Age	Year	Actual				Target	Estimate			
		1990	2000	2010	2014	2020	2020		2030	
						Japan Revitalization Strategy	Zero growth / unchanged participation	Economic revival / participation progression	Zero growth / unchanged participation	Economic revival / participation progression
Total	20-34	74	73	74	76	78	76	79	76	82
	20-64	75	74	75	77	80	78	81	77	84
	60-64	53	51	57	61	65	60	67	61	71
Females	25-44	61	61	66	71	73	71	77	72	82

Notes: 1. Actual figures up to 2014 are from the Statistics Bureau, MIC “Labour Force Survey”. Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

(Table IV-12, IV-13). In the economic revival / participation progression scenario, the number of employees by industry in 2030, compared to 2014, is forecast to increase in information and communications (360,000 increase), medical, health care and welfare (2.15 million increase), and miscellaneous services (210,000 increase).

In medical, health care and welfare, numbers are forecast to increase in all scenarios compared to 7.47 million in 2014. Namely, in the zero growth / unchanged participation scenario, it will rise to 8.08 million in 2020 (610,000 increase) and 9.10 million in 2030 (1.63 million increase); and in the economic revival / participation progression scenario, to 8.58 million in 2020 (1.11 million increase) and 9.62 million in 2030 (2.15 million increase). Similarly, in information and communications, compared to 2014, the number is forecast to increase by 150,000 in 2020 and 140,000 in 2030 in the zero growth / unchanged participation scenario, and by 250,000 in 2020 and 360,000 in 2030 in the economic revival / participation progression scenario, respectively.

In manufacturing industries as a whole, the number is forecast to fall from 10.04 million in 2014, by 430,000 to 9.61 million in 2020 and by 1.30 million to 8.74 million in 2030 in the zero growth / unchanged participation scenario. In the economic revival / participation progression scenario by 250,000 to 10.29 million in 2020 and 180,000 to 9.86 million in 2030. Here, therefore, the scale of decrease is expected to be smaller. In the wholesale and retail trade, compared to 2014, the number is forecast to decrease

by 800,000 in the zero growth / unchanged participation scenario, and 400,000 in the economic revival / participation progression scenario in 2020, and by 2.53 million in the zero growth / unchanged participation scenario, and 1.44 million in the economic revival / participation progression scenario in 2030. Thus, the number is forecast to decrease vastly in all scenarios.

## 7. National labor productivity

The annual average rate of change in labor productivity (man-hours) in 2014-2020 is forecast to be 1.3% in the zero growth / unchanged participation scenario, and 2.0% in the economic revival / participation progression scenario (Figure IV-14). The annual average rate of change in labor productivity (man-hours) in 2020-2030 is forecast to be 0.8% in the zero growth / unchanged participation scenario, and 2.7% in the economic revival / participation progression scenario.

\* See JILPT (2016) for the results of national estimates in the baseline / gradual participation scenario (the reference scenario).

## 8. Prefectural labor force

In the zero growth / unchanged participation scenario, prefectures with large rates of decrease in the labor force in 2030 compared to 2014 include Akita (26.7% decrease), Aomori (23.3% decrease) and Iwate (20.8% decrease) in the Tohoku region. Prefectures with relatively small decrease rates include Okinawa

**Table IV-12 Outline of the Number of Employees by Industry**

(10,000 Persons)

	Actual	Estimates				
		2014	2020		2030	
			Zero growth / unchanged participation	Economic revival / participation progression	Zero growth / unchanged participation	Economic revival / participation progression
Number of employees by industry (10,000 persons)	Agriculture, forestry and fisheries	230	222	244	176	216
	Mining and construction	505	461	477	416	424
	Manufacturing	1,004	961	1,029	874	986
	Food, beverages and tobacco	142	134	141	112	137
	General and precision machinery	136	132	140	108	132
	Electrical machinery	145	138	154	124	141
	Transportation equipment	105	98	107	95	105
	Other manufacturing	476	461	487	434	471
	Electricity, gas, water and heat supply	29	27	29	26	28
	Information and communications	206	221	231	220	242
	Transport	317	297	311	278	302
	Wholesale and retail trade	1,100	1,020	1,060	847	956
	Finance, insurance and real estate	234	209	221	177	206
	Eating and drinking places, accommodations	328	285	309	233	300
	Medical, health care and welfare	747	808	858	910	962
	Education, learning support	298	265	275	221	237
	Living-related and personal services	162	147	158	118	155
	Miscellaneous business services	360	331	355	309	342
	Miscellaneous services	449	443	456	442	470
Government, compound services, industries unable to classify	382	349	368	313	344	
<b>Industry total</b>	<b>6,351</b>	<b>6,046</b>	<b>6,381</b>	<b>5,561</b>	<b>6,169</b>	
Difference compared to 2014 (10,000 persons)	Agriculture, forestry and fisheries		-8	14	-54	-14
	Mining and construction		-44	-28	-89	-81
	Manufacturing		-43	25	-130	-18
	Food, beverages and tobacco		-8	-1	-30	-5
	General and precision machinery		-4	4	-28	-4
	Electrical machinery		-7	9	-21	-4
	Transportation equipment		-7	2	-10	0
	Other manufacturing		-15	11	-42	-5
	Electricity, gas, water and heat supply		-2	0	-3	-1
	Information and communications		15	25	14	36
	Transport		-20	-6	-39	-15
	Wholesale and retail trade		-80	-40	-253	-144
	Finance, insurance and real estate		-25	-13	-57	-28
	Eating and drinking places, accommodations		-43	-19	-95	-28
	Medical, health care and welfare		61	111	163	215
	Education, learning support		-33	-23	-77	-61
	Living-related and personal services		-15	-4	-44	-7
	Miscellaneous business services		-29	-5	-51	-18
	Miscellaneous services		-6	7	-7	21
Government, compound services, industries unable to classify		-33	-14	-69	-38	
<b>Industry total</b>		<b>-305</b>	<b>30</b>	<b>-790</b>	<b>-182</b>	

Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey" (recombined in line with industrial category notation in the Labor Supply and Demand Estimates). Figures for 2020 and 2030 are estimates.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

3. "Other manufacturing" refers to forms of manufacturing other than those mentioned here. Besides other manufacturing specified in the Japan Standard Industry Classification, these also include ceramic, stone and clay products, iron and steel, metal products and other raw material industries.

4. Please note that, in the Labor Supply and Demand Estimates, dispatched workers from temporary labor agencies are classified under "Miscellaneous business services", i.e. the industry of the dispatch source, and that these dispatched workers are not included in other industries. In the "Labour Force Survey", meanwhile, dispatched workers from temporary labor agencies were classified not in the industry of the dispatch host but in that of the dispatch source until 2012. However, from 2013 they are to be classified in the industry of the dispatch host.

5. As figures in the Table have been rounded up or down to the nearest notational unit, the manufacturing and industry totals may not agree with the breakdown totals. Differences are calculated from the rounded-off figures.

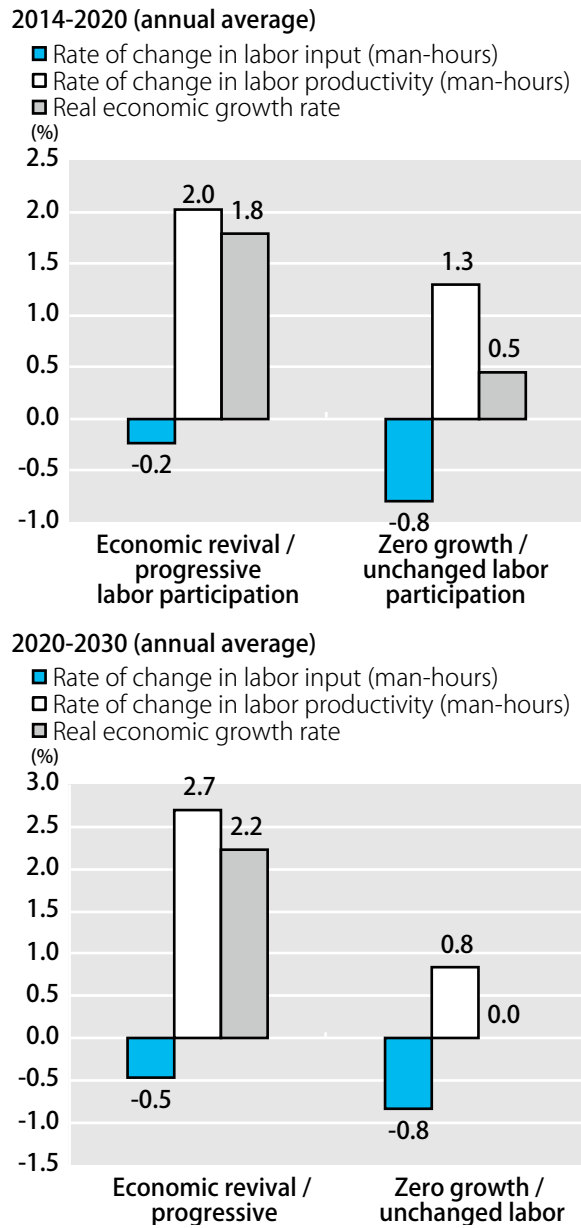
**Table IV-13 Outline of the Number of Employees by Industry  
(Component Ratio)**

(%)

	Actual	Estimates				
		2014	2020		2030	
			Zero growth / unchanged participation	Economic revival / participation progression	Zero growth / unchanged participation	Economic revival / participation progression
Number of employees by industry (component ratio, %)	Agriculture, forestry and fisheries	3.6	3.7	3.8	3.2	3.5
	Mining and construction	8.0	7.6	7.5	7.5	6.9
	Manufacturing	15.8	15.9	16.1	15.7	16.0
	Food, beverages and tobacco	2.2	2.2	2.2	2.0	2.2
	General and precision machinery	2.1	2.2	2.2	2.0	2.1
	Electrical machinery	2.3	2.3	2.4	2.2	2.3
	Transportation equipment	1.7	1.6	1.7	1.7	1.7
	Other manufacturing	7.5	7.6	7.6	7.8	7.6
	Electricity, gas, water and heat supply	0.5	0.4	0.5	0.5	0.4
	Information and communications	3.2	3.6	3.6	4.0	3.9
	Transport	5.0	4.9	4.9	5.0	4.9
	Wholesale and retail trade	17.3	16.9	16.6	15.2	15.5
	Finance, insurance and real estate	3.7	3.5	3.5	3.2	3.3
	Eating and drinking places, accommodations	5.2	4.7	4.8	4.2	4.9
	Medical, health care and welfare	11.8	13.4	13.5	16.4	15.6
	Education, learning support	4.7	4.4	4.3	4.0	3.8
	Living-related and personal services	2.6	2.4	2.5	2.1	2.5
	Miscellaneous business services	5.7	5.5	5.6	5.6	5.5
	Miscellaneous services	7.1	7.3	7.1	8.0	7.6
	Government, compound services, industries unable to classify	6.0	5.8	5.8	5.6	5.6
Industry total	100.0	100.0	100.0	100.0	100.0	
Difference compared to 2014	Agriculture, forestry and fisheries		0.1	0.2	-0.4	-0.1
	Mining and construction		-0.4	-0.5	-0.5	-1.1
	Manufacturing		0.1	0.3	-0.1	0.2
	Food, beverages and tobacco		0.0	0.0	-0.2	0.0
	General and precision machinery		0.1	0.1	-0.1	0.0
	Electrical machinery		0.0	0.1	-0.1	0.0
	Transportation equipment		-0.1	0.0	0.0	0.0
	Other manufacturing		0.1	0.1	0.3	0.1
	Electricity, gas, water and heat supply		-0.1	0.0	0.0	-0.1
	Information and communications		0.4	0.4	0.8	0.7
	Transport		-0.1	-0.1	0.0	-0.1
	Wholesale and retail trade		-0.4	-0.7	-2.1	-1.8
	Finance, insurance and real estate		-0.2	-0.2	-0.5	-0.4
	Eating and drinking places, accommodations		-0.5	-0.4	-1.0	-0.3
	Medical, health care and welfare		1.6	1.7	4.6	3.8
	Education, learning support		-0.3	-0.4	-0.7	-0.9
	Living-related and personal services		-0.2	-0.1	-0.5	-0.1
	Miscellaneous business services		-0.2	-0.1	-0.1	-0.2
	Miscellaneous services		0.2	0.0	0.9	0.5
	Government, compound services, industries unable to classify		-0.2	-0.2	-0.4	-0.4

- Notes: 1. Actual figures for 2014 are from the Statistics Bureau, MIC "Labour Force Survey" (recombined in line with industrial category notation in the Labor Supply and Demand Estimates). Figures for 2020 and 2030 are estimates.
2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.
3. "Other manufacturing" refers to forms of manufacturing other than those mentioned here. Besides other manufacturing specified in the Japan Standard Industry Classification, these also include ceramic, stone and clay products, iron and steel, metal products and other raw material industries.
4. Please note that, in the Labor Supply and Demand Estimates, dispatched workers from temporary labor agencies are classified under "Miscellaneous business services", i.e. the industry of the dispatch source, and that these dispatched workers are not included in other industries. In the "Labour Force Survey", meanwhile, dispatched workers from temporary labor agencies were classified not in the industry of the dispatch host but in that of the dispatch source until 2012. However, from 2013 they are to be classified in the industry of the dispatch host.
5. As figures in the Table have been rounded up or down to the nearest notational unit, the manufacturing and industry totals may not agree with the breakdown totals. Differences are calculated from the rounded-off figures.

**Figure IV-14 Trends in Labor Productivity (Man-hours)**



Notes: 1. The rates of change in labor input (man-hours) and labor productivity (man-hours) are estimates. For working hours, the weighted averages for full-time and part-time workers are used. The real economic growth rates in the economic revival / progressive labor participation scenario in 2014-2023 are based on the Cabinet Office “Calculations concerning Medium- to Long-Term Economic and Fiscal Administration” (submitted by the Council on Economic and Fiscal Policy, July 22, 2015), while the real economic growth rate from 2024 onwards and in the zero growth / unchanged labor participation scenario are assumed in this study.

2. Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

(5.3% decrease), Shiga (5.4% decrease) and Aichi (5.4% decrease) (Figure IV-15). According to IPSS estimates, the populations of Okinawa, Shiga and Aichi are projected to increase in 2030 compared to 2014.

In the economic revival / progressive labor participation scenario, prefectures with large rates of decrease since 2014 include Akita (19.8% decrease), Aomori (15.7% decrease) and Yamagata (13.8% decrease) in the Tohoku region, while those with large rates of increase since 2014 include Okinawa (4.7% increase), Shiga (3.5% increase) and Aichi (3.4% increase).

## 9. Prefectural labor force ratio

In the zero growth / unchanged participation scenario, prefectures with large decreases in the labor force ratio in 2030 compared to 2014 include Hokkaido (5.5 point decrease), Akita (5.1 point decrease) and Miyagi (5.1 point decrease), while those with relatively small decreases include Okayama (2.6 point decrease), Yamaguchi (3.1 point decrease) and Mie (3.3 point decrease) (Figure IV-16). Generally, the decrease in the labor force ratio is relatively smaller in western Japan. In the economic revival / progressive labor participation scenario, Akita (0.3 point decrease) and Hokkaido (0.2 point decrease) show decreases compared to 2014, but the other prefectures show increases, with particularly large rises in Okayama (2.6 point increase), Tokyo (2.1 point increase), Wakayama (2.1 point increase) and Yamaguchi (2.1 point increase), among others.

## 10. Prefectural number of persons in employment

In the zero growth / unchanged participation scenario, prefectures with large rates of decrease in the number of persons in employment in 2030 compared to 2014 include Akita (27.1% decrease), Aomori (24.3% decrease) and Kochi (21.8% decrease), while those with relatively small rates of decrease include Tokyo (4.9% decrease), Aichi (5.1% decrease) and Okinawa (6.2% decrease) (Figure IV-17). Generally, the rate of decrease in the number of persons in employment is relatively smaller in large conurbations. In the economic revival / progressive labor participation

scenario, prefectures with large rates of decrease since 2014 include Akita (19.2% decrease), Aomori (15.4% decrease) and Yamagata (13.6% decrease), while those with large increases since 2014 include Okinawa (5.4% increase), Tokyo (4.7% increase) and Aichi (4.5% increase).

## 11. Prefectural employment rates

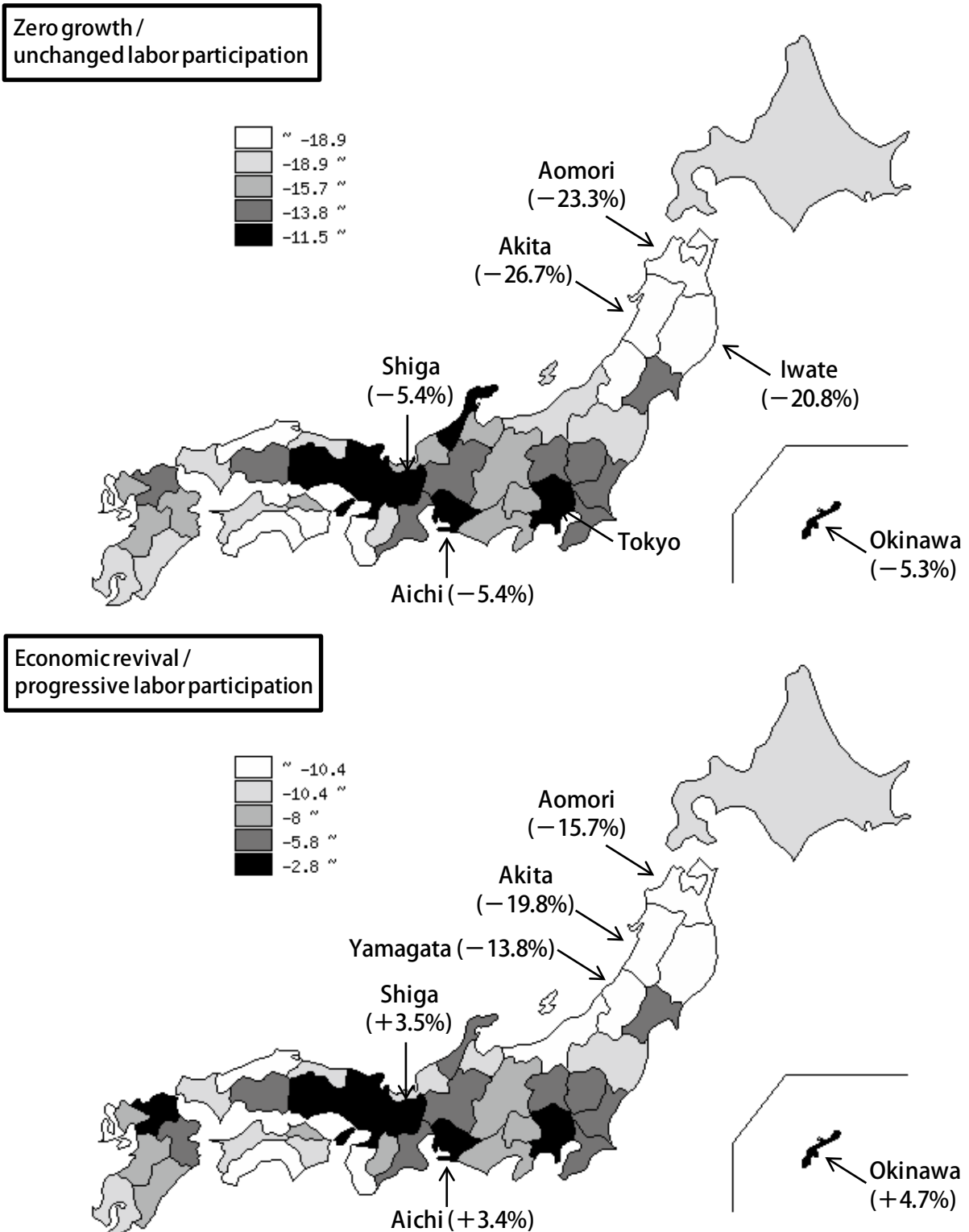
In the zero growth / unchanged participation scenario, prefectures with large decreases in the employment rate in 2030 compared to 2014 include Hokkaido (5.8 point decrease), Aomori (5.5 point decrease) and Chiba (5.3 point decrease), while those with relatively small decreases include Okayama (2.7 point decrease), Tokyo (2.8 point decrease) and Aichi (3.2 point decrease) (Figure IV-18). In the economic revival / progressive labor participation scenario, the rate shows a rise in all prefectures compared to 2014, with particularly large increases in Tokyo (3.1 point increase), Okayama (2.9 point increase) and Aichi (2.6 point increase), among others.

## 12. Prefectural number of persons in employment by industry

In the economic revival / progressive labor participation scenario, the number of persons employed in the medical, health care and welfare sector in 2030 will increase compared to 2014 in all prefectures. In the same scenario, the number of persons employed in manufacturing industries in 2030 will increase from 2014 in 15 prefectures including Aichi (73,000 increase), Tokyo (34,000 increase) and Hiroshima (29,000 increase).

**Figure IV-15 Rate of Change in Labor Force by Prefecture (2014-2030)**

(%)

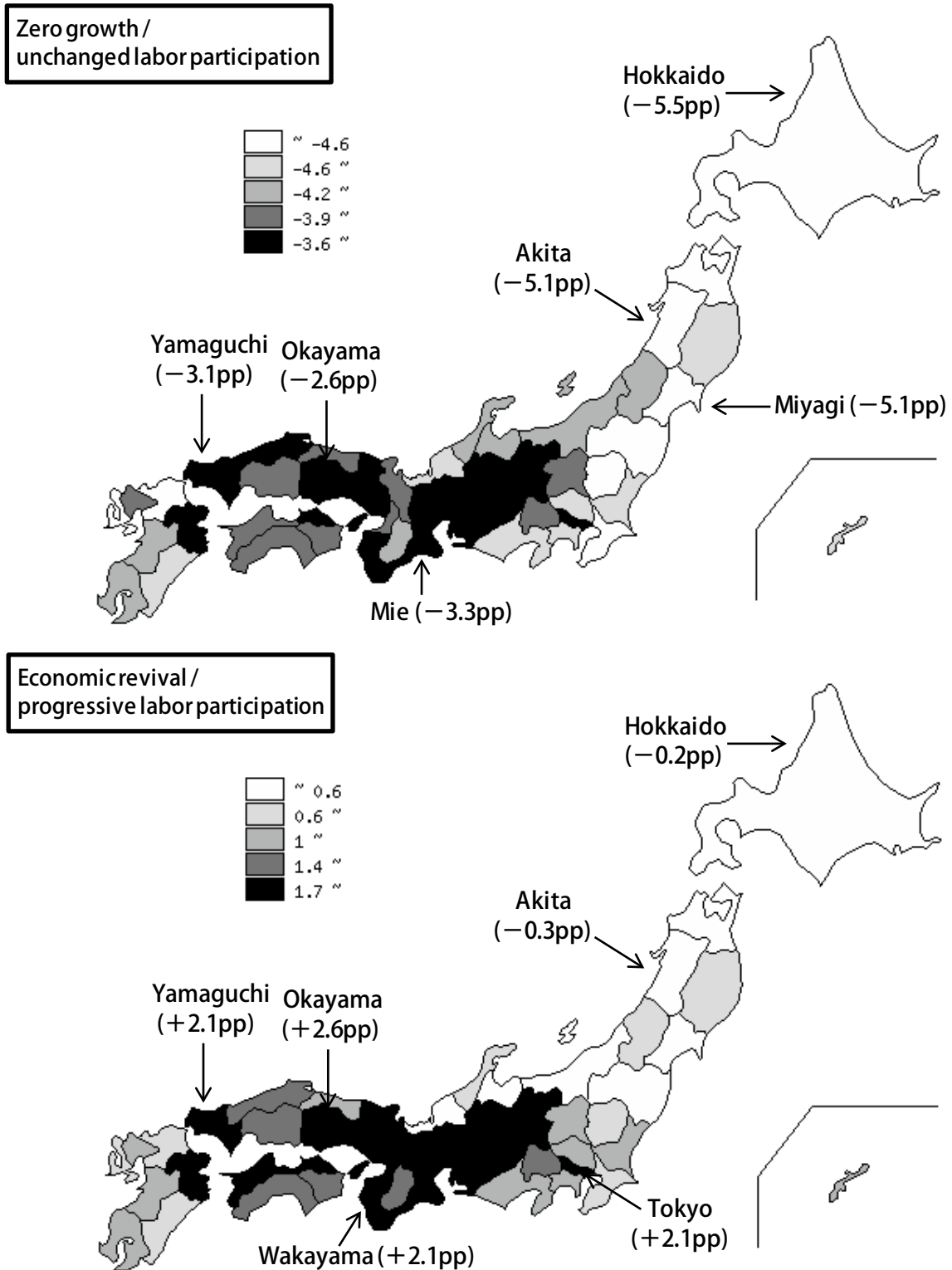


Note: Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.

Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

**Figure IV-16 Change in Labor Force Ratio by Prefecture (2014-2030)**

(% Points)

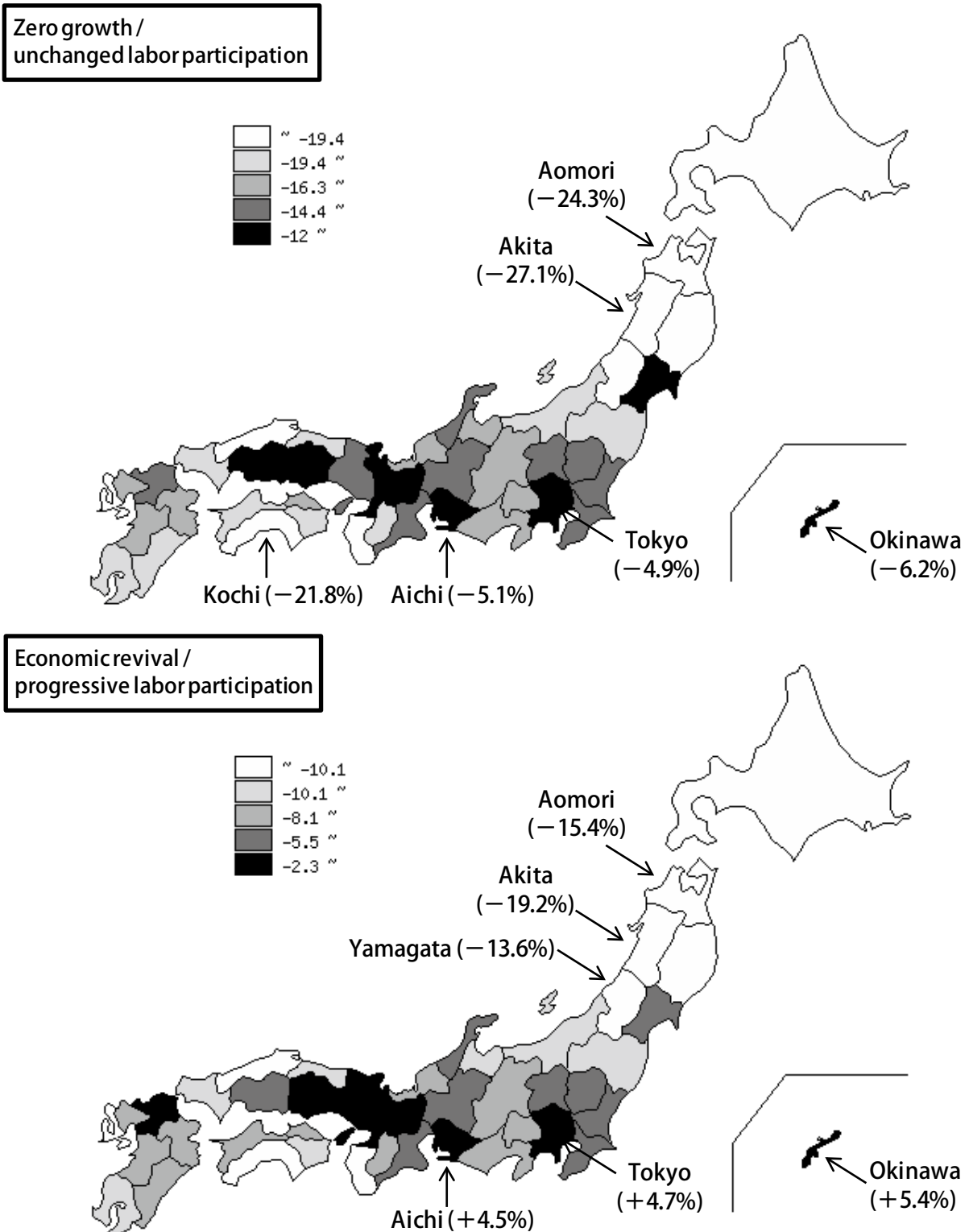


Note: Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.

Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

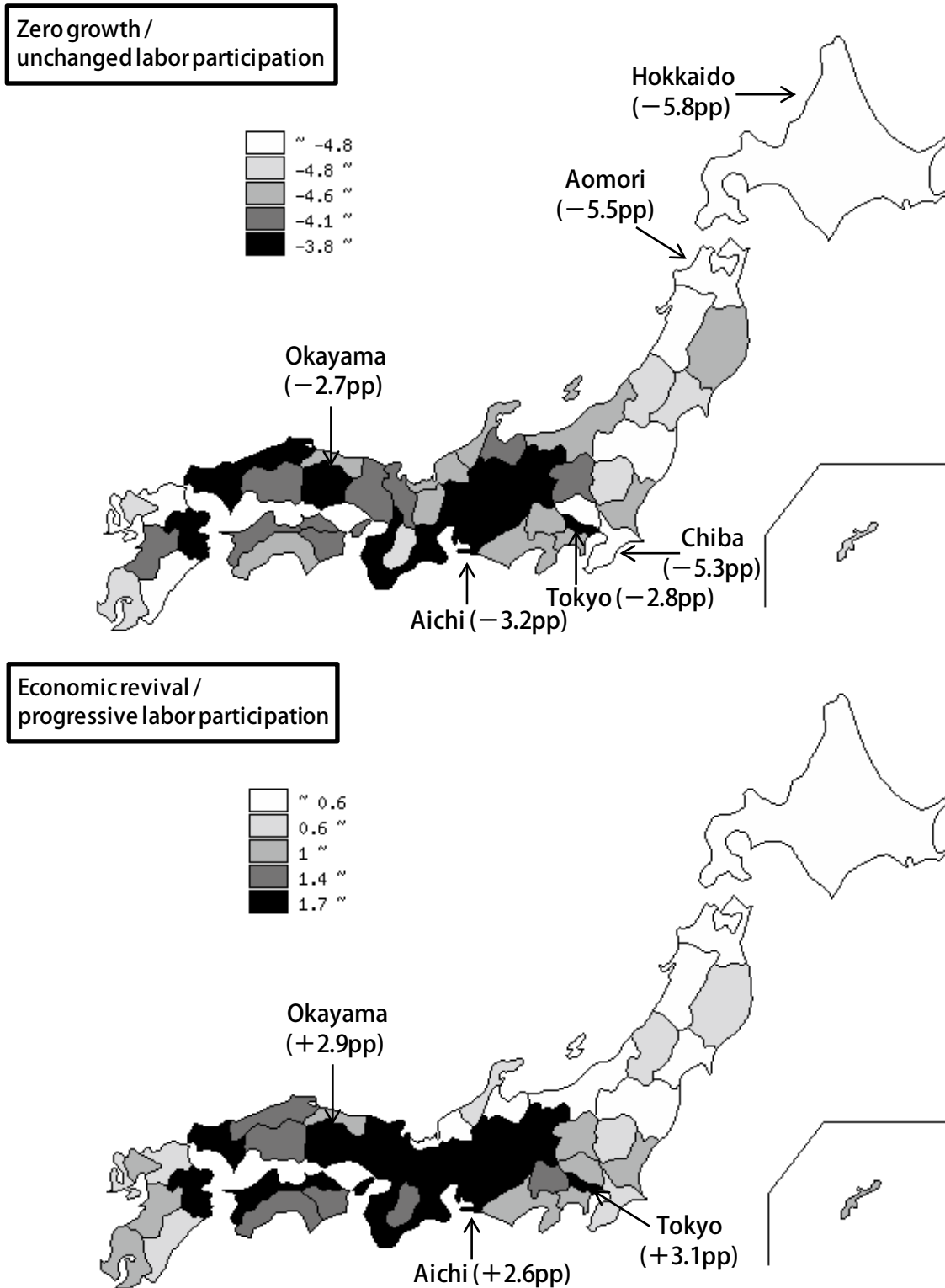


**Figure IV-17 Rate of Change in Employed Persons by Prefecture (2014-2030)**  
(%)



Note: Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.  
Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

**Figure IV-18 Change in Employment Rate by Prefecture (2014-2030)**  
(% Points)



Note: Economic revival / progressive labor participation: Scenario in which economic growth and labor market participation by young people, women, the elderly and others progress.  
 Zero growth / unchanged labor participation: Scenario projecting almost zero growth, with labor force ratios by gender and age group trending at 2014 levels.

## Section 5 Conclusion

In this study, simulations have been conducted, using the Labor Supply and Demand Model, to estimate the labor force and number of employed persons by gender and age group, by the year 2030, based on targets in the “Japan Revitalization Strategy Amendment 2015”. Based on the results, the labor force and number of persons in employment by gender and age group in each prefecture and the number of persons in employment by industry have also been estimated.

Given the economic and employment climate in recent years, a number of issues need to be considered in addition to the estimates handled in this study. That is, how to estimate by employment format, how to ascertain the structural unemployment rate by estimating a mismatch index and how to incorporate this in the Labor Supply and Demand Model, how to ascertain the relationship between human resource development and improving productivity, how to incorporate this in the Labor Supply and Demand Model, and how to consider the possibility of substituting the labor force with AI and robots.

In future, as well as attempting to refine the Labor Supply and Demand Model and improve the data used in it, we should consider how these issues are to be addressed.

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\*all in Japanese except where noted

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