

Japan's Way toward Strong, Sustainable, and Balanced Growth:

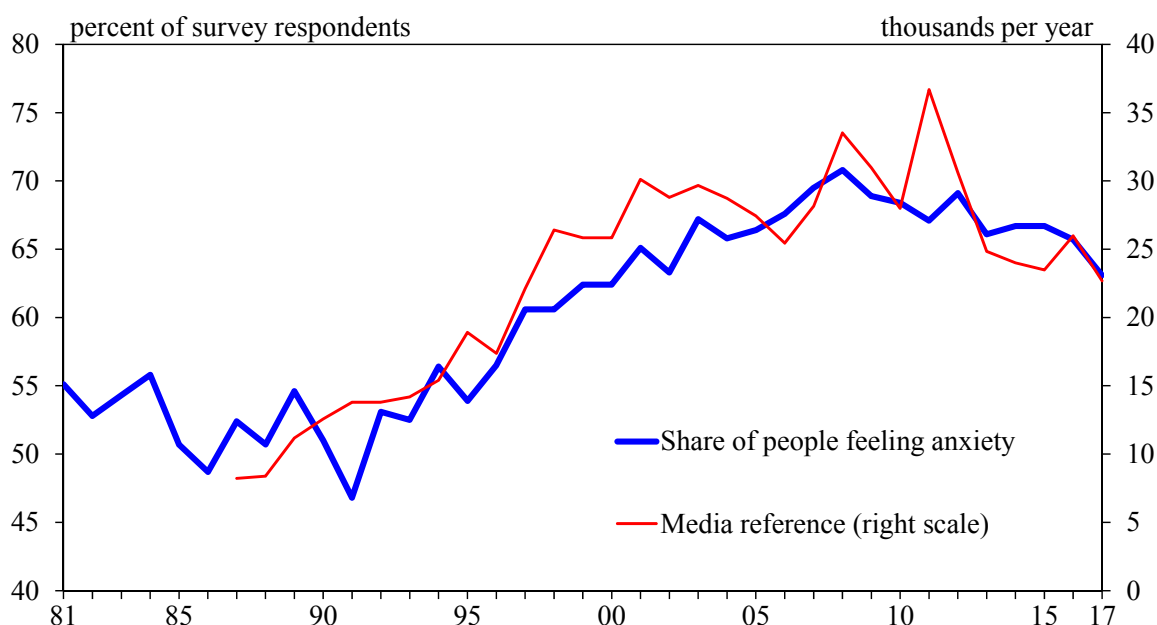
Assessment of the potential of the Japanese economy suggests
the sun also rises

*Speech at meeting hosted by the Japan Society
and the City of London Corporation in London,
October 5, 2017*

Hiroshi Nakaso
Deputy Governor of the Bank of Japan

1. Reassessing Japan's Economy

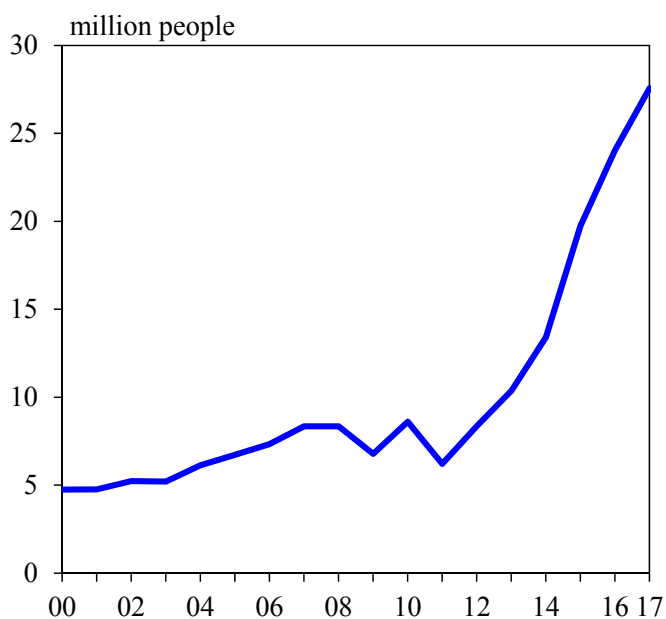
Anxiety



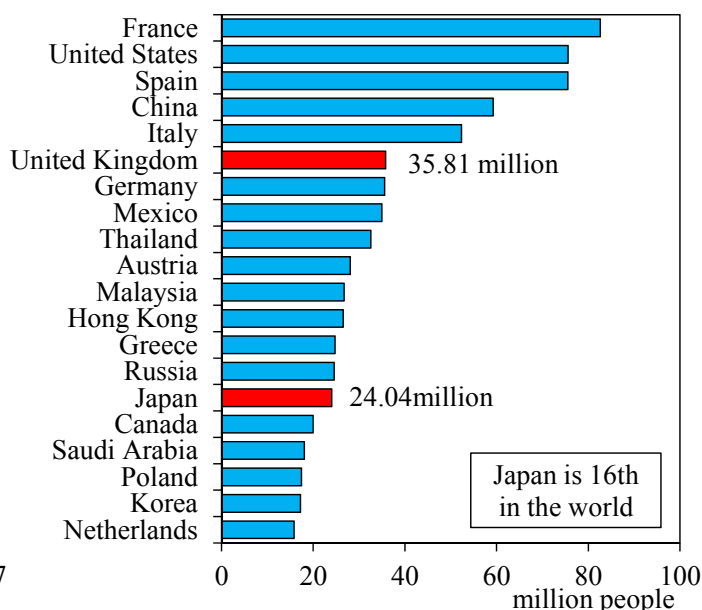
Notes: 1. The share of people feeling anxiety is the share of respondents answering “feeling high pressure or anxiety” of total respondents in the annual Public Opinion Survey on the Life of the People conducted by the Cabinet Office. Until 2015, survey participants are aged 20 and older, and from 2016 onward are aged 18 and older.
 2. Media references to anxiety displays the number of media reports citing anxiety (“fu-an” in Japanese) found in *The Asahi Shimbun*, *The Mainichi*, *The Nikkei*, *The Nikkei Business Daily*, *The Nikkei Marketing Journal*, and *The Yomiuri Shimbun*.
 Sources: Cabinet Office, “Public Opinion Survey on the Life of the People;” Nikkei Telecom.

Foreign Tourists

Foreign Tourist Arrivals in Japan

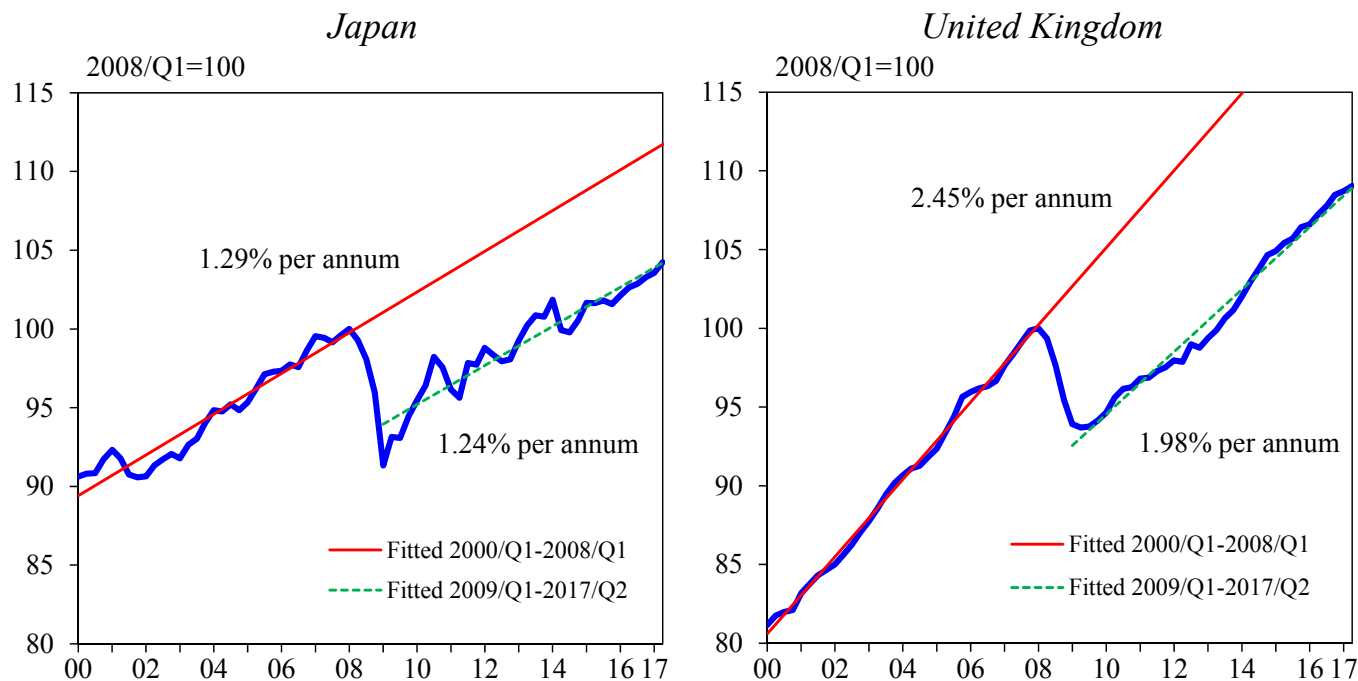


World's Top Tourism Destinations in 2016



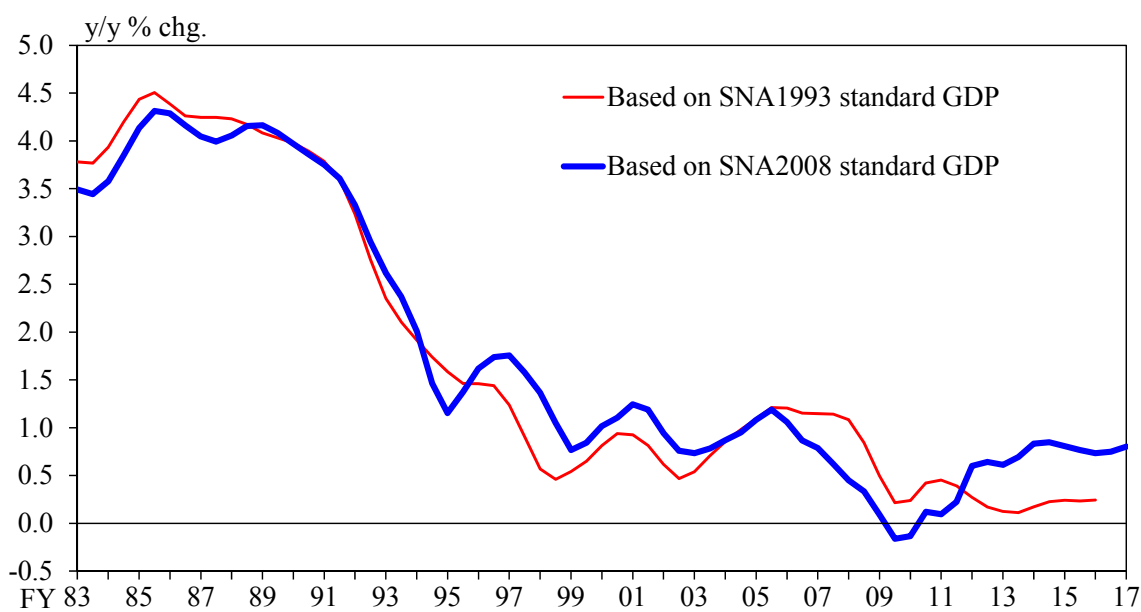
Notes: 1. The observation of foreign tourist arrivals in Japan for 2017 is the annualized level of the January - August average.
 2. While the UNWTO has announced that Turkey ranked 10th in 2016, Turkey is not displayed due to data availability.
 Sources: Japan National Tourism Organization (JNTO); UNWTO.

Real GDP



Note: The GDP series in the figures are seasonally-adjusted.
Source: OECD.

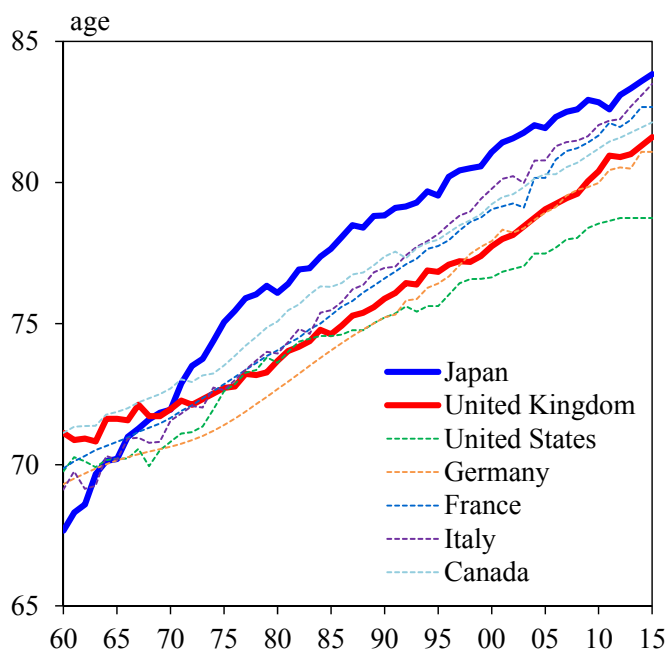
Potential GDP



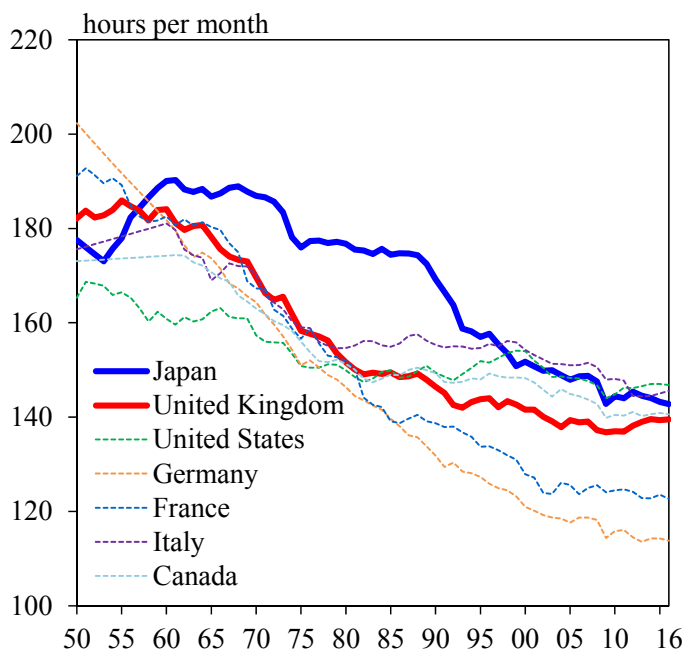
Note: The potential growth rate series are estimated by the Research and Statistics Department, the Bank of Japan.
Source: Bank of Japan.

Life Expectancy and Hours Worked

Life Expectancy



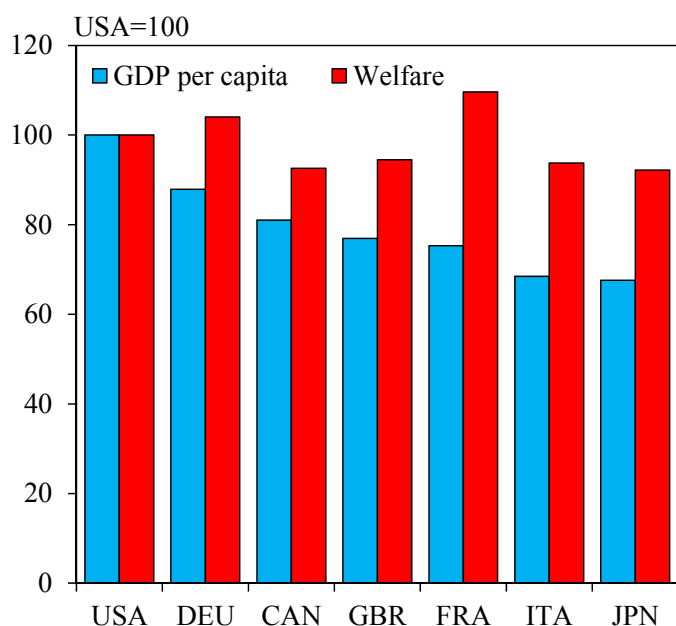
Hours Worked per Worker



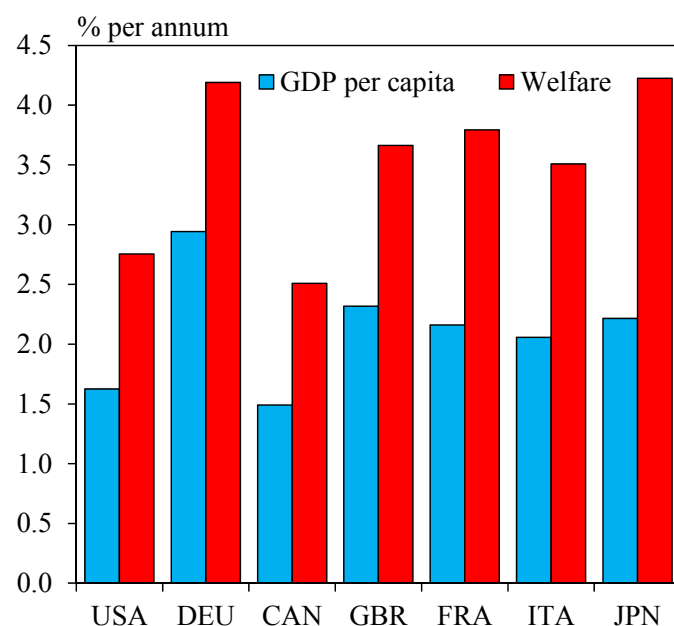
Sources: OECD; Penn World Table; World Bank.

Beyond GDP

Welfare and Income in 2014



Changes in Welfare and Income between 1985 and 2014

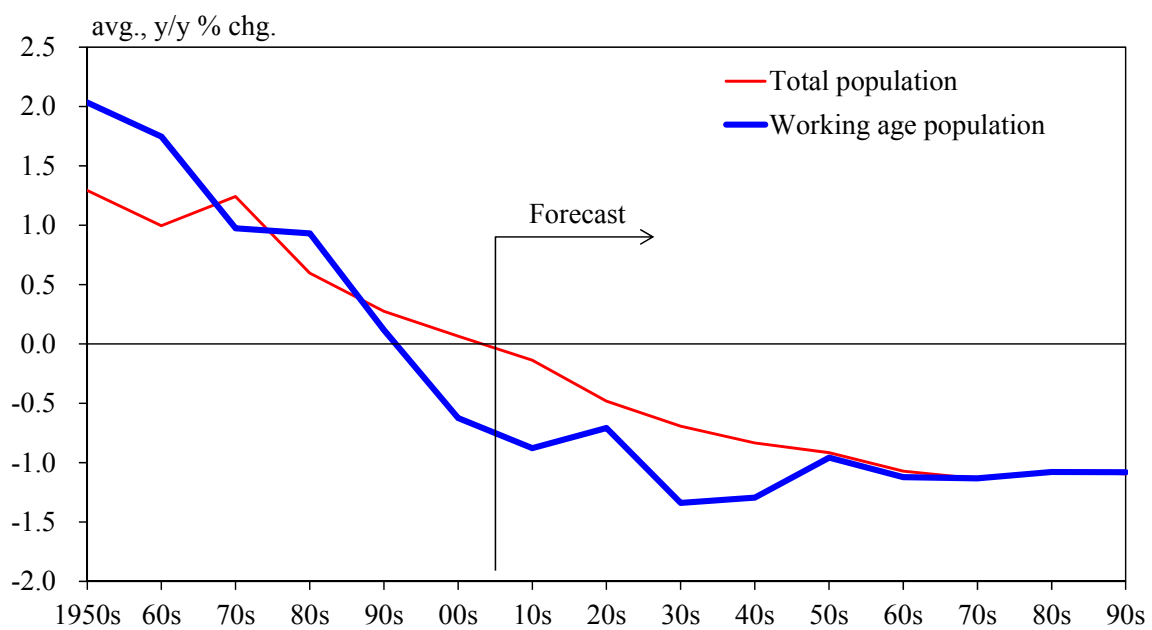


Sources: OECD; Penn World Table; World Bank; Bank of Japan staff calculations based on C. I. Jones and P. J. Klenow (2016): "Beyond GDP? Welfare across Countries and Time," *American Economic Review*, 106 (9), pp.2426-2457.

2. Labor Market Reforms and Productivity

Slide 7

Demographic Outlook



Note: The population data from 2017 onward are the medium variant of the Population Outlook published by the National Institute of Population and Social Security Research.

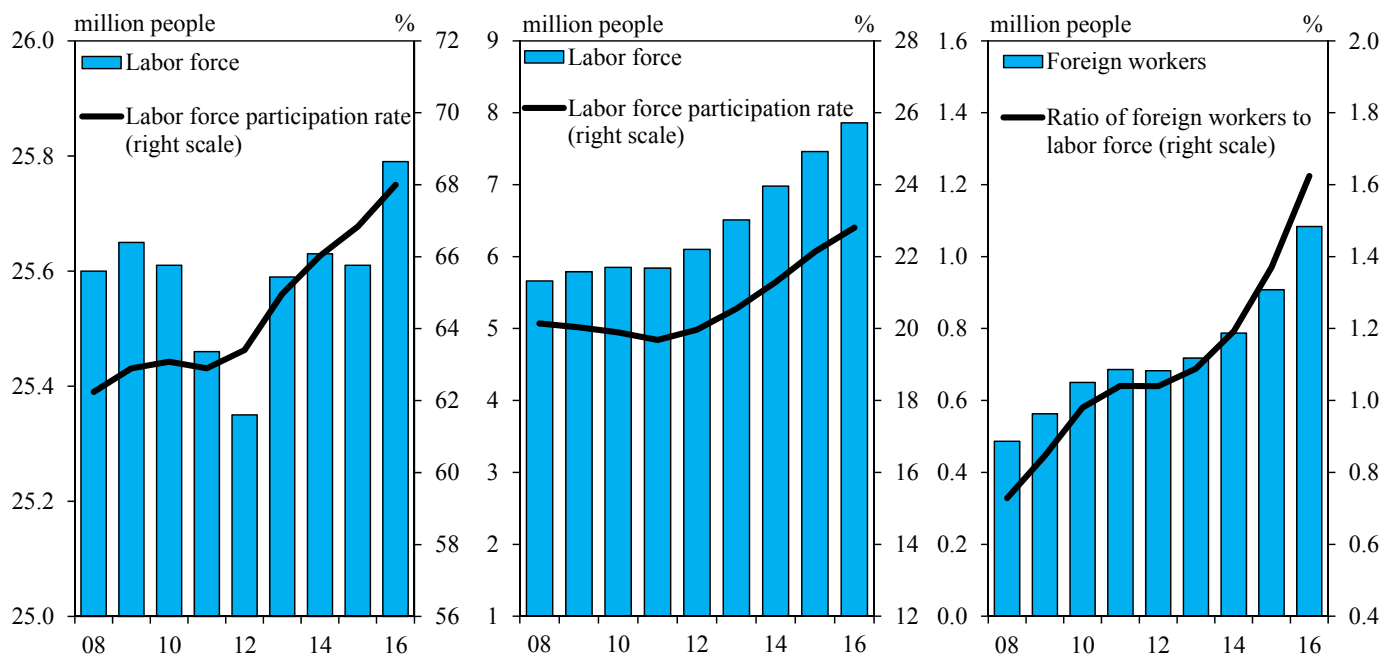
Sources: Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research.

Sources of Additional Labor Supply

Female (aged 15-64)

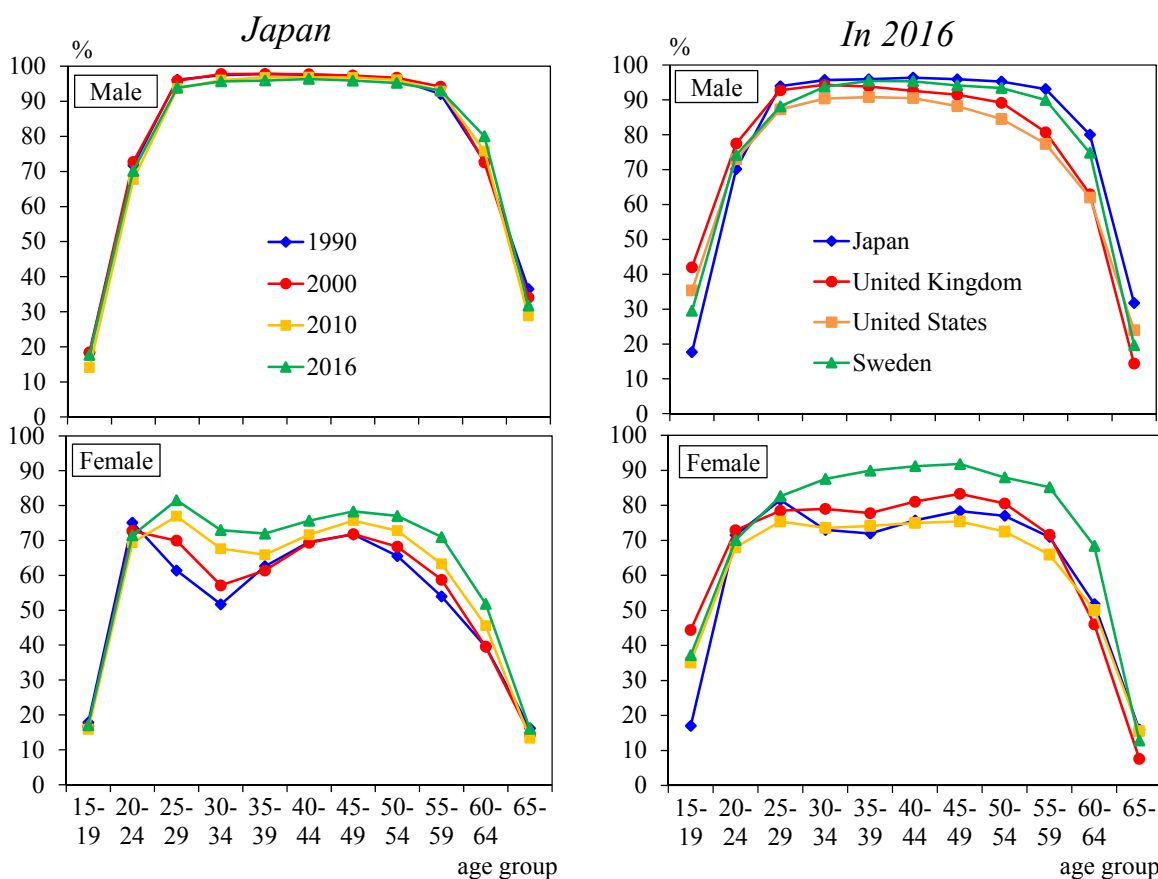
Elderly (aged 65-)

Foreign



Sources: Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.

Labor Force Participation Rates



Sources: Ministry of Internal Affairs and Communications; OECD.

Back-of-Envelope Calculation

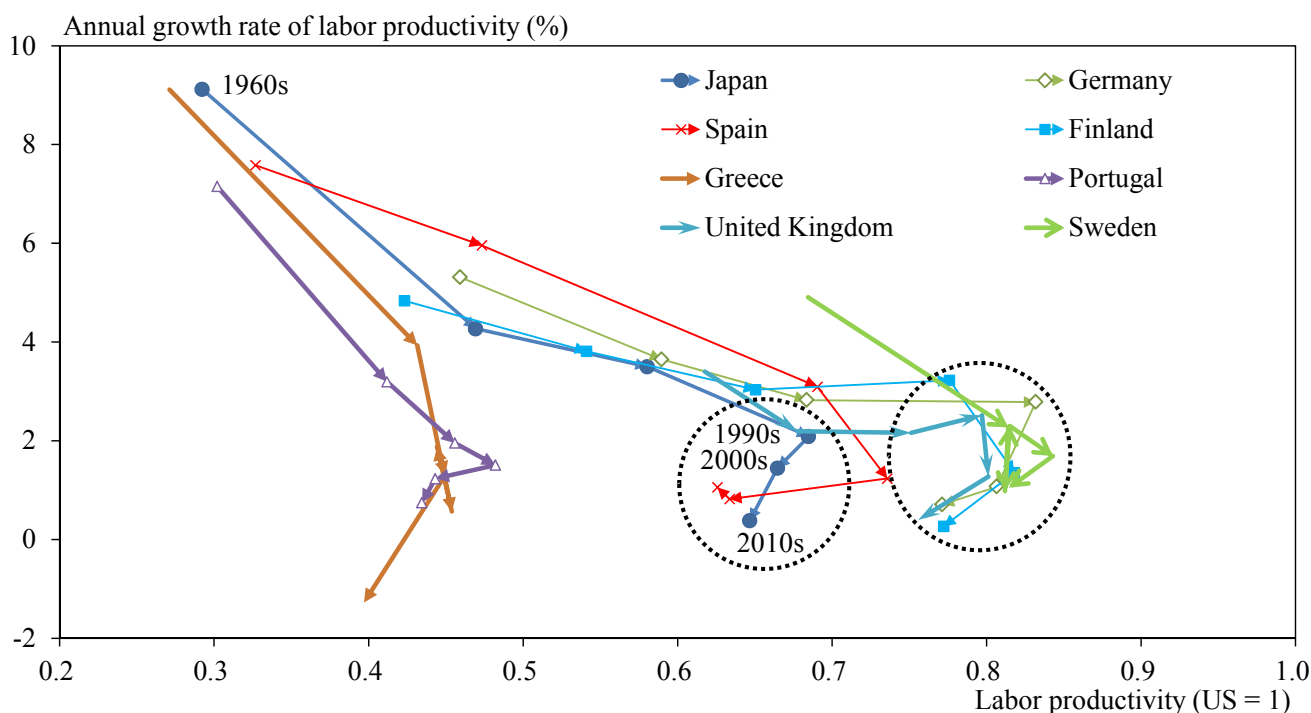
avg., y/y % chg.

	Japan					United States	
	1980-2016	1990-2016	Projection for 2017-2040			1980-2016	1990-2016
			Status quo	More female workers & more elderly workers	More foreign workers		
Real GDP	2.0%	1.2%	2.0%			2.6%	2.4%
Labor productivity	1.6%	1.0%	2.9%	1.4%	1.2%	1.4%	1.5%
Number of employed persons	0.5%	0.2%	-0.9%	0.6%	0.8%	1.2%	1.0%

Notes: 1. The “Status quo” assumes that the labor force participation rate for every age and gender group remains unchanged from that in 2016.
 2. “More female workers & more elderly workers” assumes that by 2040 i) the labor force participation rate for females aged 25-59 is that of the same age and gender group in Sweden in 2010 and ii) all of the healthy people aged 60 and older are in the labor force.
 3. “More foreign workers” additionally assumes that by 2040 the share of foreigners in the labor force will rise to the level of the United Kingdom in 2010.
 Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; Cabinet Office; Japan Institute for Labour Policy and Training; Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research; OECD.

Productivity Trap

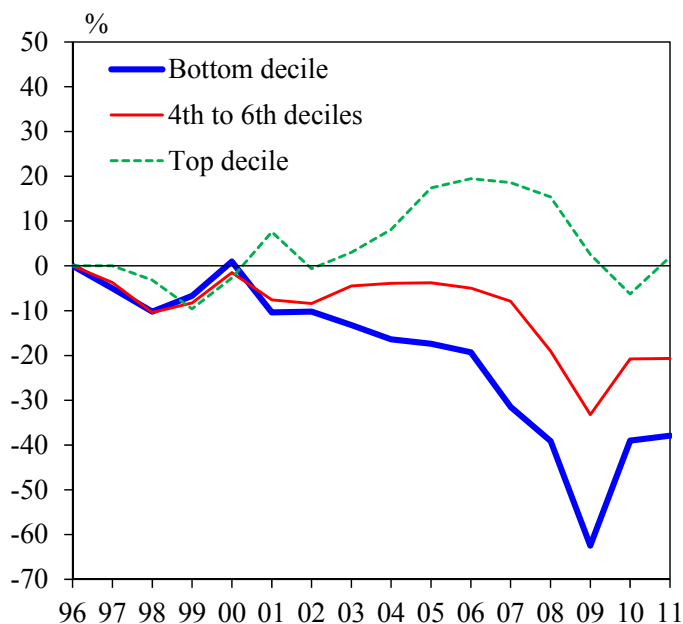
Growth Rate of Labor Productivity and Distance from the World Technology Frontier



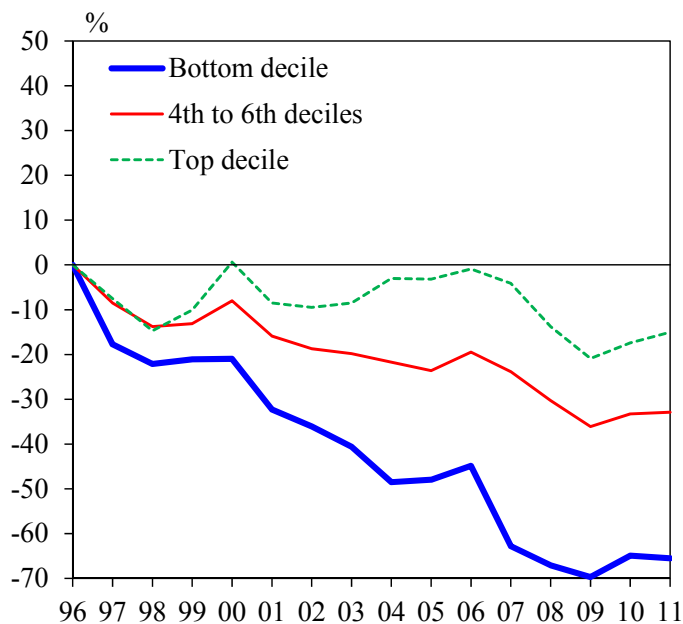
Note: Labor productivity is expressed in terms of per hour worked. Relative labor productivity for each country displays the country’s labor productivity level relative to the United States between the 1960s and 2010s. The data for the 2010s are averages over the years 2010 to 2015.
 Sources: The Conference Board, “The Conference Board Total Economy Database™, May 2016;” K. Aoki, N. Hara, and M. Koga (2017): “Structural Reforms, Innovation and Economic Growth,” Bank of Japan Working Paper Series, 17-E-2.

Productivity Gap at Firm's Level

Manufacturing Sector



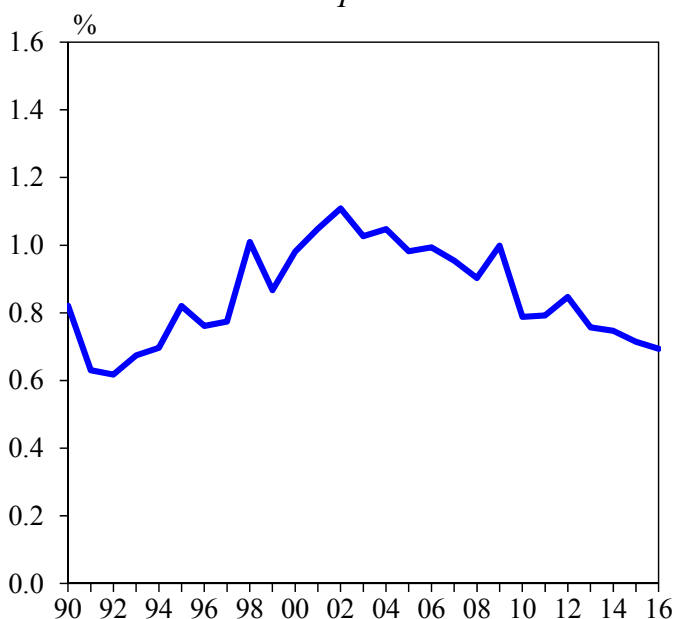
Non-Financial Market Services Sector



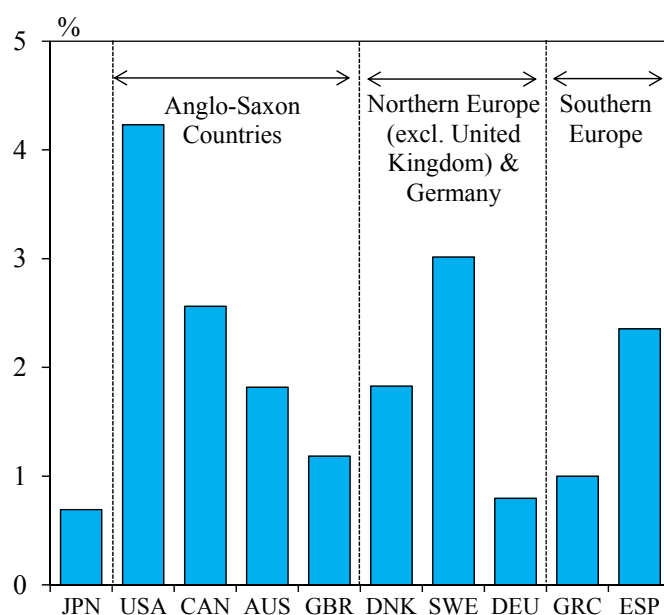
Notes: 1. The figures display cumulated changes of the labor productivity from 1996 for Japanese firms of the corresponding sector in the bottom decile, between the 4th and 6th deciles, and in the top decile of the labor productivity distribution in any given year.
 2. This data only includes firms with more than 50 employees, and covers the period from 1996 to 2011.
 Sources: OECD; G. Berlingieri, P. Blanchenay, and C. Criscuolo (2017): "The Great Divergence(s)," OECD Science, Technology, and Innovation Policy Papers No. 39.

Labor Mobility

Japan

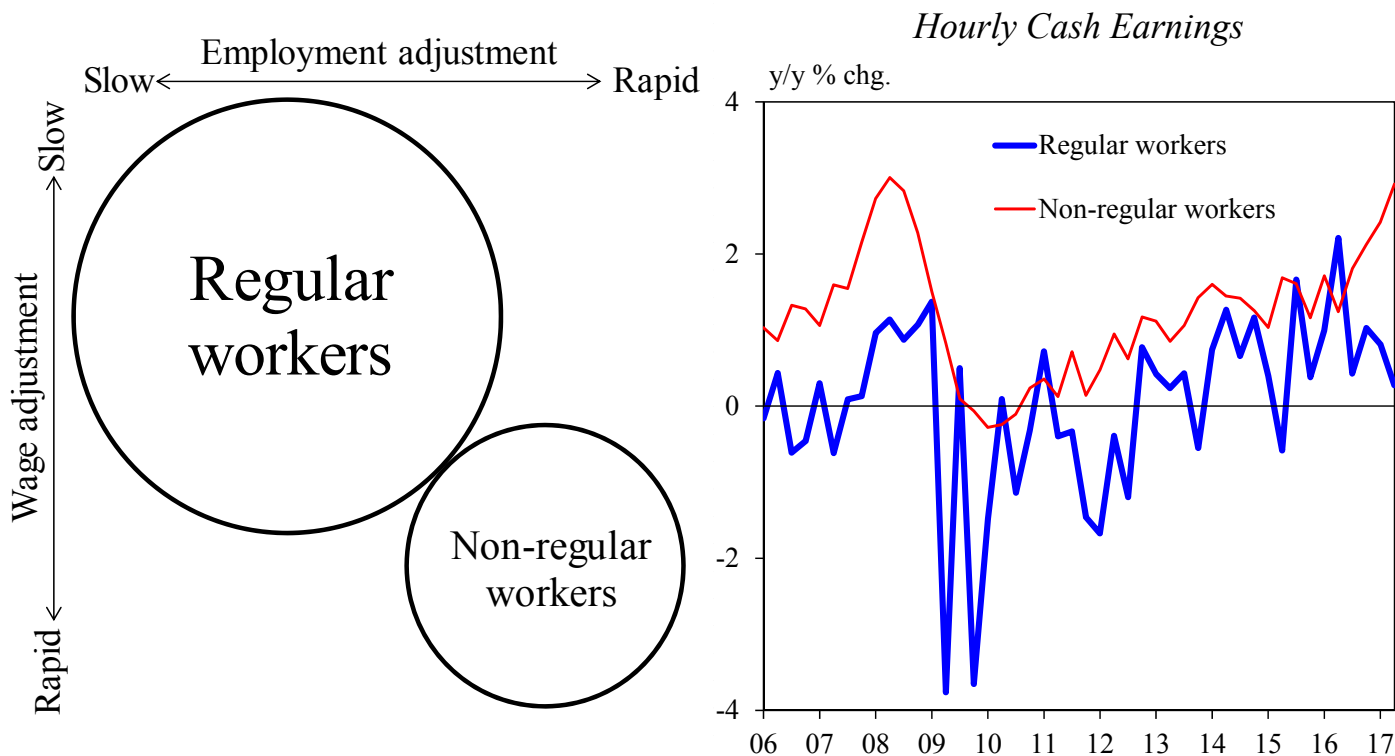


In 2016



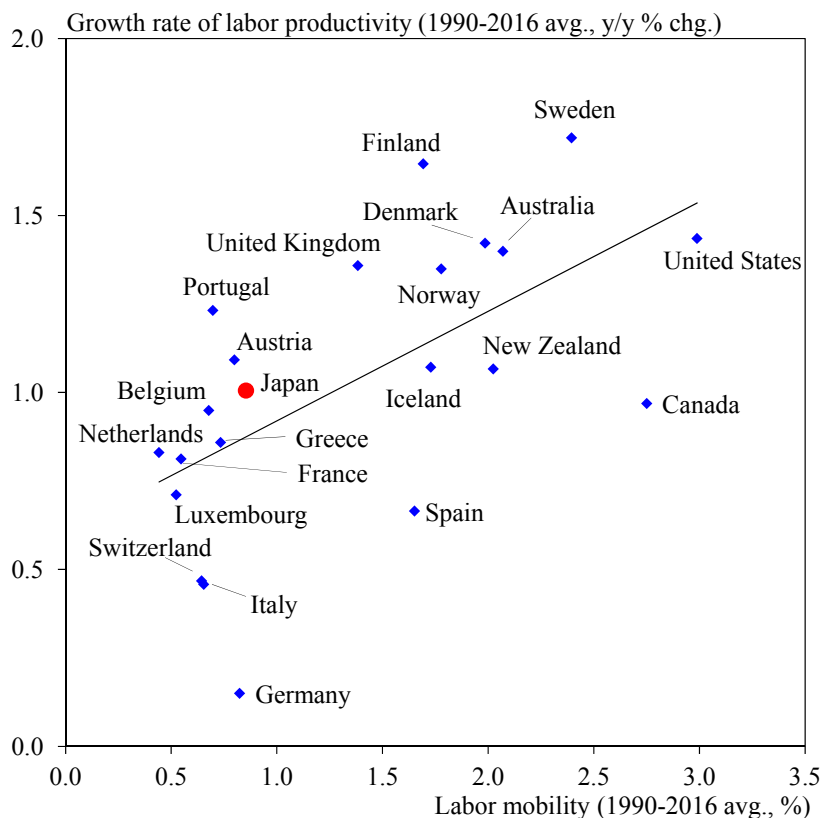
Note: A country's labor mobility is measured by the ratio of the sum of flows in and out of short-term unemployment (unemployed less than one month) for population aged 15-64 in the respective country.
 Sources: OECD; World Bank.

Japan's Labor Market Dichotomy



Notes: 1. For hourly cash earnings, Q1 = March-May, Q2 = June-August, Q3 = September-November, and Q4 = December-February.
 2. Hourly scheduled cash earnings for part-time employees are displayed for non-regular workers.
 Source: Ministry of Health, Labour and Welfare.

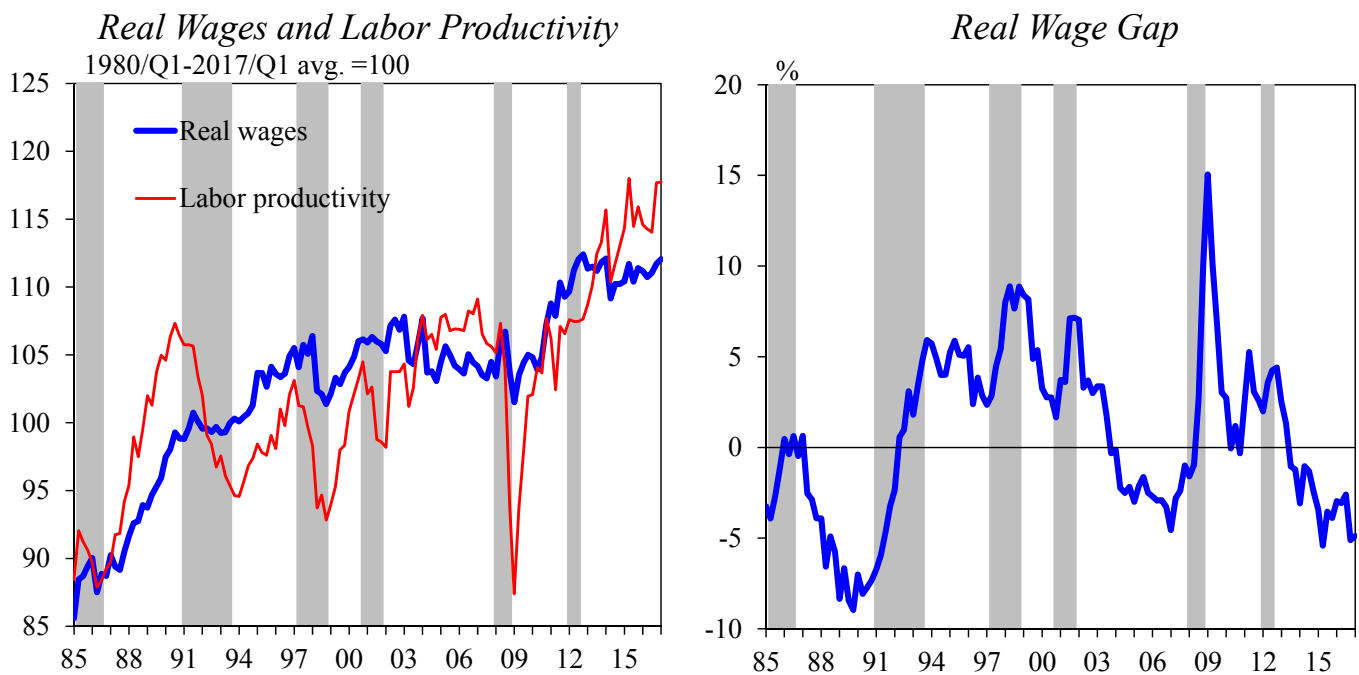
Labor Mobility and Productivity



Note: A country's labor mobility is measured by the ratio of the sum of flows in and out of short-term unemployment (unemployed less than one month) for population aged 15-64 in the respective country.
 Sources: OECD; World Bank.

3. Labor Market Reforms and Prices

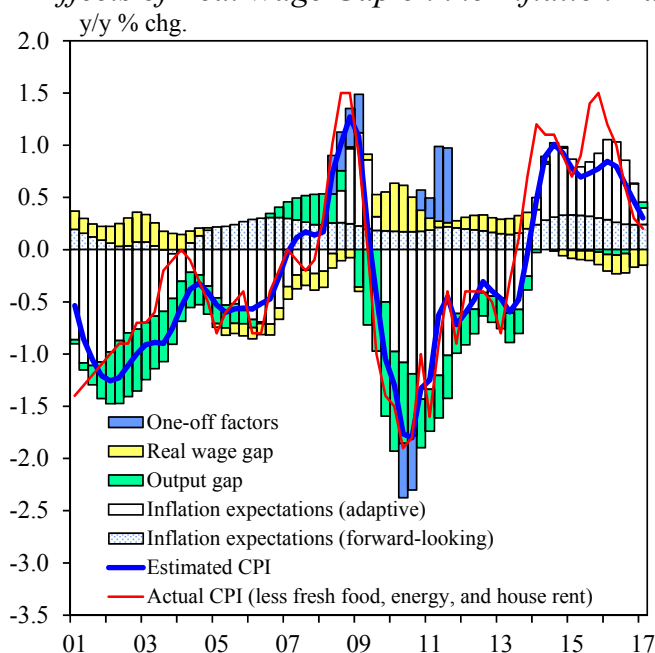
Real Wage Gap



Notes: 1. Real wages = personnel expenses / number of employees / GDP deflator.
 2. Labor productivity = (operating profits + personnel expenses + depreciation expenses) / number of employees / GDP deflator.
 The data used to compute labor productivity except for the GDP deflator series are based on the “Financial Statements Statistics of Corporations by Industry, Quarterly,” and do not cover the finance and insurance industry.
 3. The real wage gap is defined as the deviation of real wages from labor productivity.
 4. Shaded areas indicate recession periods.
 5. Data for real wages and labor productivity are seasonally adjusted.
 Sources: Cabinet Office; Ministry of Finance.

Augmented Phillips Curve

Effects of Real Wage Gap on the Inflation Rate



(a) Specifications

$$\begin{aligned} \pi_t = & \beta_0 \\ & + \beta_1 \times \pi_t^e \\ & + (1 - \beta_1) \times (\pi_{t-1} + \pi_{t-2}) / 2 \\ & + \beta_2 \times ygap_t \\ & + \beta_3 \times (wgap_{t-2} + wgap_{t-3}) / 2 \\ & + \Omega \times (\text{dummy variables for one-off factors}) \end{aligned}$$

π : CPI less fresh food, energy, and house rent (seasonally adjusted q/q % changes, annualized).

π^e : medium to long-term inflation expectations (%).

ygap: output gap (%). wgap: real wage gap (%).

(b) Estimation Results

β_0	-0.30 **
β_1	0.30 ***
β_2	0.19 ***
β_3	0.05 *
Adj. R ²	0.62
S.E.	0.36

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

S.E. represents the standard errors for the estimated y/y % changes.

Estimation period: 1997/Q1-2017/Q1.

- Notes: 1. Figures for medium to long-term inflation expectations are the expectations for the CPI 6 to 10 years ahead and are based on the "Consensus Forecasts."
 2. In the estimations, dummy variables are included in order to control for the estimated effects of one-off factors such as the introduction of a subsidy for high school tuition.
 3. The output gap is estimated by the Research and Statistics Department, Bank of Japan.
 4. The CPI figures are adjusted for changes in the consumption tax rate.
 5. The effects of the constant term are evenly allocated to the contributions of inflation expectations (forward-looking and adaptive).

Sources: Consensus Economics Inc., "Consensus Forecasts;" Ministry of Finance; Ministry of Internal Affairs and Communications; Bank of Japan staff calculations.

Substitution between Labor and Capital

Estimates of σ , Elasticity of Substitution (Panel Estimation)

$$\ln \frac{K_{it}}{L_{it}} = -\sigma \times \ln \frac{r(K)_{it}}{w_{it}} + \text{Const.} + \text{fixed effect}_i + \varepsilon_{it}$$

		Case of all types of capital	Case of ICT capital
All industries (24 industries)	σ	0.26	0.75
	(S.E.)	(0.03)	(0.04)
	Adj-R ²	0.99	0.95
	S.E. of regression	0.11	0.26
Manufacturing (14 industries)	σ	0.30	1.01
	(S.E.)	(0.04)	(0.06)
	Adj-R ²	0.98	0.95
	S.E. of regression	0.12	0.25
Non-manufacturing (10 industries)	σ	0.22	0.51
	(S.E.)	(0.03)	(0.06)
	Adj-R ²	0.99	0.97
	S.E. of regression	0.10	0.24

Estimation period: 1995-2015. Cross-section fixed effects are included.

Notes: 1. All types of capital excludes residential and R&D stocks. ICT capital consists of information and communication machinery and software.

2. The following 5 industries are excluded in the analysis above: agriculture, forestry and fishing; mining; public administration; education; and human health and social work activities.

Sources: Bank of Japan; Bloomberg; Cabinet Office; Ministry of Finance.

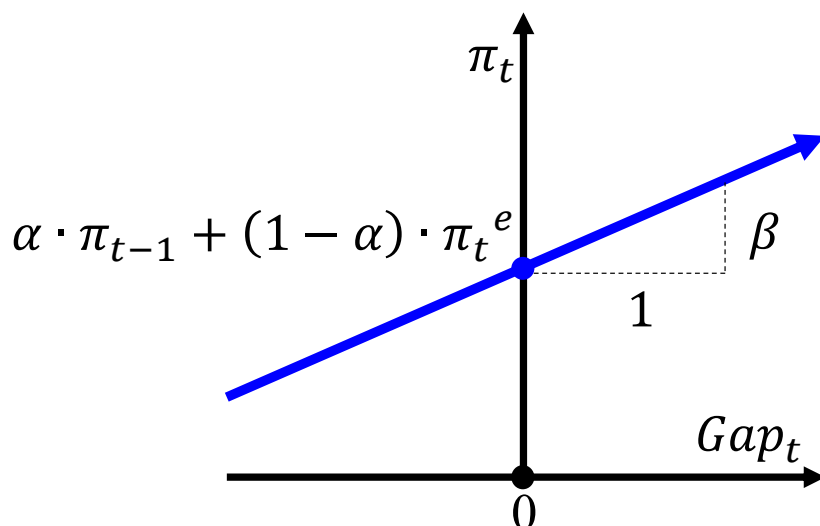
Stylized Phillips Curve

$$\pi_t = \alpha \cdot \pi_{t-1} + (1 - \alpha) \cdot \pi_t^e + \beta \cdot Gap_t + u_t$$

Inflation

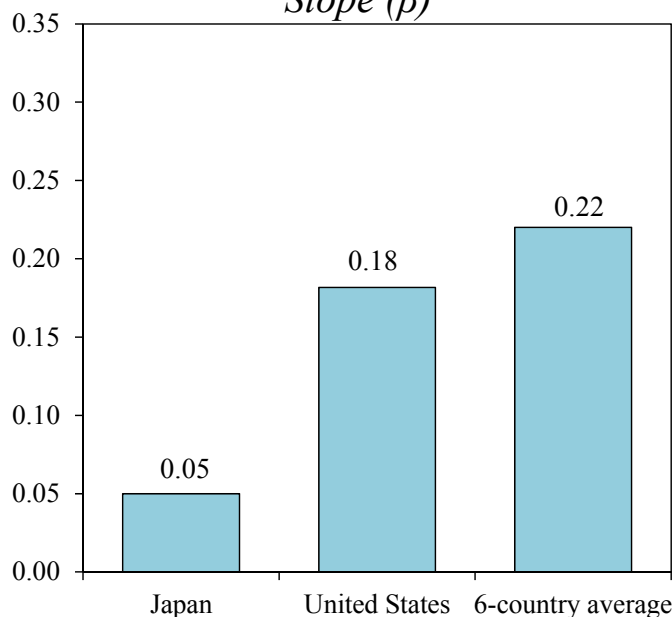
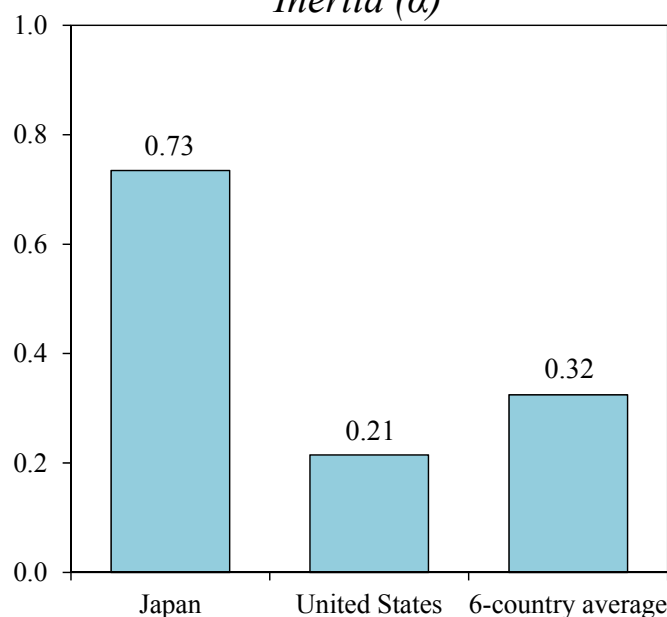
Past
InflationExpected
InflationOutput
Gap

Others



Estimated Phillips Curve

$$\pi_t = \alpha \pi_{t-1} + (1 - \alpha) \pi_t^e + \beta Gap_t + u_t$$

Inertia (α)*Slope* (β)

Notes: 1. Data for inflation is the CPI (all items). Data for expected inflation is computed using expectations of the CPI inflation for the next six to ten years published in the Consensus Forecasts.

2. The results of 6-country average are those of an estimation using the data for Canada, France, Germany, Italy, Japan, and the United States. The United Kingdom is not included in the dataset due to data availability.

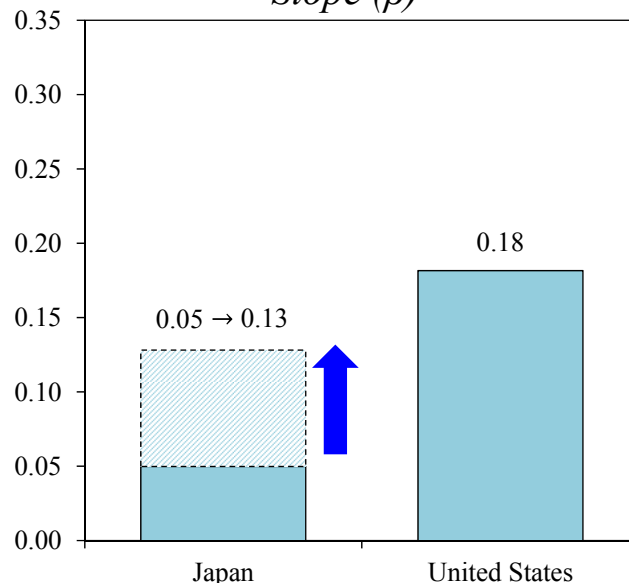
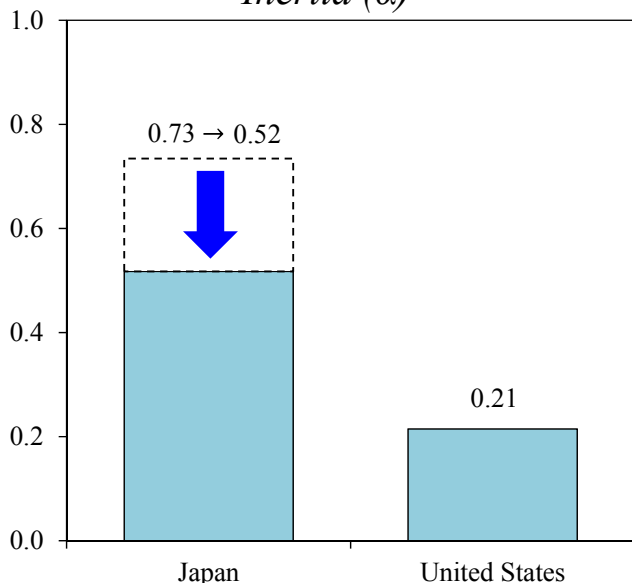
Sources: Consensus Economics Inc., "Consensus Forecasts;" OECD; World Bank; Bank of Japan staff calculations.

If Japan's Labor Mobility Catches Up with the US

$$\pi_t = \alpha\pi_{t-1} + (1 - \alpha)\pi_t^e + \beta Gap_t + u_t$$

Inertia (α)

Slope (β)



Notes: 1. We calculate impacts of the given rise in Japan's labor mobility on the inertia and the slope based on the following estimation results.

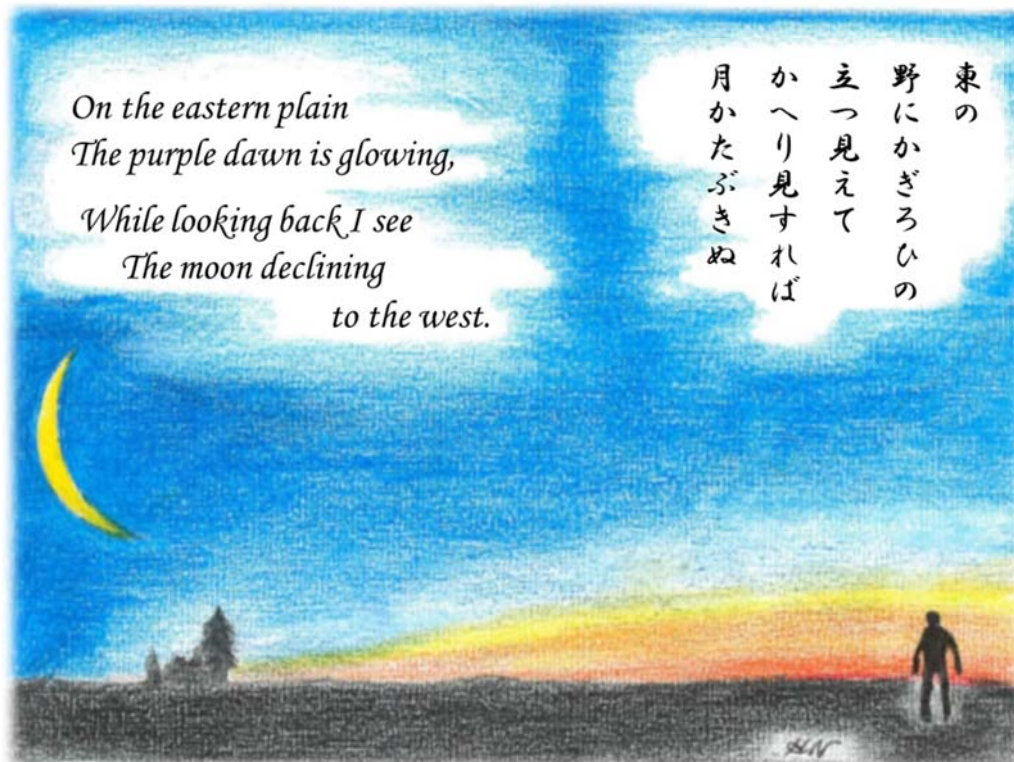
$$\pi_{JP,t} = (0.42 - 0.10 * \bar{m}_{JP}) * \pi_{JP,t-1} + (1 - (0.42 - 0.10 * \bar{m}_{JP})) * \pi_{JP,t}^e + (0.10 + 0.04 * \bar{m}_{JP}) * Gap_{JP,t} + \bar{u}_{JP,t}$$

where \bar{m}_{JP} and \bar{m}_{US} respectively denote the average labor mobility of Japan and that of the United States over the period 1990 - 2016.

The computed changes in the inertia and the slope are $-0.10 * (\bar{m}_{US} - \bar{m}_{JP})$ and $0.04 * (\bar{m}_{US} - \bar{m}_{JP})$ respectively.

2. Data for actual inflation, expected inflation, and output gap are those used in Slide 20. Data for labor mobility are those displayed in Slide 15.

Sources: Consensus Economics Inc., "Consensus Forecasts;" OECD; World Bank; Bank of Japan staff calculations.



A waka-poem by the eighth century Japanese poet, Kakinomoto no Hitomaro.

Note: Translation from Nippon Gakujutsu Shinkōkai, Japanese Classics Translation Committee, 1965, *The Manyōshū, The Nippon Gakujutsu Shinkōkai Translation of One Thousand Poems with the Texts in Romaji with a New Foreword by Donald Keene*, Columbia University Press, New York.