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Japan's Medium-term Economic Outlook
—*June 2011*—

Overcoming the earthquake, Japan aims for tangible growth

Japanese report: 16 Jun 11

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Summary

- We forecast that Japan's economy will grow at an annualized average of 1.8% (nominal) and 1.5% (real) over the next 10 years. Per capita real GDP, a measure of average living standards, will rise 1.9%. Viewed from the supply side, the economy will achieve an increase of 2.0% in man-hour productivity.

- Focusing on structural deflation caused by corporate activity, the efforts of manufacturing industries to reduce labor costs and to increase price competitiveness in foreign markets have given way to the appreciation of the yen, deflation, and lackluster domestic demand. To surmount deflation and to achieve sustainable growth, it will be important to increase productivity by easing regulations and creating a better employment environment. Equally significant will be the establishment of a framework for distributing domestically the increase in income derived from higher productivity.

- As measures for dealing with power shortages following the nuclear power plant incident triggered by the Great East Japan Earthquake, gas-fired power generation using LNG with relatively low CO2 emissions should be increased in the short term. In the medium to long term, geothermal power, small and micro hydropower, and other sources of renewable power generation should be promoted and solar and wind power generators built in suitable locations. Such prioritization should be established by broadly referring to the time cost and economic cost of increasing supply capacity as well as the environmental burden.

- We have assumed in this current forecast that the consumption tax will be increased from its current rate of 5% to 8% in FY14 and to 10% in FY15 as part of the integrated reform of the social insurance and tax systems. A higher consumption tax would reduce demand and blunt economic growth in the short term. However, in view of the hyper-aged society that Japan is becoming, some increase in the taxpayer burden is unavoidable and the economy may well be able to withstand the consumption tax increasing by the order we have described. Since the objective of raising the consumption tax is to ensure the sustainability of the social insurance system, the taxpayer burden should not be increased unless social insurance benefits are at the same time made more efficient.

Contents

Forecast Tables

Medium-term Outlook for Japan's Economy (as of Jun 2011)

	Actual		DIR estimates		
	FY2001-05	FY2006-10	FY2011-20	FY2011-15	FY2016-20
Real GDP (Y/y %)	1.3	-0.1	1.5	1.5	1.5
Private final consumption	1.3	0.3	1.2	0.8	1.6
Private capital investment	2.7	-2.4	3.3	4.2	2.5
Private housing investment	-2.0	-7.4	-0.5	1.8	-2.7
Public fixed capital formation	-7.6	-3.9	-1.1	-0.4	-1.8
Government final consumption	2.0	1.7	1.1	0.9	1.4
Exports of goods and services	6.5	2.3	4.2	4.2	4.2
Imports of goods and services	3.7	-0.1	4.1	4.2	4.1
Nominal GDP (Y/y %)	0.0	-1.1	1.8	1.8	1.9
GDP deflator (Y/y %)	-1.3	-1.1	0.3	0.3	0.4
Corporate Goods Price Index (Y/y %)	-0.3	0.5	1.1	1.2	0.9
Consumer Price Index (Y/y %)	-0.4	-0.1	1.1	1.1	1.0
O/N call rate (%)	0.0	0.3	1.1	0.4	1.9
Yields on 10-yr JGBs (%)	1.3	1.5	2.2	1.7	2.7
Y/$	116.1	102.0	79.4	82.5	76.2
Current balance (% of nominal GDP)	3.2	3.6	3.3	3.1	3.5
Nominal employee compensation (Y/y %)	-0.9	-0.5	1.1	0.3	1.9
Unemployment (%)	4.9	4.4	4.0	4.4	3.7
Labor's share (ratio of employee compensation to national income)	72.1	72.2	68.2	68.6	67.7
Central & local government fiscal balance (% of nominal GDP)	-6.7	-5.5	-3.5	-4.5	-2.6
Central & local government primary balance (% of nominal GDP)	-4.6	-3.9	-1.7	-2.8	-0.8
Central & local government debt (% of nominal GDP)	168.5	199.1	235.1	233.3	236.6

Source: Compiled by DIR.
Notes: 1) Period avg.
2) Some of FY10 figures: DIR estimates.
3) Fiscal balance: excl. ad-hoc factors.

Main Economic Indicators

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nominal GDP (Y tril)	503.2	510.9	515.8	492.1	474.0	475.8	470.2	479.9	489.8	506.8	521.2	528.5	537.6	548.9	560.1	571.5
(Y/y %)	0.9	1.5	1.0	-4.6	-3.7	0.4	-1.2	2.1	2.1	3.5	2.8	1.4	1.7	2.1	2.0	2.0
Nominal GNI (Y tril)	516.4	525.9	533.4	507.4	486.8	488.5	482.5	494.1	505.5	523.9	539.1	547.3	557.0	568.9	580.5	592.0
(Y/y %)	1.5	1.8	1.4	-4.9	-4.0	0.3	-1.2	2.4	2.3	3.6	2.9	1.5	1.8	2.1	2.0	2.0
Real GDP (Chained [2000]; Y tril)	540.0	552.5	562.5	539.6	526.4	538.5	538.9	554.5	567.8	574.0	580.0	586.8	595.4	605.7	615.3	624.6
(Y/y %)	2.3	2.3	1.8	-4.1	-2.4	2.3	0.1	2.9	2.4	1.1	1.0	1.2	1.5	1.7	1.6	1.5
Contribution of domestic demand to real GDP growth (% pt)	1.8	1.5	0.6	-2.9	-2.7	1.4	0.7	3.1	2.3	0.6	0.7	0.9	1.4	1.8	1.7	1.6
Contribution of foreign demand to real GDP growth (% pt)	0.5	0.8	1.2	-1.1	0.3	0.9	-0.5	-0.2	-0.1	0.5	0.3	0.3	0.1	0.0	-0.1	-0.1
Per capita real GDP (Chained [2000]; Y mil)	4.2	4.3	4.4	4.2	4.1	4.2	4.2	4.4	4.5	4.5	4.6	4.7	4.8	4.9	5.0	5.1
(Y/y %)	2.3	2.3	1.8	-4.0	-2.3	2.2	0.3	3.2	2.7	1.4	1.4	1.6	1.9	2.2	2.1	2.0
Real GDI (Chained [2000]; Y tril)	529.1	537.2	541.3	516.3	510.4	515.8	514.3	527.7	539.4	545.0	550.0	554.6	560.7	568.0	574.8	581.3
(Y/y %)	1.2	1.5	0.8	-4.6	-1.1	1.1	-0.3	2.6	2.2	1.0	0.9	0.8	1.1	1.3	1.2	1.1
Index of Industrial Production (2005 = 100)	100.7	105.3	108.1	94.4	86.1	93.8	92.8	97.3	100.9	102.0	102.9	104.1	106.0	108.5	110.7	112.8
(Y/y %)	1.6	4.6	2.7	-12.6	-8.8	9.0	-1.1	4.8	3.7	1.0	0.9	1.2	1.8	2.3	2.0	1.9
Corporate Goods Price Index (2005 = 100)	100.5	102.5	104.9	108.2	102.6	103.3	102.4	102.5	103.2	106.9	109.7	110.4	111.3	112.4	113.5	114.8
(Y/y %)	1.8	2.0	2.3	3.2	-5.2	0.7	-0.8	0.1	0.7	3.6	2.6	0.7	0.8	1.0	1.0	1.1
Consumer Price Index (2005 = 100)	100.0	100.2	100.6	101.7	100.0	99.6	99.2	99.2	99.6	102.7	105.2	106.1	107.1	108.3	109.5	110.8
(Y/y %)	-0.1	0.2	0.4	1.1	-1.7	-0.4	-0.4	0.0	0.4	3.1	2.4	0.9	1.0	1.1	1.1	1.2
O/N call rate (%)	0.0	0.2	0.5	0.4	0.1	0.1	0.0	0.0	0.0	0.9	1.0	1.2	1.6	2.0	2.3	2.5
Yields on 10-yr JGBs (%)	1.4	1.8	1.6	1.5	1.4	1.1	1.3	1.5	1.5	2.1	2.2	2.3	2.5	2.7	2.8	2.9
Y/$	113	117	114	100	93	86	83	83	84	82	81	79	78	77	75	73
Y/EUR	138	150	162	143	131	113	112	112	112	109	106	104	103	101	98	96
Current balance (Y tril)	19.1	21.2	24.5	12.3	15.8	16.0	12.8	12.8	13.4	17.4	19.6	20.8	20.7	20.0	18.4	17.1
(% of nominal GDP)	3.8	4.1	4.8	2.5	3.3	3.4	2.7	2.7	2.7	3.4	3.8	3.9	3.9	3.6	3.3	3.0
Labor force (0000)	6,654	6,660	6,668	6,648	6,608	6,584	6,572	6,545	6,515	6,486	6,468	6,455	6,427	6,399	6,371	6,345
(Y/y %)	0.2	0.1	0.1	-0.3	-0.6	-0.4	-0.2	-0.4	-0.5	-0.4	-0.3	-0.2	-0.4	-0.4	-0.4	-0.4
No. employed (0000)	6,365	6,389	6,414	6,373	6,265	6,256	6,251	6,246	6,237	6,220	6,209	6,202	6,181	6,162	6,141	6,123
(Y/y %)	0.5	0.4	0.4	-0.6	-1.7	-0.1	-0.1	-0.1	-0.1	-0.3	-0.2	-0.1	-0.3	-0.3	-0.3	-0.3
No. of employees (0000)	5,420	5,486	5,523	5,520	5,457	5,419	5,431	5,444	5,453	5,456	5,464	5,475	5,475	5,477	5,478	5,481
(Y/y %)	1.2	1.2	0.7	0.0	-1.2	-0.7	0.2	0.2	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.1
No. unemployed (0000)	289	271	255	275	343	328	321	299	278	266	258	253	246	237	229	223
Unemployment rate (%)	4.3	4.1	3.8	4.1	5.2	5.0	4.9	4.6	4.3	4.1	4.0	3.9	3.8	3.7	3.6	3.5
Nominal employee compensation (Y tril)	260	264	263	261	251	254	246	246	248	251	257	263	267	272	277	282
(Y/y %)	1.4	1.8	-0.4	-0.9	-3.6	0.9	-3.1	0.0	0.9	1.3	2.3	2.2	1.5	1.8	1.8	2.0
Nominal household disposable income (Y tril)	292	295	294	292	292	292	285	288	293	301	310	318	326	335	344	353
(Y/y %)	1.2	1.2	-0.7	-0.6	0.1	-0.1	-2.3	1.1	1.7	2.7	3.0	2.5	2.4	2.9	2.7	2.6
Labor's share (%)	71.0	70.4	69.5	74.1	74.1	73.0	70.9	69.0	68.1	67.2	67.9	68.6	68.1	67.4	67.2	67.2
Household savings rate (%)	3.7	3.9	1.7	3.2	5.5	5.9	5.3	5.6	5.5	5.2	5.1	5.2	5.5	6.1	6.4	6.7
Central & local government fiscal balance (Y tril)	-23.0	-17.2	-14.0	-23.5	-45.6	-35.8	-27.1	-26.8	-24.3	-19.2	-14.5	-13.6	-14.2	-14.2	-14.7	-15.7
(% of nominal GDP)	-4.6	-3.4	-2.7	-4.8	-9.6	-7.5	-5.8	-5.6	-5.0	-3.8	-2.8	-2.6	-2.6	-2.6	-2.6	-2.7
Central & local government primary balance (% of nominal GDP)	-2.9	-1.8	-1.2	-3.1	-7.8	-5.7	-3.9	-3.8	-3.2	-2.0	-1.1	-0.8	-0.8	-0.8	-0.7	-0.8
Central & local government debt (Y tril)	938	944	960	962	1,009	1,041	1,080	1,119	1,156	1,188	1,215	1,242	1,270	1,299	1,328	1,360
(% of nominal GDP)	186.4	184.8	186.0	195.5	212.8	218.8	229.7	233.2	236.0	234.3	233.2	235.0	236.2	236.6	237.1	238.0

Source: Compiled by DIR.
Notes: 1) FY10 figures for labor force, no. employed, no. of employees, no. unemployed, unemployment rate: Period avg.
2) Through FY10: actual; some FY10 figures: DIR estimates.
3) Fiscal balance: excl. ad-hoc factors.

Nominal Gross Domestic Expenditure (Y tril)

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nominal GDP	503.2	510.9	515.8	492.1	474.0	475.8	470.2	479.9	489.8	506.8	521.2	528.5	537.6	548.9	560.1	571.5
(Y/y %)	0.9	1.5	1.0	-4.6	-3.7	0.4	-1.2	2.1	2.1	3.5	2.8	1.4	1.7	2.1	2.0	2.0
Domestic demand	496.7	503.8	507.8	494.0	470.0	471.7	469.0	480.6	491.5	505.7	518.6	525.4	535.2	547.9	561.1	574.1
(Y/y %)	1.5	1.4	0.8	-2.7	-4.9	0.4	-0.6	2.5	2.3	2.9	2.5	1.3	1.9	2.4	2.4	2.3
Private final consumption	287.3	290.3	293.6	287.3	280.7	279.3	274.8	276.7	281.8	290.4	299.5	306.6	313.1	320.3	327.6	335.4
(Y/y %)	1.1	1.1	1.1	-2.2	-2.3	-0.5	-1.6	0.7	1.9	3.0	3.1	2.4	2.1	2.3	2.3	2.4
Private housing investment	18.4	18.8	16.6	16.4	12.9	12.9	13.5	15.0	15.7	15.8	15.4	14.7	14.4	14.4	14.4	14.6
(Y/y %)	-0.1	2.0	-11.5	-1.2	-21.3	0.3	4.4	11.1	4.8	0.7	-2.6	-4.8	-1.7	-0.5	0.4	1.0
Private capital investment	75.9	79.8	80.9	76.3	63.7	65.9	64.0	69.4	72.3	74.6	77.8	78.9	81.0	84.2	86.7	88.9
(Y/y %)	6.1	5.2	1.4	-5.7	-16.6	3.4	-2.8	8.4	4.2	3.2	4.2	1.4	2.8	3.9	3.0	2.6
Change in private inventories	1.3	2.5	3.1	0.8	-3.6	-2.2	-1.0	-0.1	2.5	4.2	3.1	1.4	0.8	1.7	3.0	3.6
Government final consumption	90.6	90.9	92.9	93.4	94.9	96.4	97.7	97.2	98.0	99.1	101.5	103.8	105.6	107.2	109.0	110.9
(Y/y %)	0.9	0.4	2.1	0.5	1.7	1.5	1.4	-0.5	0.8	1.2	2.4	2.2	1.8	1.5	1.7	1.8
Public fixed capital formation	23.0	21.2	20.3	19.6	21.3	19.3	19.9	22.3	21.0	21.3	21.0	20.0	20.1	20.1	20.3	20.5
(Y/y %)	-4.2	-7.7	-4.2	-3.8	8.6	-9.0	2.8	12.3	-6.0	1.3	-1.2	-4.9	0.5	0.3	0.8	1.2
Change in public inventories	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Exports of goods and services	74.9	83.9	92.2	78.3	64.2	73.5	71.0	75.8	79.8	84.1	87.5	90.4	93.6	97.2	99.4	101.8
(Y/y %)	11.7	12.0	9.9	-15.1	-18.0	14.5	-3.4	6.7	5.3	5.3	4.0	3.3	3.6	3.8	2.3	2.4
Imports of goods and services	68.4	76.8	84.2	80.2	60.2	69.5	73.1	77.5	81.5	82.9	84.9	87.3	91.2	96.2	100.4	104.4
(Y/y %)	17.7	12.2	9.7	-4.7	-25.0	15.5	5.2	6.0	5.2	1.7	2.4	2.8	4.4	5.5	4.3	4.0

Real Gross Domestic Expenditure (chained [2000]; Y tril)

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real GDP	540.0	552.5	562.5	539.6	526.4	538.5	538.9	554.5	567.8	574.0	580.0	586.8	595.4	605.7	615.3	624.6
(Y/y %)	2.3	2.3	1.8	-4.1	-2.4	2.3	0.1	2.9	2.4	1.1	1.0	1.2	1.5	1.7	1.6	1.5
Domestic demand	522.9	530.8	533.9	517.8	503.8	511.2	514.7	530.8	543.2	546.4	550.4	555.2	562.9	572.9	582.8	591.9
(Y/y %)	1.8	1.5	0.6	-3.0	-2.7	1.5	0.7	3.1	2.3	0.6	0.7	0.9	1.4	1.8	1.7	1.6
Private final consumption	302.2	306.4	310.8	304.0	303.9	306.5	304.5	308.1	314.0	315.0	318.5	324.7	329.7	335.0	340.2	345.7
(Y/y %)	1.8	1.4	1.4	-2.2	0.0	0.8	-0.7	1.2	1.9	0.3	1.1	1.9	1.5	1.6	1.5	1.6
Private housing investment	18.4	18.4	15.9	15.3	12.6	12.5	13.1	14.6	15.1	14.6	13.7	12.8	12.4	12.2	12.0	11.9
(Y/y %)	-1.2	-0.2	-13.5	-3.6	-18.2	-0.2	5.0	10.7	3.7	-3.5	-6.0	-6.3	-3.1	-2.1	-1.3	-0.8
Private capital investment	83.2	87.1	87.8	81.8	70.6	73.6	73.2	80.5	84.3	87.1	90.6	91.7	94.3	97.7	100.2	102.3
(Y/y %)	6.2	4.7	0.8	-6.9	-13.6	4.3	-0.6	9.9	4.8	3.4	4.0	1.2	2.7	3.7	2.6	2.1
Change in private inventories	1.5	2.7	3.3	1.7	-4.2	-1.8	-1.2	-0.2	2.7	4.5	3.3	1.4	0.8	1.7	3.1	3.7
Government final consumption	94.6	95.7	97.1	97.3	100.7	103.0	106.2	106.5	107.6	106.9	107.8	109.6	111.3	112.5	113.9	115.4
(Y/y %)	0.8	1.1	1.5	0.2	3.5	2.3	3.1	0.3	1.0	-0.6	0.8	1.7	1.5	1.1	1.2	1.3
Public fixed capital formation	23.2	21.1	19.8	18.4	21.0	18.9	19.7	22.1	20.7	19.7	18.5	17.4	17.3	17.1	17.0	16.9
(Y/y %)	-5.6	-8.8	-6.4	-6.8	14.2	-10.0	4.1	12.3	-6.7	-4.7	-5.8	-6.1	-0.6	-1.0	-0.7	-0.4
Change in public inventories	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Exports of goods and services	75.8	82.1	89.8	80.4	72.7	85.1	84.0	90.2	95.4	100.3	104.3	108.9	114.1	119.5	123.6	128.0
(Y/y %)	9.0	8.3	9.3	-10.4	-9.6	17.0	-1.2	7.4	5.8	5.1	4.0	4.4	4.8	4.7	3.5	3.5
Imports of goods and services	58.7	60.6	61.7	59.1	52.6	58.4	62.7	66.1	68.8	70.1	71.6	73.6	76.8	80.7	84.2	87.4
(Y/y %)	5.8	3.1	1.9	-4.2	-11.0	11.0	7.4	5.4	4.1	1.9	2.1	2.7	4.4	5.1	4.3	3.8

Deflator (chained [2000])

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP deflator	93.2	92.5	91.7	91.2	90.0	88.4	87.3	86.5	86.3	88.3	89.9	90.1	90.3	90.6	91.0	91.5
(Y/y %)	-1.3	-0.7	-0.9	-0.5	-1.3	-1.9	-1.3	-0.8	-0.3	2.4	1.8	0.2	0.3	0.4	0.5	0.5
Domestic demand	95.0	94.9	95.1	95.4	93.3	92.3	91.1	90.5	90.5	92.5	94.2	94.6	95.1	95.6	96.3	97.0
(Y/y %)	-0.3	-0.1	0.2	0.3	-2.2	-1.1	-1.3	-0.6	-0.1	2.3	1.8	0.4	0.5	0.6	0.7	0.7
Private final consumption	95.1	94.8	94.5	94.5	92.4	91.1	90.2	89.8	89.8	92.2	94.0	94.4	95.0	95.6	96.3	97.0
(Y/y %)	-0.7	-0.3	-0.3	0.0	-2.2	-1.3	-0.9	-0.5	0.0	2.7	2.0	0.4	0.6	0.7	0.7	0.8
Private housing investment	99.8	102.0	104.4	106.9	102.8	103.4	102.8	103.2	104.2	108.7	112.7	114.4	116.0	118.0	120.0	122.2
(Y/y %)	1.1	2.2	2.3	2.5	-3.9	0.6	-0.6	0.4	1.0	4.3	3.6	1.5	1.4	1.6	1.7	1.8
Private capital investment	91.2	91.7	92.2	93.4	90.2	89.4	87.4	86.2	85.8	85.7	85.9	86.0	86.0	86.2	86.5	86.9
(Y/y %)	-0.1	0.5	0.6	1.3	-3.4	-0.8	-2.2	-1.3	-0.5	-0.1	0.2	0.1	0.0	0.2	0.4	0.5
Government final consumption	95.7	95.1	95.6	96.0	94.3	93.6	92.0	91.3	91.1	92.7	94.2	94.6	94.9	95.2	95.7	96.2
(Y/y %)	0.1	-0.7	0.6	0.4	-1.7	-0.7	-1.7	-0.8	-0.2	1.8	1.7	0.4	0.2	0.4	0.5	0.5
Public fixed capital formation	99.3	100.6	103.0	106.3	101.1	102.2	100.9	100.8	101.5	108.0	113.3	114.6	115.9	117.5	119.3	121.1
(Y/y %)	1.4	1.3	2.4	3.3	-4.9	1.0	-1.3	-0.1	0.7	6.4	4.9	1.2	1.1	1.4	1.5	1.6
Exports of goods and services	98.8	102.1	102.7	97.4	88.3	86.4	84.6	84.0	83.6	83.8	83.9	83.0	82.1	81.3	80.4	79.5
(Y/y %)	2.5	3.4	0.6	-5.2	-9.3	-2.1	-2.1	-0.7	-0.5	0.3	0.0	-1.1	-1.1	-0.9	-1.1	-1.1
Imports of goods and services	116.4	126.7	136.5	135.8	114.5	119.0	116.6	117.2	118.4	118.2	118.5	118.6	118.7	119.2	119.3	119.5
(Y/y %)	11.2	8.8	7.7	-0.5	-15.7	4.0	-2.0	0.5	1.1	-0.2	0.2	0.1	0.0	0.4	0.1	0.2

Source: Compiled by DIR.
Note: Through FY10: actual.

Assets and Labor and Capital Supply

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Potential GDP (Real GDP chained [2000]; Y tril)	539.2	548.2	556.5	550.8	552.2	553.0	551.7	559.1	565.7	569.9	576.1	583.4	590.6	598.4	606.3	614.5
Hourly labor productivity (Chained [2000]; yen)	5,395	5,448	5,547	5,429	5,444	5,530	5,590	5,738	5,869	5,951	6,026	6,104	6,209	6,326	6,439	6,548
(Y/y %)	0.9	1.0	1.8	-2.1	0.3	1.6	1.1	2.6	2.3	1.4	1.3	1.3	1.7	1.9	1.8	1.7
Hours worked per annum and per capita	1,811	1,813	1,804	1,768	1,739	1,751	1,742	1,743	1,743	1,737	1,731	1,726	1,722	1,719	1,715	1,711
(Y/y %)	0.0	0.1	-0.5	-2.0	-1.6	0.7	-0.5	0.1	0.0	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
Labor participation rate (%)	60.4	60.4	60.4	60.2	59.8	59.6	59.5	59.2	59.0	58.7	58.6	58.5	58.4	58.2	58.1	58.0
Net corporate sector capital stock (2000 prices; Y tril)	1,025	1,034	1,043	1,047	1,041	1,026	1,026	1,026	1,029	1,035	1,043	1,053	1,064	1,076	1,090	1,104
(Y/y %)	1.0	0.9	0.9	0.4	-0.6	-1.4	0.0	-0.1	0.3	0.6	0.8	0.9	1.0	1.2	1.3	1.3
Household financial assets (Y tril)	1,533	1,554	1,462	1,410	1,453	1,468	1,490	1,538	1,581	1,619	1,624	1,628	1,655	1,682	1,712	1,742
(% of nominal GDP)	304.8	304.2	283.5	286.6	306.6	308.5	316.9	320.5	322.8	319.4	311.7	308.1	307.7	306.5	305.6	304.8
External assets (Y tril)	558	620	629	575	599	591	593	611	629	639	656	674	688	702	709	713
(% of nominal GDP)	111.0	121.3	122.0	116.9	126.5	124.2	126.1	127.3	128.5	126.2	125.9	127.6	127.9	127.9	126.5	124.8
Net external assets (Y tril)	183	224	244	236	276	272	273	282	290	295	303	311	317	324	327	329
(% of nominal GDP)	36.4	43.8	47.3	47.9	58.3	57.3	58.1	58.7	59.2	58.2	58.1	58.8	59.0	59.0	58.3	57.5
Stock prices (TOPIX)	1,392	1,644	1,556	1,057	904	885	935	1,025	1,168	1,417	1,591	1,663	1,766	1,818	1,818	1,808
(Y/y %)	22.2	18.1	-5.4	-32.0	-14.5	-2.2	5.6	9.7	13.9	21.3	12.3	4.6	6.2	2.9	0.0	-0.5
Land Price Index (nationwide; all purpose; 2000 = 100)	67.1	64.8	64.2	62.9	59.9	57.3	57.1	58.6	59.8	62.8	62.5	60.4	58.8	58.5	58.9	59.6
(Y/y %)	-6.2	-3.4	-0.9	-2.0	-4.8	-4.3	-0.4	2.6	2.1	5.0	-0.6	-3.2	-2.7	-0.5	0.7	1.1

Assumptions

(FY)	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
World economic growth (PPP; y/y %)	4.7	5.3	4.7	2.0	0.9	4.9	4.4	4.5	4.5	4.6	4.6	4.7	4.9	5.1	4.9	4.9
Oil price (WTI; $/bbl)	60.7	66.1	84.1	85.3	72.3	84.9	88.8	92.6	96.5	100.1	103.6	106.9	110.1	113.0	115.8	118.4
(Y/y %)	32.5	9.0	27.1	1.5	-15.3	17.5	4.5	4.3	4.1	3.8	3.5	3.2	2.9	2.7	2.5	2.3
Population (mil)	127.7	127.8	127.7	127.7	127.5	127.6	127.3	127.0	126.7	126.3	125.8	125.3	124.8	124.3	123.7	123.1
(Y/y %)	0.0	0.0	0.0	-0.1	-0.1	0.1	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.5	-0.5
Population 15-64 (mil)	84.4	83.7	83.0	82.2	81.5	81.1	80.8	79.8	78.7	77.5	76.6	75.8	75.1	74.5	74.0	73.4
Population over-65 (mil)	25.6	26.5	27.5	28.3	29.0	29.4	29.7	30.8	31.9	32.9	33.8	34.5	35.0	35.4	35.7	35.9
Ratio of those over 65 to overall population (%)	20.1	20.8	21.5	22.1	22.8	23.1	23.3	24.2	25.2	26.1	26.9	27.5	28.0	28.5	28.9	29.2
Consumption tax rate (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0
Effective corporation tax rate (%)	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7
Employees' pension contribution rate (%)	14.3	14.6	15.0	15.4	15.7	16.1	16.4	16.8	17.1	17.5	17.8	18.2	18.3	18.3	18.3	18.3

Source: Compiled by DIR.
Note: Through FY10: actual; some FY10 figures: DIR estimates.

Introduction

Medium-term economic outlook for the next 10 years

We have formulated a medium-term outlook for Japan's economy covering the next 10 years. In the process, we restructured our existing medium-term macroeconomic forecasting model, which we employ as a forecasting tool, so as to better portray Japan's economic structure of recent years and thus provide better policy simulations regarding the future.

Structure of this report

Our outlook for Japan's economy for the next 10 years is given in Section 1, deflation and productivity are examined in Section 2, our recommendations regarding power supply problems that emerged after the Great East Japan Earthquake are presented in Section 3, an analysis and simulation of the integrated reform of the social security and tax systems as well as a consumption tax hike, both policy changes that are beginning to take shape, comprise Section 4, and, finally, an overview of our medium-term forecasting model and discussion of risk scenario simulations appear in Section 5.

1. Japan's Economy in the Next 10 Years

1.1 Japan's economy to date

1.1.1 Globalization and Japan's economy

Lehman shock and Great East Japan Earthquake interrupted longest postwar expansion

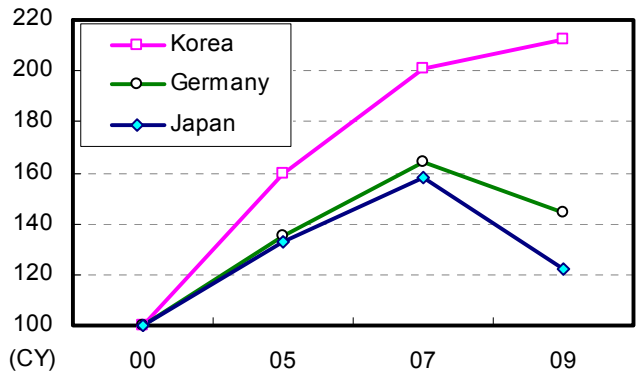
The longest postwar expansionary period (69 months) that began at the start of 2002 continued until autumn 2007, with the economy achieving average annual growth of 2.1% in real terms. However, the global retreat of demand in the aftermath of the Lehman shock put Japan's economy in a tailspin (nominal growth of −6.6% and real growth of −6.3% in CY09). Moreover, the Great East Japan Earthquake in March 2011 imparted both supply-side and demand-side blows to Japan's economy, interrupting the recovery that had been under way since early 2009.

Globalization has not meant notable increase in Japanese exports

What was the character of economic growth before the Lehman shock? Japan's economy was described as being export led. Certainly, Japan benefited greatly from the expansion of the world economy through globalization as epitomized by the growing presence of emerging economies. As shown in Chart 1.1, however, Japan's exports cannot be described as having expanded adequately in the same global context.

Real Exports (2000 = 100)

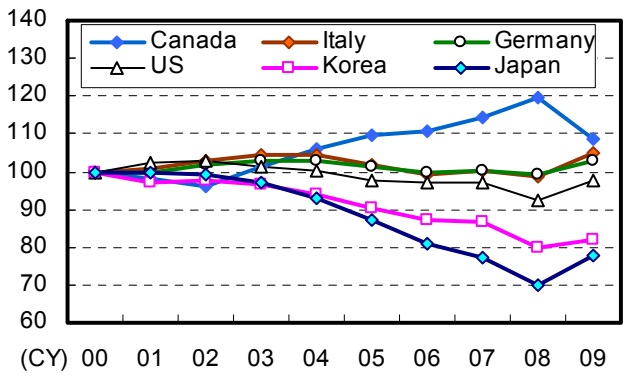
Chart 1.1



Source: OECD; compiled by DIR.

Terms of Trade (2000 = 100)

Chart 1.2



Source: OECD; compiled by DIR.

Was Japan more globalized in the first half of the 20th century?

We can gain some perspective by examining the ratio of nominal exports to nominal GDP. This ratio most recently peaked at 17.9% in FY07 (it fell to 13.5% in FY09). In contrast, the ratio, which was less than 10% toward the end of the 19th century, rose to surpass 20% immediately before World War I and remained around the same until around World War II. Compared to the situation before World War II, Japan is not necessarily riding the wave of internationalization in the 21st century.

Terms of trade deteriorated sharply

Moreover, it should be underscored that the growth of real exports has been supported by worsening terms of trade. As indicated in Chart 1.2, moving into the 21st century, no other economy saw its terms of trade deteriorate as much as Japan did. A sizable amount of income has flowed abroad from Japan as trading losses. This means that income has not risen for households or companies as much as might be expected when viewed from the production side. Even if the prices of resources that must be imported surge upward, terms of trade do not necessarily worsen if accompanied by yen appreciation. Terms of trade worsening despite yen appreciation is largely the consequence of falling export prices.

If exports expand but terms of trade worsen, income will falter

Terms of trade by their nature move inversely to production, operating rate, and corporate profits. In other words, their worsening can be viewed as the converse of strong external demand. Also, exports and imports occur since their benefits exceed the worsening of terms of trade. The structural nature of moderate real exports and worsening terms of trade, however, is a situation that is connected with sluggish nominal income and deflation. Terms of trade and deflation will be discussed in greater detail in Section 2.

1.1.2 Has productivity increased?

Economic growth means increase in productivity

Economic growth from the supply side means an increase in labor productivity in the final analysis. For Japan with a shrinking labor force, labor productivity growth is all the more significant. Productivity growth here does not mean the reduction of staffing levels but the expansion of real value added. Industries and companies for whom labor productivity is increasing rapidly are highly competitive, a situation providing them with the capacity to expand employment. When making medium- to long-term economic forecasts, an important consideration is how to estimate the future growth of productivity.

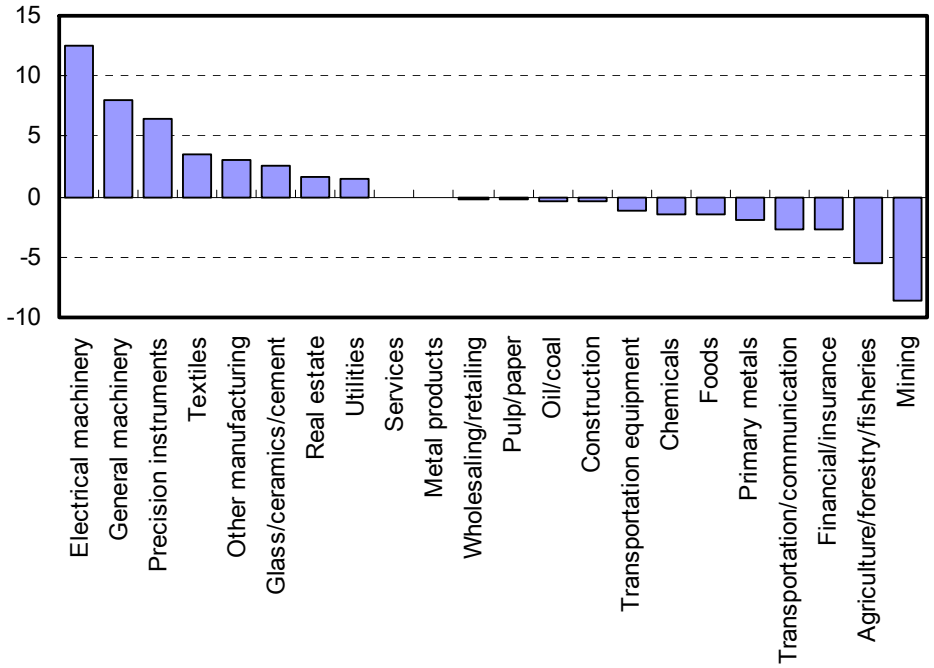
Limited number of industries saw labor productivity increase

Chart 1.3 examines productivity by industry during the longest postwar expansionary period preceding the Lehman shock. Industries where man-hour productivity increased noticeably are limited to electrical machinery, general machinery, and precision instruments. Transportation equipment, Japan's leading export industry, actually experienced a decrease in productivity. Material industries recorded strong earnings for a time as up to 2008 they were able to pass on the sharp ascent of resource prices to product prices. Such stellar performance, however, was only on a nominal basis. Productivity growth in the context of the long-term growth structure of material industries did not accelerate.

Situation surrounding non-manufacturers

The situation surrounding non-manufacturers, who account for 70% of value added generated by Japan's industries, is even worse. A comparison of the growth rate of value added between Japan and the US reveals that, excluding the period immediately after the collapse of the asset bubble in the first half of the 1990s and the liquidity crisis in the latter half of the 1990s, value added of Japanese manufacturers increased at a similar rate as that for US manufacturers (Chart 1.4). However, as shown in Chart 1.5, the growth rate of value added of Japanese non-manufacturers has been less than that of US non-manufacturers for the last 20 years.

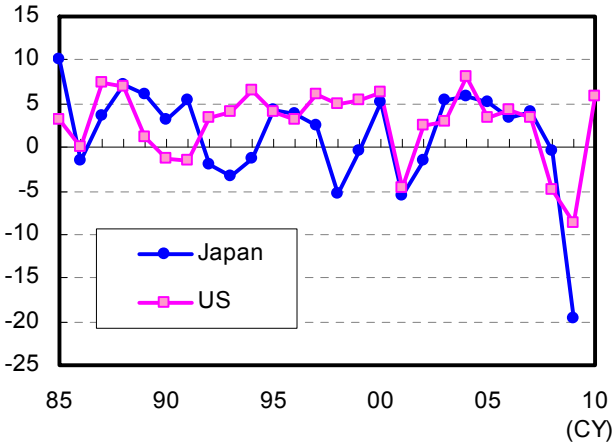
Labor Productivity Growth During Longest Post-World War II Economic Expansionary Period
(Difference between annualized change in 2003-07 and that in 1998-2002; % pt)
Chart 1.3



Source: Cabinet Office; compiled by DIR.

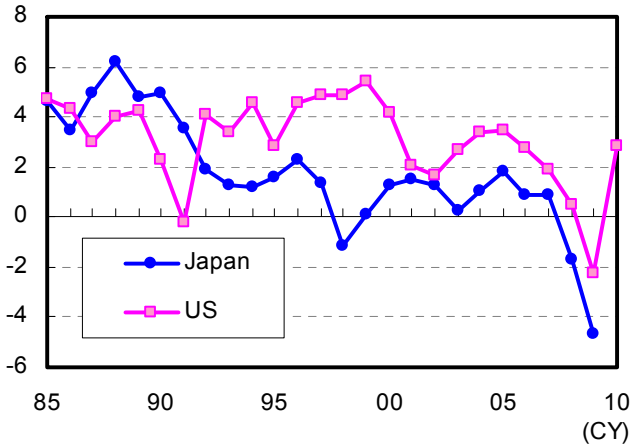
Note: Man-hour productivity.

Real Manufacturing Value Added (y/y %)
Chart 1.4



Source: US Department of Commerce, Cabinet Office; compiled by DIR.

Real Non-manufacturing Value Added (y/y%)
Chart 1.5



Source: US Department of Commerce, Cabinet Office; compiled by DIR.
Note: Manufacturing and government services value added subtracted from overall GDP.

Contrast in the structure of non-manufacturing industries between Japan and the US

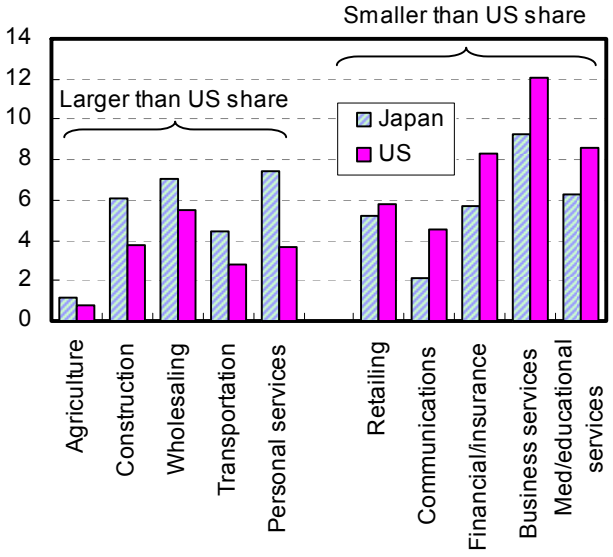
When we compare the structure of non-manufacturing industries between Japan and the US (Chart 1.6), agriculture, construction, wholesaling, transportation, and consumer services enjoy high percentage shares in Japan. These are industries where the level and growth rate of value added are generally low, but, in other words, they are industries where some growth potential for value added remains. Currently, however, the percentage shares of such industries as communications, finance/insurance, and business services that are based on new technology and knowledge are low in Japan. The implication is that labor is not moving smoothly

to industries where value added is increasing rapidly. Hence, income is stagnant overall, and the economy's shift from manufacturing to services is proceeding sluggishly in Japan.

Situation regarding disparity between domestic and foreign prices

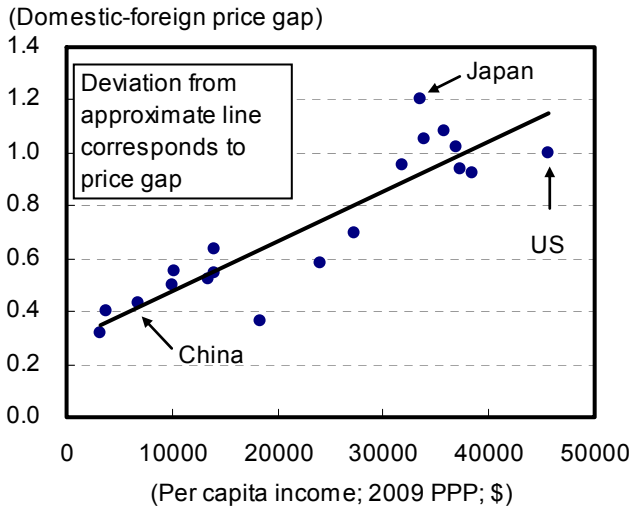
Recent years have heard an increasing number of voices saying that the disparity between domestic and foreign prices has contracted for certain industries in the non-manufacturing sector. These assertions, however, are contradicted by the weakness of the real income generated by Japan's non-manufacturers. In actuality, as depicted in Chart 1.7, the disparity between domestic and foreign prices, when measured by the gap between currency market exchange rates and purchasing power parity (the upward deviation from the approximate line in the chart) is the largest for Japan among G-20 nations. In the period around 2006 to 2008, the effects of monetary easing caused the yen to depreciate, and this merely made it appear that the disparity between domestic and foreign prices had diminished. Another possibility can be mentioned. When the gap between domestic and foreign prices is viewed as the difference in domestic productivity between trade and non-trade goods, it may be the case that the productivity of Japan's manufacturers has declined and that they have become less competitive internationally. If the disparity between domestic and foreign prices has contracted for this reason, the situation is far more acute for Japan.

Non-manufacturing Structure
(% of nominal value added; 2009) **Chart 1.6**



Source: US Department of Commerce, Cabinet Office; compiled by DIR.

Domestic-foreign Price Gap in G20 Nations **Chart 1.7**



Source: World Bank; compiled by DIR.
Notes: 1) Domestic-foreign price gap: ratio of PPP to currency at market rate; 2000s avg.
2) Per capita income: 2009 PPP; $ basis.

1.2 Premises and assumptions of our forecast

1.2.1 Reconstruction efforts following the March quake

Post-quake reconstruction efforts should be positioned as growth strategy

As we have discussed, to summarize Japan's situation in the 21st century, things are not necessarily going well and the economy is stagnating. The fact that productivity is low means that Japan finds itself on a low launchpad as it faces the future. However, productivity cannot be improved without ingenuity and knowledge. With this in mind, reconstruction efforts to repair the unprecedented damage caused by the Great East Japan Earthquake and accompanying tsunami should be firmly positioned as a growth strategy for the revival of Japan's economy.

Loss of capital stock from the disaster estimated at Y18 tril

We estimate that Y18.3 trillion in capital stock was lost through the quake in the three prefectures suffering the greatest damage (Iwate, Miyagi, and Fukushima).1 Compared to the losses estimated for the Great Hanshin Earthquake in 1995, losses caused by the March 2011 quake were quite large for roads and bridges. The March quake and accompanying tsunami damaged public infrastructure over an extremely wide area. This means that, for Japan's economy as a whole, the loss of productive facilities occurred on a similar scale.

Reconstruction period assumed to be five years for private and public investments

With respect to FY11, we assume that the waning of consumer sentiment will cause personal spending to decline, centering on spending on non-essential and non-urgent goods and services, and that the severing of supply chains and power shortages will result in lower exports and higher imports. We also assume that reconstruction demand in the form of public investments, private-sector capex, and the housing investments of households will be seen over a five-year period from 2H FY11 and that total fixed capital formation will increase centering on the first half of the reconstruction period. Moreover, we assume that, led by such reconstruction activities as the installation of solar panels and other energy-related investments, reconstruction-related expenditures will total around Y20 trillion over the next 10 years.

Desired reconstruction menu

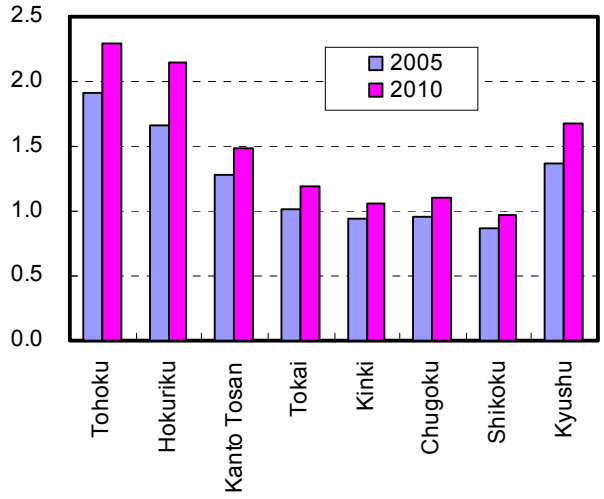
While macroeconomic forecasting models do not offer an expedient means for portraying individual reconstruction activities and their economic effects, desirable areas for reconstruction efforts are (1) establishment of model green-energy regions in promoting the spread of renewable energy, (2) building of housing stock appropriate for an aging society while giving maximum consideration to environmental and energy issues, (3) creation of regional city functions, urban models, and daily life-related industry models, which incorporate such housing, and (4) promotion of agriculture, forestry, and fisheries as growth industries through modernization and the entry of corporations.

Promotion of agriculture and fisheries as growth industries

Much agricultural land currently lies fallow in the Tohoku region. Given the accumulation of agricultural know-how in the region, increasing agricultural productivity by expanding the area cultivated per management entity will contribute to the growth of Japan (Chart 1.8). Also, as the global production of marine products expands significantly, it should not be overlooked that the sea off the Sanriku coast of the Tohoku region is reported to be one of the world's major fishing grounds. Despite this situation, as shown in Chart 1.9, the number of fishery management entities is decreasing in the Tohoku region, and they are not growing in size. While we do not have the space to offer proposals regarding the agricultural and fishery industries, the difference between merely recovering from the Great East Japan Earthquake and a policy of also incorporating regional views and developing a strategic growth path expressing national intent would be quite significant.

1. The loss of capital stock should be viewed with some latitude. We have assumed that the loss ratio is 20% for buildings other than housing, 30% for housing, 30% for transportation equipment, 40% for other structures (roads and bridges), and 20% for other assets. The effect of the nuclear incident is not included in these percentages.

Agricultural Land per Business (hectares)
Chart 1.8



From 2005 to 2010 agricultural land grew an average 28.3% for Hokuriku, 22.1% for Kyushu, and 20.4% for Tohoku.

Source: Ministry of Agriculture, Forestry and Fisheries; compiled by DIR.
Note: Incl. self-employed.

No. of Fishery Businesses in Tohoku Region
Chart 1.9

	No. of fishery businesses								
		Coastal fishery businesses						Small businesses (10 to 1000-ton boats)	Large businesses (more than 1000-ton boats)
			Without fishing boat	Non-powered fishing boats	Power boats (less than 10 tons)	Set net fishing	Marine culture		
1988	24906	23673	887	214	11421	1172	9979	1160	73
1993	22426	21459	753	107	10393	1154	9052	909	58
1998	19765	18902	624	62	9363	1077	7776	817	46
2003	17670	16922	522	44	8579	1086	6691	709	39
2008	16590	15939	836	27	8324	878	5874	626	25

Source: Ministry of Agriculture, Forestry and Fisheries; compiled by DIR.
Note: Incl. self-employed.

1.2.2 World economy

Current world economic trends

It is difficult to say that any clear conclusion has been reached regarding whether the Lehman shock has changed the global economic structure. An examination of current conditions, however, shows that the world economy is still in the process of recovering from this shock, and there are many factors that require close attention. The unemployment rate remains high in the US, and the nation is facing mounting inflationary concerns even as the recovery slows. Europe is being rocked by sovereign risk. How this issue will be dealt with will have a significant impact on financial markets and the economy. Concerns over a real estate bubble persist in China, which can be viewed as a side effect of high economic growth, and the surge in food prices has become a political issue.

Premises for the world economy

While bearing risk factors, such as the premises behind the trend of the world economy for our current forecast, in mind**,** we believe the growth mechanism of globalization that gained force in the 21st century is beginning to function again. When the world economy rapidly slowed in FY08 and FY09, we believe many economists undervalued the durability of emerging economies as well as the skillful deployment of fiscal and monetary policies at the global level. The regulation of the international political and economic framework shifting from advanced economies to the G-20 substantiates that the world economy has grown in diversity and in breadth. The growth rate we assume for the world economy in this report is depicted in Chart 1.10.2

Current issues and their future direction

Although real estate sales remain sluggish in the US, the balance sheet problems of households that triggered the Lehman shock are undergoing steady adjustment. The economic policies of the Obama administration are also adapting to reality. In Europe, while the possibility of a default involving euro-denominated debt or for

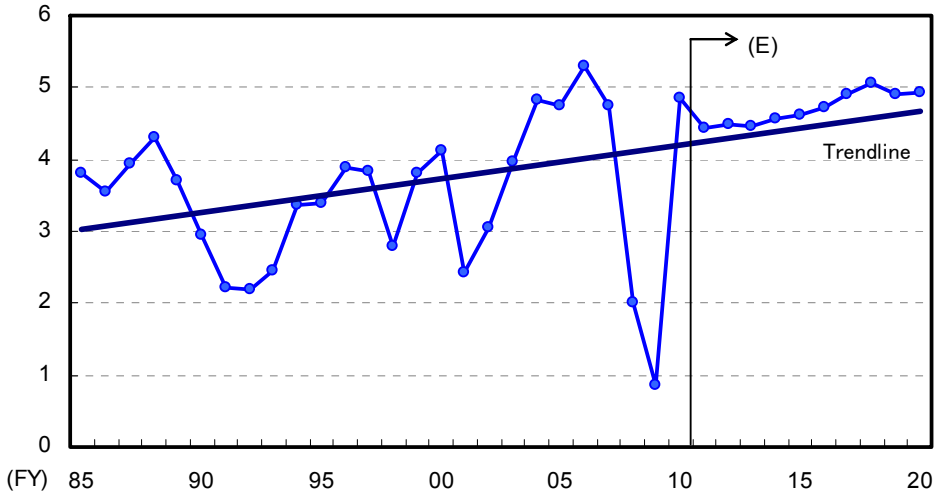
2. In the longer term, democratization in North Africa and the Middle East may, depending on the direction it takes, come to affect regional economic development or world resource prices. The horizon of our current forecast, however, is the next 10 years, and we do not go so far as to anticipate dramatic changes in these regions.

Greece leaving the euro is greater than zero, they are unlikely to be viewed as realistic choices when the benefits of doing so are weighed against their huge adverse effects. China should be able to manage the problem of inflation by allowing the yuan to rise. The ascent of interest rates in China since last year can be attributed to the outcome of weighing the loss of international competitiveness from a stronger yuan against the loss of competitiveness arising from an inflation-driven increase in wages. As China seeks to shift from overreliance on foreign and related demand to achieving a better balance with pure domestic demand, the nation is expected to increase the flexibility of its currency policies.

Impact of change in growth of world economy

If these expectations prove to be off the mark, the world economic environment will be less positive than assumed in this report. The results of simulating changes in the growth rate of the world economy are indicated in Section 5. The growth rate of the world economy slowing by 1 percentage point would cause Japan's real GDP to decline around 0.5% to 1%.

World Economic Growth (y/y %) **Chart 1.10**



Source: IMF; compiled by DIR. E: DIR estimates.

1.2.3 Labor force outlook

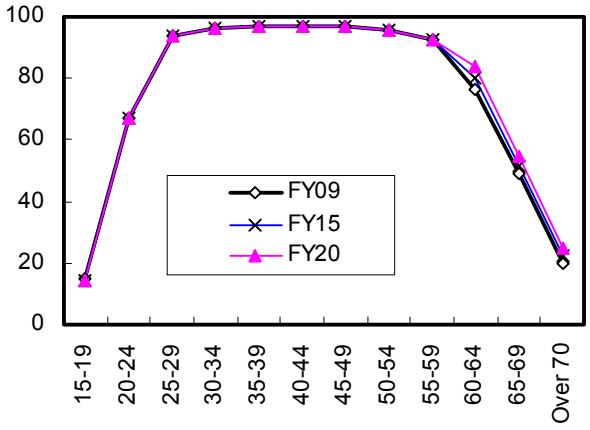
Making active use of labor force an issue for Japan

Japan's working age population peaked in 1995, and the nation's total population reached a high point in 2004. Raising the retirement age above 60 and the reemployment of people after retirement have already become widespread. How to make use of a shrinking labor force is an important issue for Japan. As spotlighted by the number of children waiting for places in day care centers or after-school children's clubs, Japan's declining birth rate is largely the consequence of the difficulties women face in balancing work and family life.

Assumptions regarding labor participation rates by gender and age cohorts

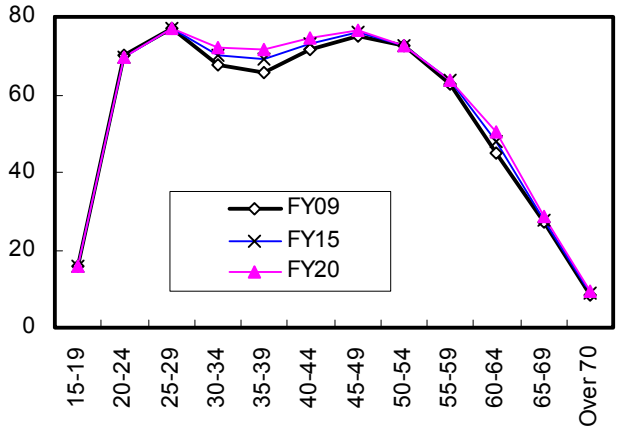
In our current report, we assume that the labor participation rates of men aged 60 or older and of women in child-rearing years will move to the extent shown in charts 1.11 and 1.12. Even if such improvements are realized, the overall labor participation rate will still continue to decline. This problem should not be viewed as one merely involving labor inputs (head counts). Unless solutions are found to a situation where people with skills want to work but cannot do so, productivity cannot be expected to rise. There is something profoundly wrong about discourse that is concerned about a shrinking labor force while overlooking the existence of young people without adequate employment opportunities, women hoping to continue working as they bear children and raise a family, or older people still desiring to work.

Labor Participation Rate Assumption
(Men; %) **Chart 1.11**



Source: Ministry of Internal Affairs and Communications; compiled by DIR.

Labor Participation Rate Assumption
(Women; %) **Chart 1.12**



Source: Ministry of Internal Affairs and Communications; compiled by DIR.

1.2.4 Assumptions regarding the tax system

Integrated reform of social security and tax systems

The current cabinet includes a minister charged with the integrated reform of the social security and tax systems, and the debate of such reform has become more concrete. Specifically, the direction being considered is strengthening certain functions of the social security system and financing such changes through a tax increase. Current discussions, however, have not gone beyond expanding social security expenditures somewhat in the period to FY15 and increasing the consumption tax rate in stages from its current 5% to 10%. Even if such steps are taken, the taxpayer burden will still escalate. To restrain this increase, improving efficiency by prioritizing health care and long-term care payments through their systematic overhaul and reforming the current pension system by raising the eligibility age for receiving benefits are measures that can be considered. Whether such measures will be implemented, however, is extremely uncertain. Also, the consumption tax rate that will be necessary after FY15 is beyond forecasting at the present moment.

Premises for social security system

For our current forecast we assume that the existing system will be extended forward with respect to the benefit side, including the implementation of already decided macroeconomic indexing, with a nominal lower limit, to the public pension. On the contribution side, we assume that the public pension premium will increase each year to FY17 as specified by current law, and that it will remain unchanged in subsequent years.

Consumption tax will increase to 8% in FY14 and 10% in FY15

We assume that the consumption tax will be increased from its current 5% to 8% in FY14 (increase of 3 points) and to 10% in FY15 (increase of 2 points). While some observers argue that the consumption tax may be raised as early as FY12, we believe this is doubtful given the outlook for CPI and other economic conditions and given the political process predicated on the conditions in Article 104 of Supplementary Provisions to the FY09 Tax Reform Act3. Before the consumption tax can be raised, conditions that must fall into place are monetary policy moving more toward normalcy and a situation where a policy mix consisting of a tight

3. Article 104 of Supplementary Provisions to the FY09 Tax Reform Act specifies that (1) legal measures shall be taken to carry out the full-fledged reform of the tax system by FY11 with a view to improving the economic situation and that (2) the enforcement date shall be decided by taking into account the situation for the economic recovery process and world economic trends while promoting the full-fledged reform of the tax system through unwavering administrative reform and while making further efforts to rigorously eliminate wasteful expenditures.

fiscal policy and a loose monetary policy can be realized.4 Social security and increase in the consumption tax will be discussed in greater detail in Section 4.

1.3 Japan's Economy in the Next 10 years

1.3.1 Overview

Nominal annual growth of 1.8% and real growth of 1.5% in the next 10 years

Forecast results based on our assessment of the current situation surrounding Japan's economy and on our premises are presented in the tables at the beginning of this report. We forecast that Japan's economy will grow at an annualized average of 1.8% (nominal) and 1.5% (real) over the next 10 years (Chart 1.13).

Real annual growth of 1.9% per capita

Besides the macro growth rate, per capita GDP is also important for a society with a declining population. We forecast that per capita real GDP, a measure of average living standards, will grow at 1.9%. In the last 10 years, the growth rate of per capita real GDP was 0.6%. In the 10 years to FY07 prior to the Lehman shock, per capita real GDP increased 1.1%. Thus, when compared to these figures, living standards are expected to rise at a faster pace in the next 10 years.

Outlook for Economic Growth Through FY2020 (10-yr avg; annualized; %) **Chart 1.13**

	Nominal	Real	Per capita; real
Gross domestic production	1.8	1.5	1.9
Gross domestic income	1.8	1.2	1.6
Gross national income	1.9	1.3	1.7

Source: Compiled by DIR.

Japan the world's largest net creditor nation

As Japan rushes toward a hyper-aged society, not only gross domestic production (GDP) but also gross national income (GNI) will become an important indicator. In CY09, Japan had external assets of Y593.3 trillion, exceeding the level of the nation's GDP. When this is offset by external liabilities totaling Y327.1 trillion, Japan is revealed to be the world's largest creditor nation with net assets of Y266.2 trillion (figures are on a national accounts basis). External assets consist of direct investments, portfolio investments, and lending made overseas. Increasing the rate of return on such assets is naturally an important perspective for a creditor nation.

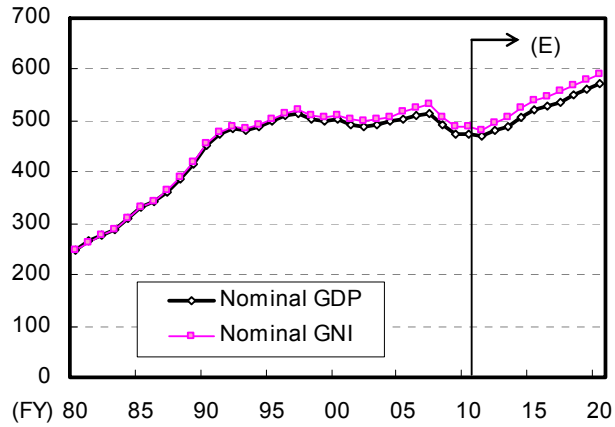
Meager income from external assets

In Japan's external asset portfolio, the percentage shares of direct investments and equity investments are small, and the share of fixed income investments is large. Also, the rate of return on the proportionally small direct investments is low when compared to the UK or US.5 Thus, Japan's earnings from external assets (income received from abroad) are quite meager despite being the world's largest net creditor nation. In our current forecast, we believe the growth rate of nominal GDP will be 1.8% over the next 10 years. On a nominal GNI basis, however, the growth rate is predicted to be 1.9%. This figure assumes that no major improvements will be made in the classes of investments making up the external asset portfolio. To seek earnings on external assets accumulated in the past and that will be accumulated going forward through current account surpluses is an essential theme for a mature, hyper-aged, advanced economy. Japan needs to face the issue of its excessive disregard of the rate of return or the efficient use of capital, including Japan's household financial assets.

4. Since it appears that the reduction in the effective corporation tax rate that the government included in the FY11 tax reform bill will not be enacted, we have assumed that the effective corporation tax rate will be unchanged.
5. Generally speaking, direct investments are associated with significant risk, and their rate of return is high compared to portfolio investments.

Nominal GDP and GNI (Y tril)

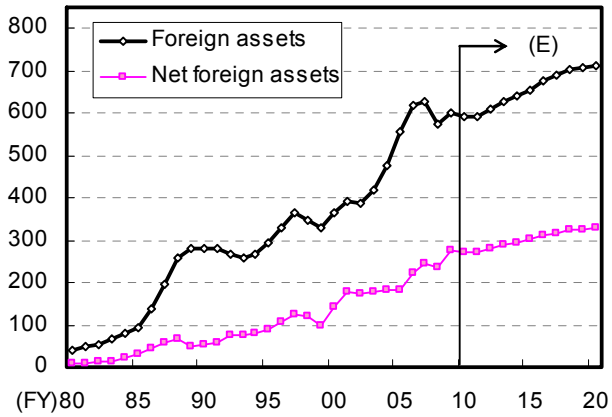
Chart 1.14



Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

Foreign Assets (Y tril)

Chart 1.15

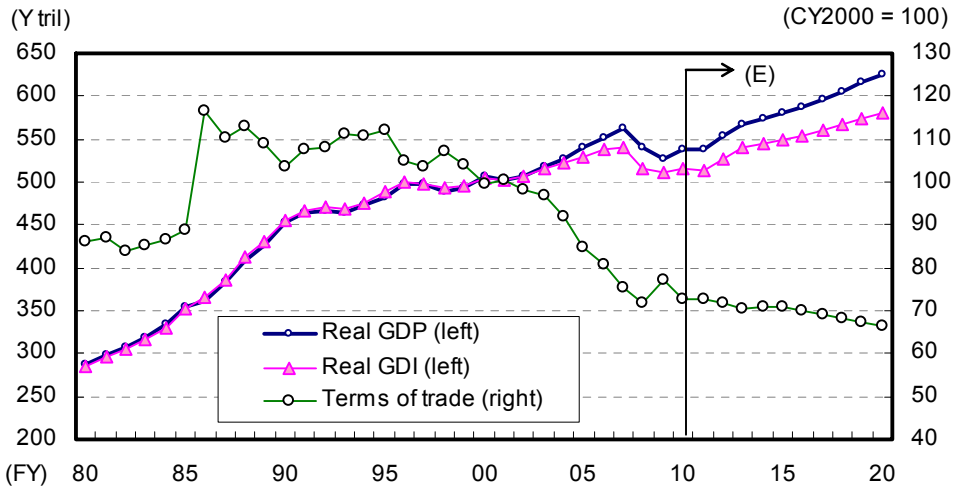


Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

Terms of trade to continue to worsen

In analyzing income on a real basis, changes in terms of trade will be an important consideration. Since the prices of real GDP components are measured at a fixed point in time, they do not reflect changes in the price terms of foreign trade from that point going forward. Real GDI represents a time series that is adjusted for changes in terms of trade.6 As we have noted above, Japan has maintained foreign demand in recent years while allowing terms of trade to worsen significantly (in other words, widening trading losses). The worsening of terms of trade here means changes in terms compared to a point in the past. While it would be mistaken to view the difference in real GDP and real GDI going forward from that point as simply the flow of income abroad, there can be no doubt that the worsening of terms of trade has slowed growth of the income of domestic residents and their living standards.7

Real GDP, Real GDI, and Terms of Trade **Chart 1.16**



Source: Cabinet Office compiled by DIR. E: DIR estimates.

6. GDP and GDI coincide when viewed in nominal terms.
7. When terms of trade worsen and trading losses increase, the amount of imports that can be purchased with a given amount of exports decreases. Thus, even if real GDP remains unchanged, the amount of goods and services that can be consumed declines.

Real GDI to grow 1.2%

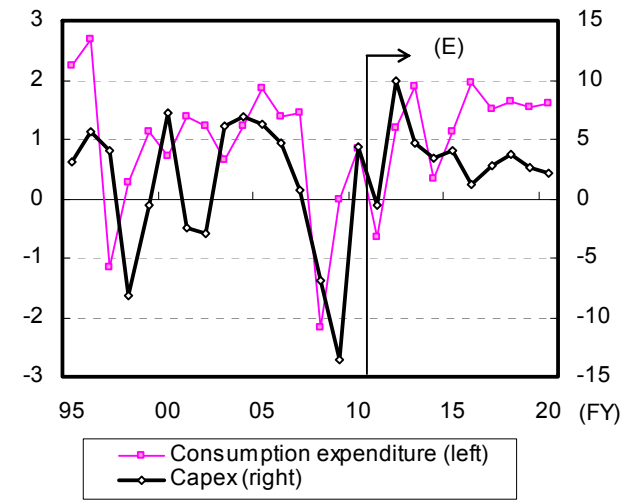
From such a perspective, we developed a forecast for medium-term growth of real GDI. In contrast to a growth rate of 1.5% for real GDP measured by chain-weighted 2000 prices, the growth rate of real GDI is predicted to be 1.2% (Chart 1.16). In order to improve terms of trade for the purpose of curbing trading losses, there is no other way by definition than to import goods and services at lower prices and to export at higher prices. If prices of crude oil and other raw materials cannot be controlled, Japan will need to export goods with high prices or goods that can be sold without lowering their price (export goods that are well differentiated from the goods of foreign competitors). This issue will be discussed further in Section 2.

1.3.2 Demand component trends

Capex to be driving force in first half of our forecast period

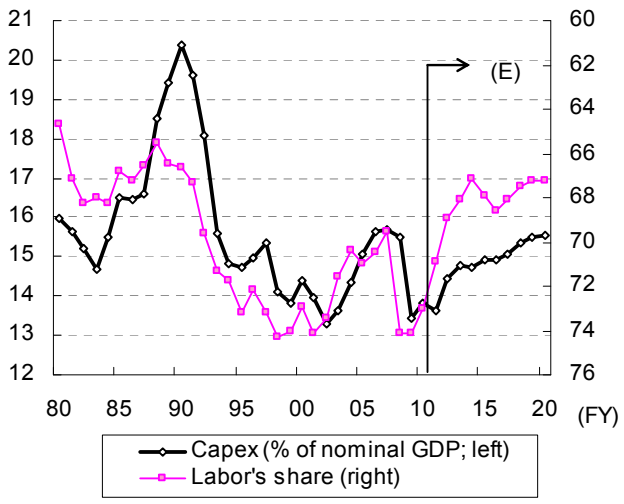
When economic growth over the next 10 years is examined in terms of real GDP demand components, it will be capex that drives the recovery in the first half of our forecast (FY11-15). Given our assumption of an economic growth rate of around 1.5% for the next 10 years, capex will enter an expansionary period in terms of the capital stock cycle, leaving behind the FY05-10 period when the growth rate for investments was restrained or negative. Also, as noted in the discussion of our premises, the next five years will see reconstruction and recovery from the Great East Japan Earthquake, and reconstruction activities can be expected to lead to the development of new businesses.

Private Consumer Expenditure and Capex (y/y %)
Chart 1.17



Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

Private Capex Ratio and Labor's Share (%)
Chart 1.18



Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

Consumption to increase in second half of our forecast period

In the second half of our forecast period (FY16-20), capex will slow somewhat in cyclical terms, and higher interest rates will dampen investment. Private consumption, however, will take over as the driver of demand in the second half. In the first half of our forecast period, similar to the present, labor's share of national income will continue to fall due to the greater use of non-regular employees and the restraint of wages. This trend will play out in the second half when an optimum part-time employee ratio will be realized. In the second half of our forecast period, employee compensation beginning to rise will enable private consumption to grow.

Housing investment

Private housing investment is foreseen to recover somewhat in the first half of our forecast period when interest rates are low and the consumption tax rate has not yet been increased. An examination of housing investment in recent years discloses that the replacement of existing housing has been lagging. Both the average price of a unit of residential housing and per capita net housing stock have decreased for more than 10 years. Improving the earthquake resistance of housing and barrier-

free renovations are becoming issues in Japan, and it is reasonable to think that housing investment will recover for the time being. However, in the second half of our forecast period, fewer households and higher interest rates make it highly probable that housing investment will lose momentum.

Public works spending

Public works spending will grow somewhat in the period of reconstruction following the disaster. Once the boost from reconstruction efforts winds down, however, public works spending will either be flat or decline slightly in real terms. The ratio of public works spending to GDP (nominal basis), which was 4.1% in FY10, will climb to 4.7% in FY12 and then retreat to 3.6% in FY20. Public works spending corresponding to 3.6% of GDP is not excessively low compared to other nations. However, given the deterioration in the stock of social capital built up during Japan's high growth period, it would be desirable if public infrastructure is repaired and maintained in an efficient manner.

Government consumption spending

Government consumption spending is a demand component that is most difficult to forecast. Government consumption includes the portion of medical care consumption consisting of benefits in kind covered by public medical insurance as well as general administrative services. Medical care consumption is all but certain to outstrip the growth of general private consumption as Japan's population ages further. Real consumption recorded as social security fund finances (nearly all consists of medical care and long-term care benefits) in the national accounts is anticipated to increase by an annual average of 2.5% over the next 10 years. Government consumption as a whole, which includes such consumption as well as national and regional administrative services, is foreseen to increase at a rate of 1.1% in the next 10 years.

Exports and imports

We anticipate that real exports will grow at an annual rate of 4.2%, about half the 9.9% growth seen between FY02 and FY07. On the other hand, we predict that real imports, a component that is subtracted from GDP, will grow at a rate of 4.1% in the next 10 years. The growth rate of real imports was 4.5% between FY02 and FY07. Hence, our portrait of economic growth over the next 10 years is not one that is powered by the outsized contribution of foreign demand (net exports), as was the case in the period before the Lehman shock. Rather, it will be domestic demand that will drive economic growth in the next 10 years on an average basis. Net exports being strong is often taken as evidence that domestic demand is weak. However, if exports are to increase in the medium to long term, higher imports will also be required. While our current forecast assumes that the world economy will grow relatively steadily, it does not envision a growth path for Japan that is overly dependent on external demand (net exports).

1.3.3 I-S balance by sector and current account balance

Labor's share

With the aging of society, the future trend of the household savings rate or the current account balance is frequently taken up for discussion. On this subject, we anticipate that the household savings rate will remain flat in the first half of our forecast period when labor's share will decline and when consumption will grow slowly. In the second half of our forecast period, when employee compensation will rise, the household savings rate is expected to increase slightly.

Household savings rate

The trend we anticipate for the household savings rate differs from the consensus view of the savings rate based on the life cycle theory. The long-term equilibrium formula of our current forecast, however, does factor in a downward trend over the very long term for the household savings rate in Japan. The plunge in the savings rate since the mid-1990s is thought to have resulted from the complex interaction of many factors, such as the sharp decline in asset income received by households due to ultra-low interest rates, an increase in the outstanding balance of real financial assets due to deflation, the ratchet effect of stagnant wages, and, more

broadly, distortions in the income distribution structure between the household sector and the corporate sector. If the household savings rate falls over the very long term, in the medium term of the next 10 years or so we believe it will see an upward correction from having fallen too far (Chart 1.19).

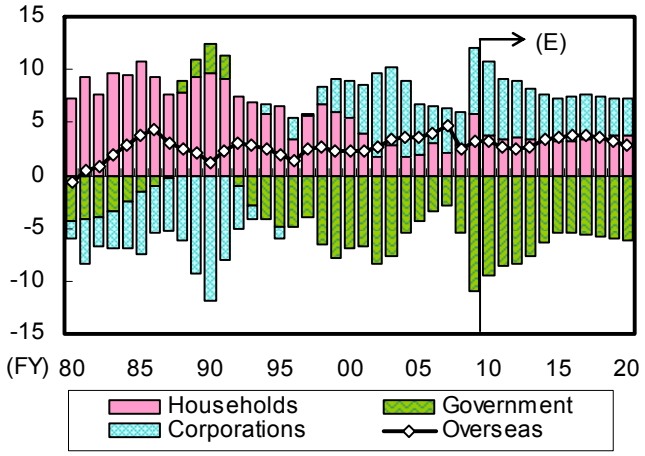
Current account balance

As a result, the I-S balance of the household sector is expected to record excess savings during our forecast period (Chart 1.20).8 Also, the excess savings of the corporate sector will not readily decline if we assume that capex will take place at around the level of our forecast. In contrast to the excess savings of the private sector going forward, ongoing fiscal deficits will continue. Once the consumption tax is increased in FY14 and FY15, however, budget deficits can be expected to contract somewhat. The difference between excess savings and fiscal deficits will balance out at the macro level as current account surpluses. During our forecast period, we believe that the current account surplus will remain around the 3% level as a percentage of GDP.

Net Household Savings Rate (%) **Chart 1.19**

Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

I-S Balance (% of nominal GDP) **Chart 1.20**



Source: Cabinet Office; compiled by DIR.
Note: Adjusted for special factors.
E: DIR estimates.

Current account surplus to remain around 3% of GDP

While the case is sometimes made that Japan will begin recording current account deficits in a few years' time, if such a reversal materializes, the yen's appreciation would not be as great a problem as it is made out to be. With the worsening of terms of trade, there may be fiscal years going forward when Japan's nominal trade balance is negative. However, in view of such developments as the growing number of visitors to Japan, the deficit in the services account is narrowing. At the same time, given that Japan is the largest net creditor worldwide, the income balance surplus is expected to widen. Given Japan's balance of payments and I-S balance, it is difficult to imagine the nation beginning to record current account deficits in the next 10 years.

Are current account deficits such a problem?

In the first place, it is doubtful whether Japan beginning to record current account deficits is such a problem. Japan's current account surpluses to date are an indication that the expenditures of households and companies did not increase and that the domestic economy was less vigorous than it might have been. As globalization progresses further, the significance of any one nation's current account balance is expected to wane. The discussion of current account balances, which are merely the outcome of the economic behavior of economic agents, should be handled with care.

8. The balance of household financial assets is forecast to be Y1,740 trillion (national accounts basis) in FY20.

1.3.4 Prices and foreign exchange

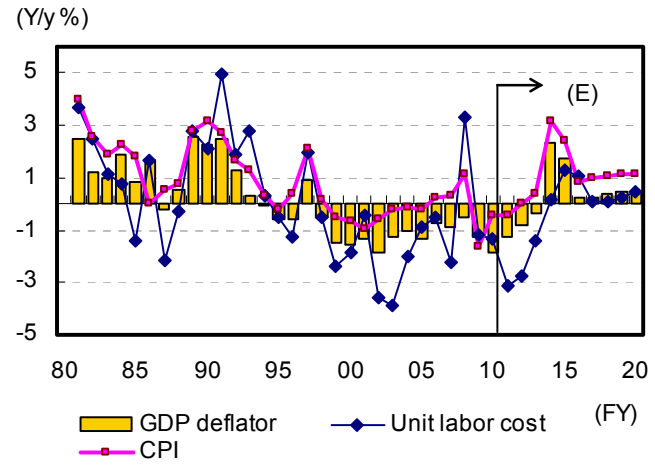
Wages and prices

In short-term economic analyses, the most significant factor to consider for prices is the GDP gap. In making medium- to long-term forecasts, however, wages become the key factor. While a more detailed discussion will be provided in Section 2, corporate behavior to reduce unit labor costs at the macro level and over the long term has governed the price determination structure imposing persistent deflation. This has been the situation for Japan's economy to date.

Wages and price deflation

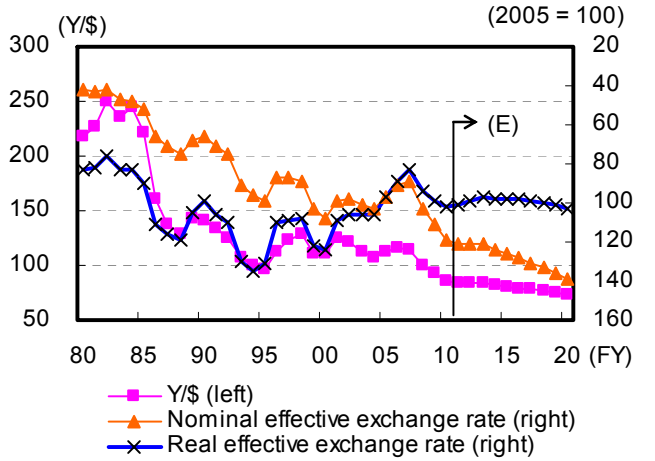
Real wages that hovered at a high level in the 1990s in Japan were brought down over time to correspond with productivity. The actual methods used by companies were to reduce nominal wages or to make greater use of non-regular employees. Should such measures usher in lower prices, they will create an adverse cycle where real wages do not fall. Exporting companies allowed terms of trade to worsen in the midst of global competition, and domestic companies centering on the non-manufacturing sector cut back wages as they confronted low productivity and deregulation. Neither companies nor employees welcome deflation. Both, however, came to accept deflation: companies by increasing the ratio of value added to capital and employees by holding on to jobs even if in non-regular positions.

Unit Labor Cost and Prices **Chart 1.21**



Source: Cabinet Office, Ministry of Internal Affairs and Communications; compiled by DIR.
E: DIR estimates.

Yen Exchange Rate **Chart 1.22**



Source: BIS; compiled by DIR.
E: DIR estimates.

Deflation to continue in the first half of our forecast period

As long as the structure we have described is sustained, the restraint of prices will continue since there is no need to pass through changes in prices to the goods and services that are produced. Prices will begin to normalize when wages in the non-manufacturing sector fall to the point of eliminating the disparity between domestic and foreign prices or when the products of the manufacturing sector can maintain export competitiveness without the need to worsen terms of trade. In our current forecast, we predict that wages and prices will remain stagnant in the first half of our forecast period.

Gradual appreciation of the yen

If the real exchange rate is not expected to change significantly, the nominal exchange rate, which is determined by relative prices, will tend to appreciate in the case of the yen. In addition, whether in real or nominal terms, Japan's economy is thought to have a bias toward a stronger yen. A review of the historical record suggests that restrictions on exports from Japan or trading partners' protectionism prevented the nation from realizing the current account surpluses that would fully correspond to its domestic net savings (in practice, however, Japan was frequently pressed to adopt artificial policies to expand domestic demand). Moreover, current

account surpluses over the long term have turned Japan into the world's largest net creditor nation. For creditor nations, an age of globalization and the greater uncertainty that has entailed has created a bias where their currencies strengthen. While household financial assets have reached extraordinarily high levels in Japan, it is quite possible that international diversified investments (demand for foreign assets) have remained inadequate due to unsophisticated asset investing.

1.3.5 Public finance and interest rates

Public finances to show improvement for the time being

The primary budget deficit (central and local government basis) that was 7.8% of GDP in FY09 will begin to contract toward the mid-2010s, in part the outcome of the consumption tax rate being raised in FY14 and FY15. The key issue to consider here is tax revenues. First, lower tax revenues are thought to be a significant factor behind the widening of the budget deficit after the Lehman shock. Thus, the capacity for tax revenues to recover when the economy normalizes should not be underestimated since that would contribute to overestimating the size of the tax increases that will be needed. Second, we have assumed in this report that the consumption tax will be raised by 5 points in two stages. There is good reason for believing that Japan's economy is strong enough to withstand such an increase.

Long-term interest rates

The long-term interest rate will gradually increase going forward as the economic growth rate swings upward from reconstruction demand and as the end of deflation nears in a context where the debt to GDP ratio is trending flat or slightly upward. We predict that the long-term interest rate will be 2.1% in FY14 when the consumption tax rate is assumed to be increased. This forecast may appear to be somewhat on the high side. However, as efforts get under way to restore government finances to health, we believe our forecast is actually somewhat conservative. In the forecast figures presented in this report, the nominal economic growth rate will be higher than the nominal long-term interest rate between FY12 and FY15. Thus, the real long-term interest rate measured by CPI will be negative in FY14 and FY15.

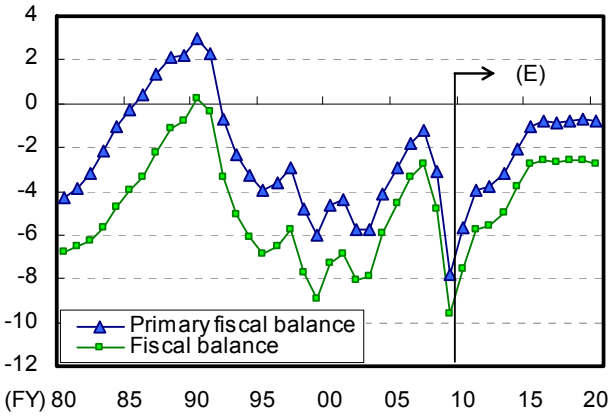
Short-term interest rates

We expect the overnight call rate will be increased starting in FY14 once the CPI rate of change turns positive in FY13. In Chart 1.24, it appears that interest rates will rise by a sizable amount in FY14. However, the real short-term interest rate (O/N call rate) will be negative from FY13 to FY15 once it is adjusted for the growth rate of CPI, including an increase in the consumption tax rate. Contractionary public finances in the form of a higher consumption tax rate should be implemented together with economic adjustment measures that rely on monetary policy. This also means that it will be necessary to wait to increase taxes until FY14.

No solution to government finance problems

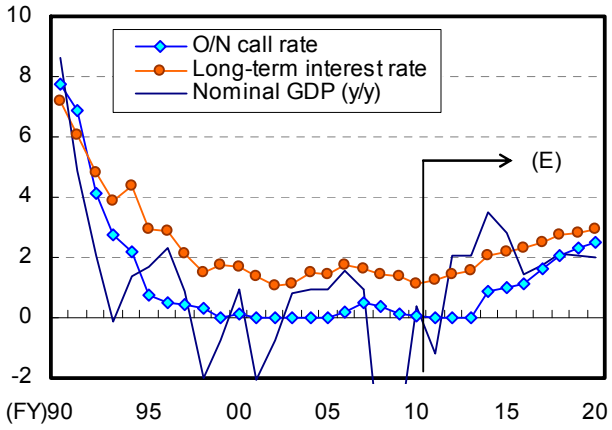
According to our current forecast, the goal of achieving a positive primary balance by FY20 will not be achieved. In other words, government expenditures being cut or taxes being increased by the amounts assumed in our forecast will be insufficient to return government finances to a sustainable path. The forecast period of our report goes to FY20. Should our forecast of government finances be extended further forward, the interest burden will grow without the primary budget deficit being trimmed adequately, and the likelihood is high that the budget balance as a whole will record higher deficits. It will be essential to reduce government expenditures and to raise taxes during the 2010s beyond what we have assumed in our forecast.

Central and Local Government Fiscal Balances (% of nominal GDP) **Chart 1.23**



Source: Cabinet Office; compiled by DIR.
Note: Adjusted for special factors (fiscal payments and receipts).
E: DIR estimates.

Nominal Short- and Long-term Interest Rates (%) **Chart 1.24**



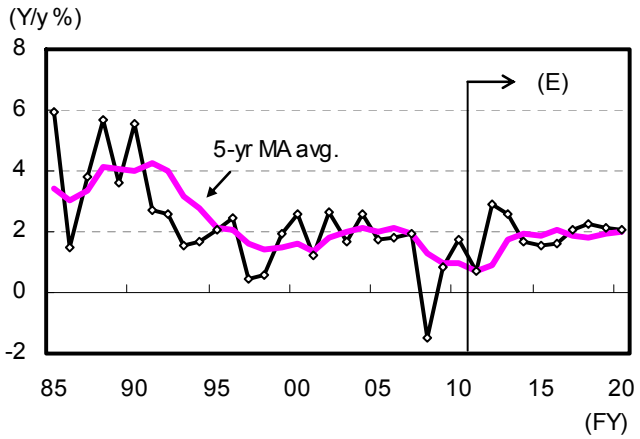
Source: Cabinet Office, Bank of Japan; compiled by DIR.
E: DIR estimates.

1.3.6 Supply-side view

Labor productivity to increase 2.0%

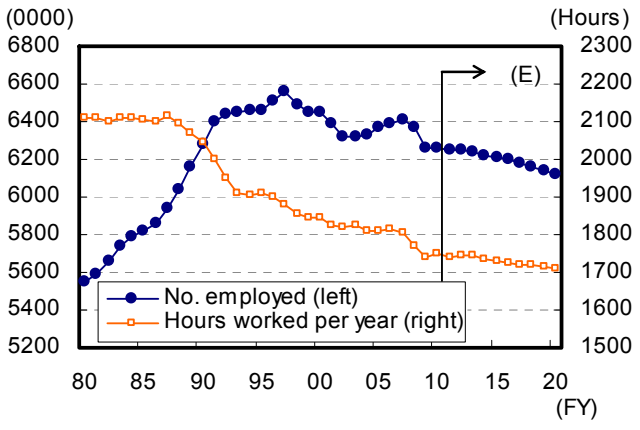
Viewing our forecast from the supply side, the economy will achieve an annual increase of 2.0% in man-hour productivity, 0.5 points higher than the 1.5% growth in 2000-2010. However, when we take the perspective of growth accounting and analyze economic growth in terms of labor input, capital input, and technological innovation, we anticipate that the growth rate of total factor productivity corresponding to technological innovation will be largely unchanged. In other words, we do not believe that man-hour productivity will increase to the point of further elevating the production function. While labor input (= number employed x hours worked) is expected to decline, capex of a certain level will enable productivity to maintain 2% growth. In the 1990s, which have been labeled Japan's lost decade, man-hour productivity rose at an annual rate of 1.9%.

Man-hour Productivity **Chart 1.25**



Source: Cabinet Office; compiled by DIR.
E: DIR estimates.

No. Employed and Hours Worked **Chart 1.26**



Source: Ministry of Internal Affairs and Communications; Ministry of Health, Labour, and Welfare; compiled by DIR.
E: DIR estimates.

Many issues will likely need addressing to increase total factor productivity and to make more vigorous use of attendant capex. For a start, efforts to recover from the Great East Japan Earthquake should be construed as a growth strategy for Japan. It will also be desirable to make good use of the unemployed with skills and the desire to work as well as to promote IT investments by small and medium-sized enterprises. Broadly-defined education (human resource investment) and R&D investments by companies will be indispensable as well.

2. How Should Deflation Be Understood and Overcome?

Japan's economy was overtaken by deflation in the second half of the 1990s. Despite the Bank of Japan's historically accommodative monetary policies and the longest postwar expansionary period, deflation still maintains its grip on the nation. Much has been written about the factors, whether fundamental or financial, that have contributed to deflation. In this section, we focus on structural deflation arising from corporate behavior. We will argue that the efforts of manufacturing industries to reduce labor costs to increase price competitiveness in foreign markets gave rise to yen appreciation, deflation, and lackluster domestic demand. We will further argue that, to surmount deflation and to achieve sustainable growth, it will be important to increase productivity by easing regulations and improving the employment environment. Equally significant will be the establishment of a framework for distributing domestically income growth derived from higher productivity.

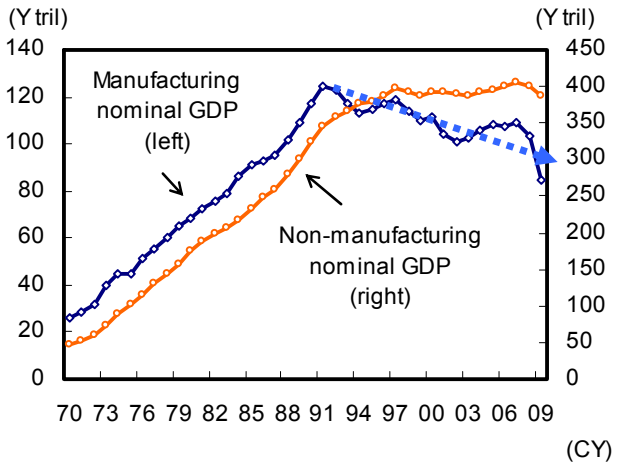
2.1 Manufacturing sector labor cost cuts give rise to deflation

2.1.1 Persistent decline in unit labor costs explains weak growth capacity of the manufacturing sector in nominal terms

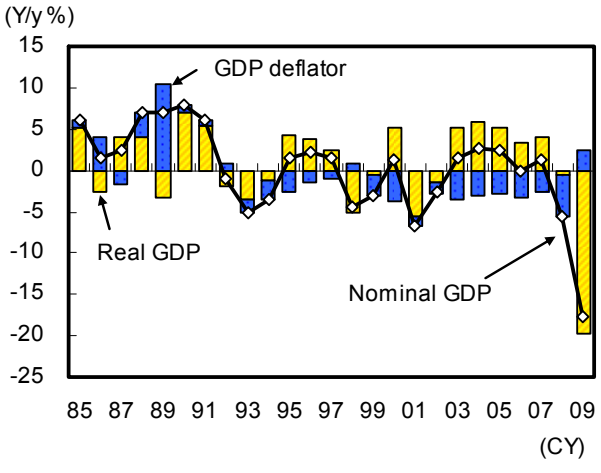
Since the 1990s, weak growth capacity of manufacturing sector pronounced in terms of nominal GDP

We will begin by reviewing the trends of the nominal GDPs of the manufacturing and non-manufacturing sectors in Japan (Chart 2.1). Our interest usually concerns real GDP, but here we will focus on nominal GDP that includes the effect of prices. Through the 1980s, both manufacturers and non-manufacturers found themselves in an expansionary phase. Bounded by 1990, however, this expansionary trend underwent a major change for both sectors. The nominal GDP of Japan's manufacturers turned downward after peaking in 1991, falling about Y40 trillion (down about 30%) from its high in the period to 2009. Despite the experience of the longest post-World War II expansionary period from 2002 to 2007, the nominal GDP of the manufacturing sector, which was the driving force behind this expansion, barely departed from its downward trend. In the case of the non-manufacturing sector, while its nominal GDP did retreat in 2008 and 2009, this was by a smaller margin than that of the manufacturing sector, and the nominal GDP of non-manufacturers was for the most part unchanged. Thus, when viewed on a nominal basis, the weak growth capacity of the manufacturing sector stands out.

Japan's Manufacturing and Non-manufacturing Nominal GDP **Chart 2.1**



Factors Contributing to Manufacturing Nominal GDP Growth **Chart 2.2**



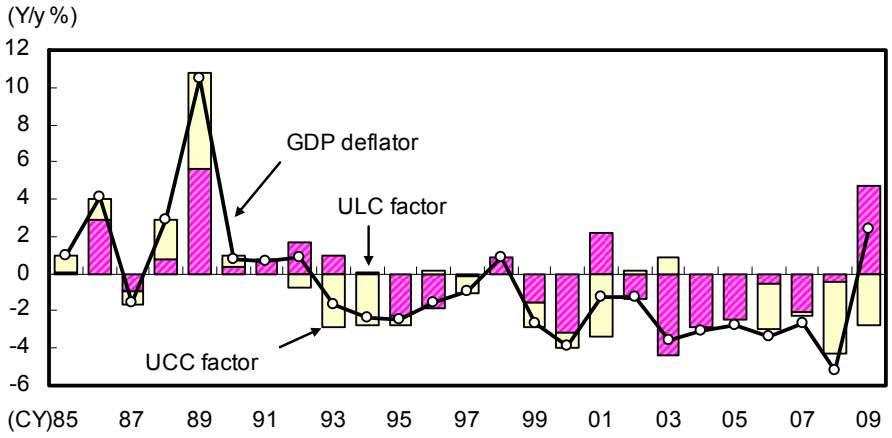
Source: Cabinet Office; compiled by DIR.

Why did the nominal GDP of the manufacturing sector decrease? We sought to answer this question by examining real GDP and the GDP deflator. As should be evident from Chart 2.2, the ongoing decline in the GDP deflator since 1993 has had a significant impact. Upward pressure in the form of a higher consumption tax rate in 1997 and lower energy prices in 2009 did enable the GDP deflator to momentarily rise, but once such one-time factors are excluded, the deflator has receded for nearly 20 years.

Factor explaining downward drift of GDP deflator is the sustained decrease in unit labor costs

The GDP deflator is determined by dividing nominal GDP by real GDP. Moreover, nominal GDP can be broken down into employee compensation and capital income. Hence, the movement of the GDP deflator can be explained by the two factors of unit labor costs (nominal employee compensation / real GDP; ULC hereafter) and unit capital costs (nominal capital income / real GDP; UCC hereafter). This means that the unit prices of final demand goods (GDP deflator) are determined by labor costs (ULC) and machinery and other capital costs (UCC). As portrayed in Chart 2.3, when the GDP deflator of the manufacturing sector is broken down into the two factors of ULC and UCC, it is ULC that broadly explains changes in the GDP deflator. The chart also reveals that the manufacturing ULC has fallen over the long term. In other words, it is reasonable to conclude that the sustained decrease in the product prices of the manufacturing sector has been realized through the ongoing curtailment of labor costs.

Factors Contributing to Manufacturing GDP Deflator Growth **Chart 2.3**



Source: Cabinet Office; compiled by DIR.
Notes: 1) UCC: Unit capital cost; ULC: Unit labor cost.
2) Due to confounding, sum of contributions does not necessarily conform to GDP deflator growth.

2.1.2 Manufacturing ULC cuts through restraint of higher wages stands out in international terms

The sustained decrease in the manufacturing ULC as seen in Japan is not seen in other advanced economies. Japan's efforts to reduce labor costs stand out in international terms.

Japan's manufacturing ULC has trended downward since around 1975

Chart 2.4 compares the manufacturing ULCs of Japan, the US, Germany, and South Korea.9 We can see from the chart that the ULCs of the US, Germany, and South Korea, after trending upward through the first half of the 1990s, have drifted sideways or have slowly declined since then. In contrast, Japan's ULC has trended steadily downward since around 1975. Next, in a comparison of levels, while Japan's ULC was at the same level as those of Germany or the US around 1980, it

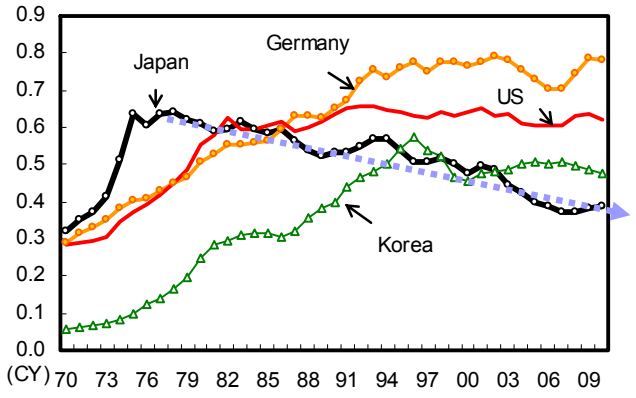
9. For our international comparison, we employed the EU KLEMS database. Since real GDP, the denominator of ULC, is in 1995 prices, the ULC figures are also according to 1995 prices.

is now about half the level of Germany and has reverted to its level in the first half of the 1970s. Japan's ULC is still the lowest when we include other advanced economies10 in our comparison.

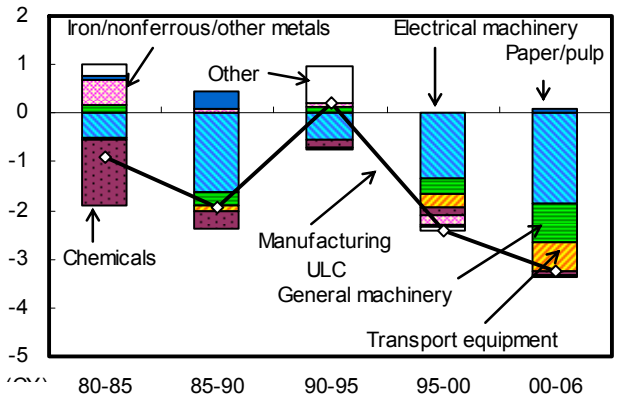
Export industries place downward pressure on ULC

When the decline in Japan's ULC is examined by industry, we find that the electrical machinery industry has been a source of steady downward pressure (Chart 2.5). Between 1980 and 1985, it was the chemical industry that contributed the most to the slide in ULC. Since then, however, the downward pressure provided by this industry has eased year by year. In contrast, the downward pressure of the general machinery and transportation equipment industries has grown since 1995. As a result, the dip in the manufacturing ULC since 1995 is nearly fully explained by the three export industries of electrical machinery, general machinery, and transportation equipment. Although the contributions of other industries are smaller, ULC has declined for nearly all industries since 1995. This is the outcome of corporate efforts to reduce labor costs in a broad range of industries in Japan, centering on export industries, which is unlike the situation surrounding other advanced economies.

ULC by Country
(Nominal employee compensation; % of real GDP)
Chart 2.4



Japan: Industry Contribution to % Change in ULC
(%; % pt)
Chart 2.5



Source: OECD; EU KLEMS database; compiled by DIR.
Notes: 1) ULC: unit labor cost; manufacturing basis.
2) Nominal employee compensation: country data for 1970-2007 (1973-2006 in the case of Japan; 1977-2007 in the case of the US) and DIR estimates based on OECD data.

Japan was able to reduce labor costs by restraining wage increases compared to growth of labor productivity

Japan was able to reduce labor costs in comparison to other nations since much of the profits derived from labor productivity growth was used to lower selling prices, and little of such profits went to increase wages.

Chart 2.6 provides a breakdown of the average rate of change in ULC since 1980 according to nominal hourly wages and labor productivity (real GDP / total hours worked) for Japan and 16 other advanced economies (footnote 10). The growth rate of the labor productivity of Japan's manufacturing sector has trended at about the same rate as that of other nations. Nominal wages, however, have not increased by much in Japan compared to labor productivity. In contrast, in each period examined, nominal wages have risen more than labor productivity in other advanced economies, and their ULC has increased.

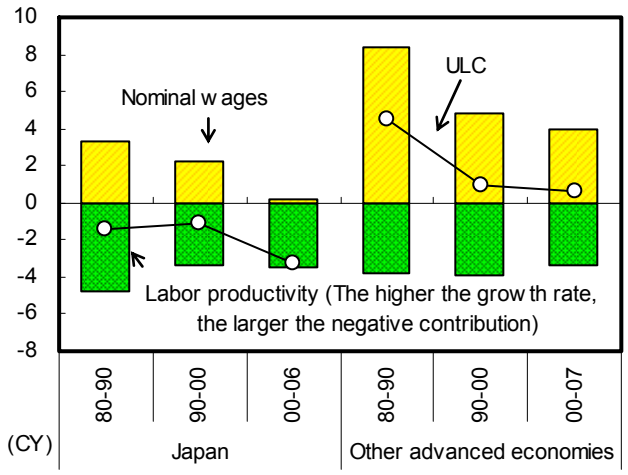
10. These economies are the 16 nations in the EU KLEMS database that are comparable using long-term time series. They consist of Australia, Austria, Belgium, Denmark, Finland, France, Germany, Italy, South Korea, Luxembourg, the Netherlands, Norway, Portugal, Sweden, the UK, and the US.

In the 2000s, restraint of labor costs strengthened further, centering on export industries

In the 2000s, despite labor productivity rising at a similar rate as in the 1990s, the growth of nominal wages fell sharply in Japan. When examined by industry, this outcome was influenced by wage growth being held below the increase in productivity, mainly in export industries (electrical machinery, general machinery, and transportation equipment; Chart 2.7). For example, the labor productivity of the general machinery industry has accelerated from 2.7% in the 1990s (average growth rate) to 6.9% since 2000, while nominal wage growth decelerated from 2.0% to –0.9%. While sales volume increased for export industries on the expansion of the world economy and yen depreciation, such industries held down labor costs by giving workers lump-sum payments, rather than annual increases to base pay, or by expanding the use of non-regular employees. As a result, the accelerated growth of labor productivity occurred simultaneously with sluggish or falling wages.

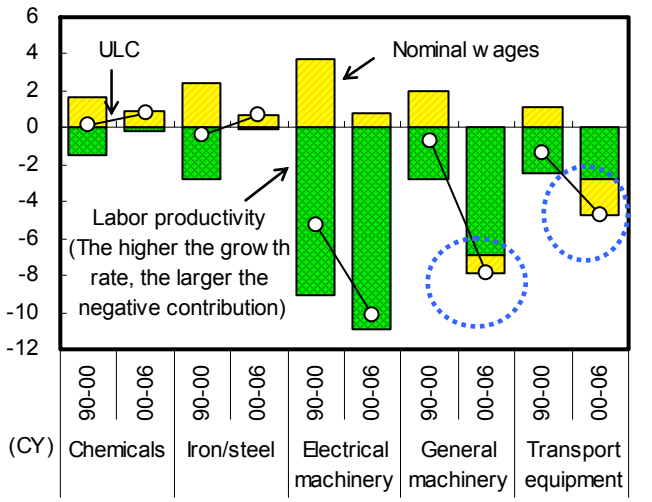
Japan and Other Advanced Economies: Contribution to % Change in ULC (%; % pt)

Chart 2.6



Japan: Contribution to % Change in ULC by Industry (%; % pt)

Chart 2.7



Source: EU KLEMS database; compiled by DIR.
Notes: 1) ULC: unit labor cost; manufacturing; per person and per hour.
2) Other advanced economies' ULC: avg of 16 countries listed in footnote 10; Portugal: through 2006.
3) Japan's iron/steel incl. other metals.

Restraint of higher wages by manufacturers gave way to falling prices

The restraint of wage hikes by manufacturers affected the wages of non-manufacturers and ULC trends. Direct and indirect deflationary pressures were the consequence.11 Given the integration of the labor market, when the wages of the manufacturing sector fall, downward pressure is exerted on the wages of the non-manufacturing sector. Also, since the non-manufacturing sector includes many labor-intensive industries, such as services, labor productivity tends to advance more slowly than in the manufacturing sector and is generally stable. For such reasons, ULC declines readily when nominal wages fall. The share of services in Japan's CPI is an elevated 50.6% (base year of 2005). Thus, changes in the ULC of the non-manufacturing sector have a large impact. In the 2000s, the longest postwar expansionary period resulted in the GDP gap shifting in the direction of excess demand. This was not enough to overcome deflation, however, which was forestalled by ongoing deflationary pressure ensuing from the sustained decline in the ULC of manufacturers and non-manufacturers. Hence, CPI did not increase to the same degree as the improvement in the macro demand environment.

11. Supposing the profit maximization behavior of companies in competitive markets, real wages will be determined in accordance with labor productivity. This relationship can be rewritten as:
$(w - p) = (y - l)$, which is rewritten into $(w + l) - y = p$ (all are logarithmic expressions)
where, w: nominal wages per hour; p: prices; y: real GDP; l: total hours worked
Therefore, the increase in labor productivity and the restraint of wage hikes would reduce ULC, dragging down prices.

2.1.3 Decrease in manufacturing ULC gave rise to stagnant domestic demand and further yen appreciation

Besides deflationary pressure, what the corporate behavior described above engendered was (1) stagnant domestic demand and (2) yen appreciation.

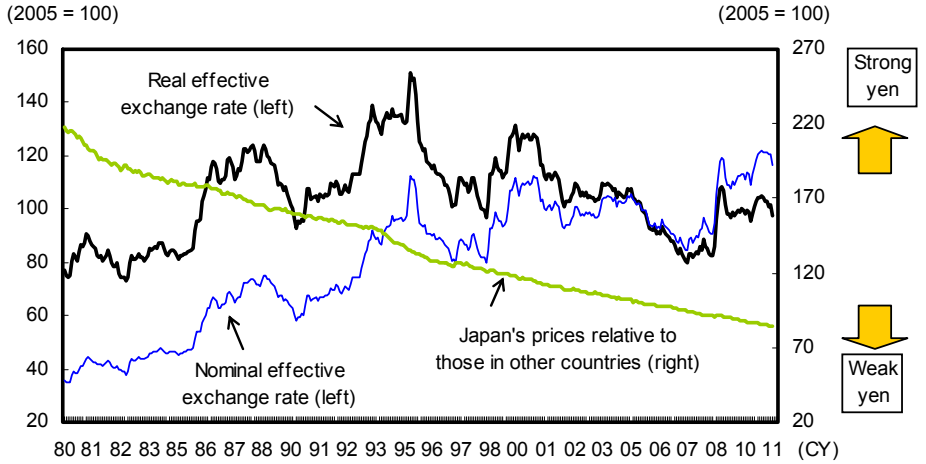
When nominal GDP decreases, nominal employee compensation also declines

For households, the source of nominal income is nominal GDP given that nominal employee compensation decreases when nominal GDP falls. Households would experience a different outcome if the income distribution ratio from nominal GDP to employee compensation (labor's share) increased. Labor's share, however, has been stable over the long term for the manufacturing sector in Japan. Employee compensation can be divided into hours worked and wages per hour. When the economy is expanding, it is difficult to reduce hours worked, and companies will strive to restrain wages. Companies sought to cut back hours worked as they endeavored to hold down growth of wages per hour. In the period since 2000, as the world economy expanded, companies eased back on reducing hours worked, strengthened their efforts to restrain wages, and gave priority to wages in trimming labor costs. A direct consequence of these efforts was the contraction of domestic demand.

Problems associated with corporate response to a stronger yen

What explains manufacturers' persistence in reducing labor costs to such an extent? The answer is thought to be corporate efforts to lower labor costs and restore price competitiveness in foreign markets when the yen appreciates. President Richard Nixon closing the gold window for the dollar and the Plaza Agreement were developments that unleashed the rapid appreciation of the yen in terms of its nominal effective exchange rate in the 1970s and 1980s. During that time, Japanese manufacturers overcame a stronger yen by trimming costs and by struggling to make technological improvements to maintain price competitiveness. This behavior remains unchanged to the present. It is, however, associated with a major problem. If price competitiveness is increased through lower labor costs, in the long term such gains will be adjusted away by inducing yen appreciation.

Nominal and Real Effective Exchange Rate of the Yen **Chart 2.8**



Source: Bank for International Settlements; compiled by DIR.
Note: Real rate: CPI basis; narrow definition through end-1993 and broadly defined thereafter.

According to PPP, corporate efforts to reduce labor costs will result in yen appreciation

Behind this, the purchasing power parity (PPP) mechanism is working. PPP assumes that exchange rates are determined so that purchasing power equalizes to realize one price for identical products. Empirically, purchasing power parity is not realized in the short term, but is achieved in the long term. In other words, the trend of real effective exchange rates does not necessarily match the PPP trend. An examination of Japan's effective exchange rate shows that, while the nominal rate

has trended gradually upward over the long term, this trend is not seen for the real rate (Chart 2.8). Corporate efforts to reduce labor costs have increased price competitiveness, but they also gave rise to stagnant domestic demand and deflationary pressure. The price competitiveness achieved will eventually be offset by yen appreciation. When the yen did appreciate, companies attempting to overcome the stronger yen through further cost cuts generated a vicious cycle of further yen appreciation, sluggish domestic demand, and deflationary pressure. For companies, trying to further slash costs is like trying to squeeze more water out of a towel that has already been wrung once. More effort will be required than before. Japanese companies have until now maintained domestic employment while trimming costs and have overcome yen appreciation. The capacity for reducing costs further, however, has become extremely limited. Some companies have solved this dilemma by shifting production abroad where wage levels are lower. Should this trend accelerate, domestic demand for labor will shrink, which will risk giving further impetus to sluggish domestic demand and deflation.

2.2 Overcoming deflation and achieving sustained growth

Two points on overcoming deflation

In the above discussion, we examined the way corporate behavior has given rise to structural deflation. What will need to be done to surmount this problem?

If companies are to increase wages, they will need to have more confidence about the future direction of the economy (the expected growth rate will need to increase). For this to occur, sustained economic growth will be required, which offers one more reason for aiming to bring deflation to an end. Given the structural problems we have examined, what will be necessary to overcome deflation are actions that give priority to (1) increasing productivity through the easing of regulations and improving the employment environment and (2) creating a framework for distributing domestically income growth derived from higher productivity.

2.2.1 Aiming for sustained increase in productivity by easing regulations and improving the employment environment

Increasing productivity a prerequisite for end to deflation and sustained economic growth

Increasing productivity is not only important for ending deflation, but it is also a prerequisite for the sustained growth of Japan's economy when the birth rate is declining and the population aging. Productivity here refers to total factor productivity (TFP). When output increases through technological innovation while labor or capital inputs are unchanged, this is regarded as an increase in TFP. Labor productivity referred to above will rise if capital input increases (an increase in the capital-labor ratio) as labor turnover would rise. This differs from TFP, which will not rise if labor or capital inputs increase unless no change is seen in an economy's long-term technological progress (dynamism). Such demographic changes as a declining birth rate and an aging population are occurring more rapidly in Japan than in any other advanced economy. This was Japan's situation when it experienced a major earthquake. To achieve sustainable growth in this difficult environment, it will be necessary to boost TFP to maintain economic growth in the midst of limited resources. What will be required are such measures as highly efficient reconstruction plans, deregulation, and participation in the Trans-Pacific Partnership.

In addition to easing regulations, productivity curves of women and older and younger workers should increase

In addition to pursuing regulatory easing, the effective use and development of human resources will be important in increasing TFP. Specifically, it will be necessary to develop the employment environment to raise the productivity curves of women and older and younger workers for whom there is considerable room for higher productivity. If the use of highly skilled workers expands, the average productivity curve of workers will increase, and this will contribute to higher TFP. The productivity curve indicates how productivity changes over the careers of

workers. Generally speaking, work skills increase as a person continues to work, and productivity rises. Then, as workers age, productivity turns to decline from physical limitations. Research analyzing the relationship between the age of workers and per capita productivity shows that plotting age along the horizontal axis and productivity along the vertical axis yields a bell curve that peaks for workers in their 40s.

Promoting employment of older people with skills and desiring to work

Accompanying the scheduled raising of the age for receiving pension benefits to 65, efforts are being made to promote the employment of older people, as evidenced by an amendment to the Act Concerning Stabilization of Employment of Older Persons.12 In the future, the retirement age is expected to become 65. Should companies act in the same manner as they did when the retirement age was raised in 1998, they will lower the wages of workers turning 60 and extend their periods of employment. Simply extending the age of retirement, however, will easily result in higher labor costs, and not lessen the corporate desire to hold down wages. Also, higher labor costs may discourage the employment of younger people. To better draw out the capacities of older workers, rather than simply extending the age of retirement, the extension of the retirement age should be accompanied by the development of a wage and employment framework where older people with skills and the desire to work can to do so regardless of their age.

Specifically, the seniority-based wage system should be revised in part so that once the wages of an average worker surpass his labor productivity as he ages, performance is given a higher weighting in determining future wages. Should performance be assigned a higher weighting in determining wage levels, it is quite likely that a relatively sizable number of people will see their wages decline. There will be a need to strengthen educational systems to support such people and to develop an environment that increases motivation and promotes the expression of individual abilities. Also, older workers who are highly skilled and strongly desire to work will be able to receive higher wages and to work without being limited by age. Since individual differences in strength and capacity increase with age, forms of employment will need to be made more flexible. One example would be to use information technology to increase telecommuting. The extent to which information technology is used by those in their 50s who will soon be retiring compares well with those under 50. Hence, inability to use information technology should not be a major problem for such people.

Productivity of college graduate women has room to grow

There is also room for the productivity of women workers to increase. In the second chapter of "*Ashita no nihon wo tsukuru jinteki shihon—aratana koyo ikusei shisutemu wo tou*" (Human capital that will build tomorrow's Japan—an inquiry into a new employment and nurturing system; Japan Center for Economic Research, February 2008; in Japanese), in discussing keys to increasing productivity Katsuaki Ochiai notes that the productivity of women college graduates is low. This low level reflects their propensity to quit working as full-time employees once they reach a certain age. As a result, they have a greater tendency not to accumulate work skills than other women workers. If an environment can be created where work and family life can be balanced more easily, the employment rate will increase and the quantity of labor input will rise. Not only that, work skills will accumulate through longer periods of employment, and an upward shift in the productivity curve can be expected.

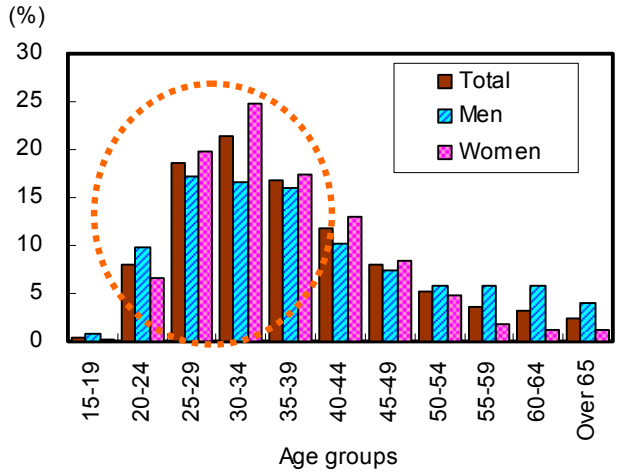
12. The act mandates companies to implement changes by FY13 to either (1) increase the retirement age to 65 or above, (2) guarantee continued employment to the age of 65 for all employees who wish to keep working, or (3) eliminate the retirement age. Many employees reaching the age of 60 have been reemployed in contract, temporary, part-time, or other non-regular positions. Also, the eligibility age for receiving the public pension will fully shift to 65 in FY25 for men and in FY30 for women.

Solving employment problems of younger workers will raise today's and tomorrow's productivity curve

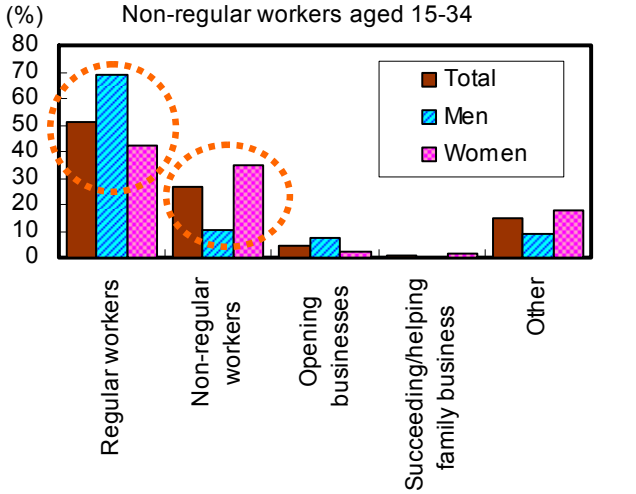
To solve the serious employment problems that younger people currently face, not only should the present-day productivity curve be raised, but it will also be important to increase future productivity. The unemployment rate for people aged 25-34, whose average productivity curve will peak 10 years later, was 6.0% in April 2011, worse than the figure for all age groups (4.7%). Thus, the ratio of those who are condemned to a situation where they cannot strengthen their work skills is relatively high compared to other generations. In addition, the proportion of younger workers in non-regular positions is higher than that for other age groups, and many such workers continue to work without the opportunity of becoming regular employees.

Chart 2.9 provides a breakdown of non-regular workers by gender and by age group. When figures for men and women workers are combined, workers aged 30-34 account for the highest percentage share, and younger workers (aged 15-34) equal about 50% of the total. Chart 2.10 shows the responses of younger non-regular workers to a question posed by the Ministry of Health, Labor, and Welfare as to what kind of work format they would like in the future. The highest percentages of both men and women workers wanted to switch to regular employment positions. This figure was about 70% for men workers. In the case of women workers, however, a considerable percentage wanted to continue working in non-regular positions. Non-regular positions have the advantage of more flexible forms of employment, and the responses of women workers indicated that many choose non-regular employment for this reason. However, it is more difficult for non-regular employees to strengthen work skills since internal training systems tend to be less rigorous for them compared to regular employees. When people work in non-regular positions over the long term, the likelihood is high that their productivity and lifetime wages will be less than regular employees. Also, significant future uncertainties attach to non-regular employees since they are more readily affected by economic downturns, such as being terminated at the end of their contracts. It will be essential to enable as many younger workers as possible to increase their skills by supporting their vocational choices and by strengthening efforts that will enable workers to move more easily from non-regular to regular positions.

Breakdown of Non-regular Workers
Chart 2.9



Positions Non-regular Workers Would Like
Chart 2.10



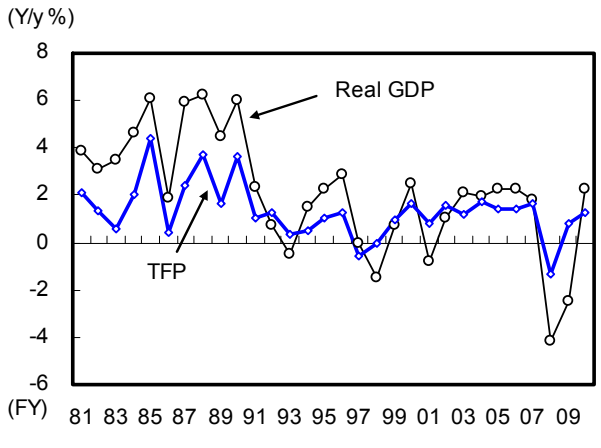
Source: Ministry of Health, Labour, and Welfare; compiled by DIR.

2.2.2 Framework to distribute domestically income growth derived from higher productivity

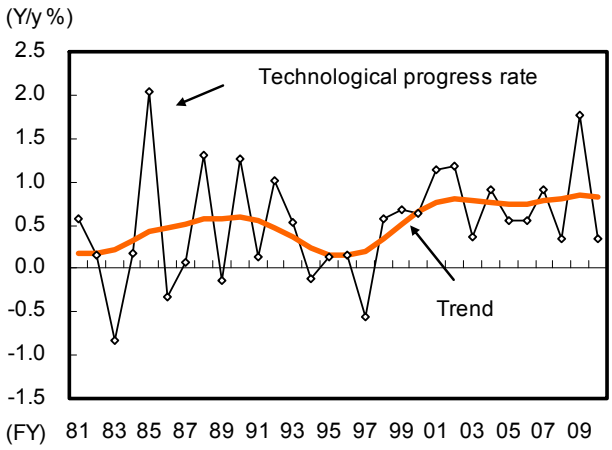
Higher productivity alone insufficient to overcome deflation

Higher productivity alone may be insufficient to bring deflation to an end and to achieve sustained economic growth. An examination of TFP growth in the past underscores that it would be going too far to say that higher productivity is the prescription for overcoming deflation and achieving sustained growth. In estimating historical TFP in Japan we find that its average growth rate accelerated in the 2000s compared to the 1990s and approached its growth rate of the 1980s when TFP rose extremely rapidly13 (Chart 2.11). Also, because of the way TFP is measured, it is known to be influenced by the business cycle. Thus, when we simply estimate the rate of technological progress14 that excludes the effect of the business cycle, it is possible to argue that TFP rose more in the 2000s than in the 1980s (Chart 2.12). When viewed in this manner, high productivity was realized in the 2000s, but Japan's economy was still unable to overcome stagnant domestic demand and deflation.

Real GDP and TFP Growth Rates **Chart 2.11**



Technological Progress Rate **Chart 2.12**



Source: Compiled by DIR based on various statistics.
Notes: 1) TFP: Total factor productivity.
2) Technological progress rate=Regression equation for TFP growth rate excluding independent variable explained by real GDP (business cycle factor); trend: smoothed using HP filter (λ = 10).

How to distribute domestically income growth derived from higher productivity also important

Despite the realization of a high TFP growth rate in the 2000s, deflation did not come to an end. This situation is thought to be explained by the fact that much of the growth in income derived from higher productivity flowed overseas and not much was distributed domestically.

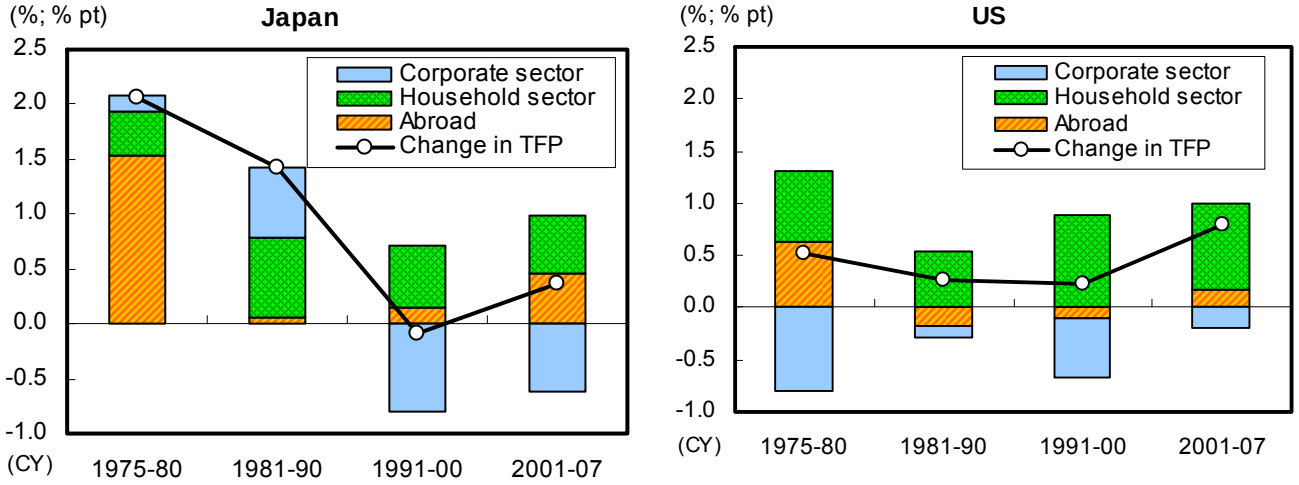
Chart 2.13 illustrates where income growth derived from a higher TFP was distributed. In the 2000s in Japan, the distribution of income to the foreign sector increased compared to the past, indicating that the flow of income overseas had increased (the growth rate of TFP differs slightly in Chart 2.11 since a different database was used). The phenomenon of the distribution of income increasing for the foreign sector also occurred in the second half of the 1970s, which reflected a surge in crude oil prices. In this instance, income growth derived from a higher TFP can be understood as being used to pay for higher import payments resulting from the increase in energy prices. Also, as noted above, the reduction in selling

13. In the JIP database 2010 of the Research Institute of Economy, Trade, and Industry, TFP is measured by developing labor and capital input indices that allow for changes in the quality of labor and capital. The growth rate of this TFP was 1.3% in the 1980s, –0.0% in the 1990s, and 1.1% between 2000 and 2007. These figures are close to the trend shown in Chart 2.11.
14. In *"Does Information Technology Raise Japan's Productivity?"* (Bank of Japan Working Paper Series, September 2008), Takuji Fueki and Takuji Kawamoto estimate the rate of technological progress adjusting for the economic effect of scale and labor and capital utilization rates.

prices by companies to increase price competitiveness became manifest as falling export prices, and this also caused income to flow overseas.

Next, looking at the household sector, income distribution was positive for each time period examined and does not appear to have diminished in the 2000s. A closer examination, however, shows that nominal wages rose along with the increase in prices through the 1990s. This changed in the 2000s when growth of real wages resulted from the combination of a slight increase in nominal wages and decrease in prices. In contrast, the household sector in the US benefited from the distribution of income in all time periods. As was previously the case in Japan, growth of real wages occurred in the form of ascending prices and rising nominal wages.

Allocation of Change in TFP in Japan and the US **Chart 2.13**



Source: EU KLEMS database; Research Institute of Economy, Trade and Industry; US Bureau of Economic Analysis; Cabinet Office; compiled by DIR.

Note: Allocation of change in total factor productivity (TFP) to abroad, household sector, and corporate sector estimated based on Cobb-Douglas production function and an identical equation for estimating share of nominal GDP between employee income and capital income as follows:

$$\Delta \ln(A_t) = -\underbrace{[\Delta \ln(P_t^V) - \Delta \ln(P_t^D)]}_{\text{Abroad}} + \underbrace{\bar{\mu}_{L_t}[\Delta \ln(W_t) - \Delta \ln(P_t^{CP})]}_{\text{Household sector}} + \underbrace{[\bar{\mu}_{K_t}\Delta \ln(R_t) - \Delta \ln(P_t^D) + \bar{\mu}_{L_t}\Delta \ln(P_t^{CP})]}_{\text{Corporate sector}}$$

A_i: TFP; L_i: labor input; W_i: nominal wages; K_i: capital input; R_i: unit nominal capital cost; $\bar{\mu}_{K_t}$ and $\bar{\mu}_{L_t}$: capital and labor input cost shares, respectively (previous and current year avg); $\Delta \ln(P_t^D)$: contribution to domestic demand deflator growth; $\Delta \ln(P_t^{CP})$: private sector final consumption expenditure deflator growth.

Reducing degree of dependence on imported energy and efforts to maintain export prices will be important

To be able to distribute domestically income growth derived from higher productivity as much as possible, Japan will first need to curb its degree of dependence on imported energy. Based on the experience of the Great East Japan Earthquake, Japan is seeking to increase the share of renewable energy in its energy profile. Promoting such an energy policy will help realize a stable power supply that is unaffected by earthquakes, and it will also be important for reducing the amount of income that flows overseas.

It will be equally important for companies to direct their efforts toward maintaining export prices rather than just toward reducing costs. No one doubts that the low-cost structures and high technological levels of Japan's manufacturers place them at the forefront of advanced economies. However, in responding to the yen's sharp appreciation through the 1980s, manufacturers turned into organizations devoted to the reduction of costs. In macroeconomic terms, they reduced selling prices (GDP

deflator) to secure sales volume (real GDP) but this created a distorted structure where the yen amount of sales (nominal GDP) declined. Even if price competitiveness is increased through cost reductions, this becomes offset over the long term through yen appreciation. The challenge currently confronting manufacturers is to commit as much energy to address the “soft” issue of building (such as through branding and marketing) a business structure where selling prices do not fall as they do to the “hard” issues of technological innovation and productivity improvements.

3. Power Shortages and Japan's Energy Policy

Power shortages weighing on business activity

In the wake of the Great East Japan Earthquake, there are fears that companies will move manufacturing facilities overseas because of supply chain disruptions and prolonged power shortages. Some nuclear power plants that were not directly affected by the quake are shut down for regular inspections, but with no indication of when they will resume operations. As a result, power shortages will continue to weigh heavily on business activity in Japan.

In this section we will discuss what we believe is the best course of action. In the short term Japan should expand the use of LNG, which has low CO2 emissions. In the medium to longer term it should promote renewable energy sources that are suited to Japan's natural environment, such as geothermal and small and medium-sized hydropower, improve the generating efficiency of thermal power, and develop solar and wind power facilities, putting the right equipment in the right places. Furthermore, it is important to promote energy conservation in order to meet future power needs while keeping the burden on the public to a minimum.

3.1 Cost of replacement generation to alleviate power shortages

3.1.1 Current electric power situation in Japan

New energy technologies account for just 1.1% of power generation

Following the Great East Japan Earthquake it is becoming harder to supply electricity generated from nuclear power plants. It has also been noted that if the number of such plants that can operate decreases, the resulting power shortages will reduce Japan's growth potential. How should Japan address this problem, from both a near-term and longer-term perspective?

First, let us look at Japan's electricity generating capacity by source (Chart 3.1). Japan's 10 electric power companies[15] have a combined generating capacity of 240 GW (FY09) and annual power output is 955.1 TWh (FY09). For a time after WWII most of Japan's electricity came from hydropower, but in the late 1960s the country began shifting to thermal power, using oil. However, after two oil shocks in the 1970s, oil-based electricity generating capacity/output began to decline, and instead output from nuclear power and LNG-fired plants began to increase. Lately, coal-fired plants have accounted for a growing share of power output.

On the other hand, although the share of power output from new energy technologies (wind and solar) has been growing, these new technologies still account for just 1.1% of the total.[16] Another renewable energy technology, hydropower (ordinary hydropower and pumped-storage hydropower), contributes 8.0% of Japan's electricity, so taken together these technologies provide 9.2% of output. Prime Minister Naoto Kan has overhauled his energy policy in the wake of the earthquake, and has set an accelerated goal for raising the share of electricity generated from renewable energy sources to 20%, aiming to achieve this as early as possible in the 2020s. To make this happen, there will have to be a major expansion of new energy technologies.

Japan rapidly losing nuclear power capacity

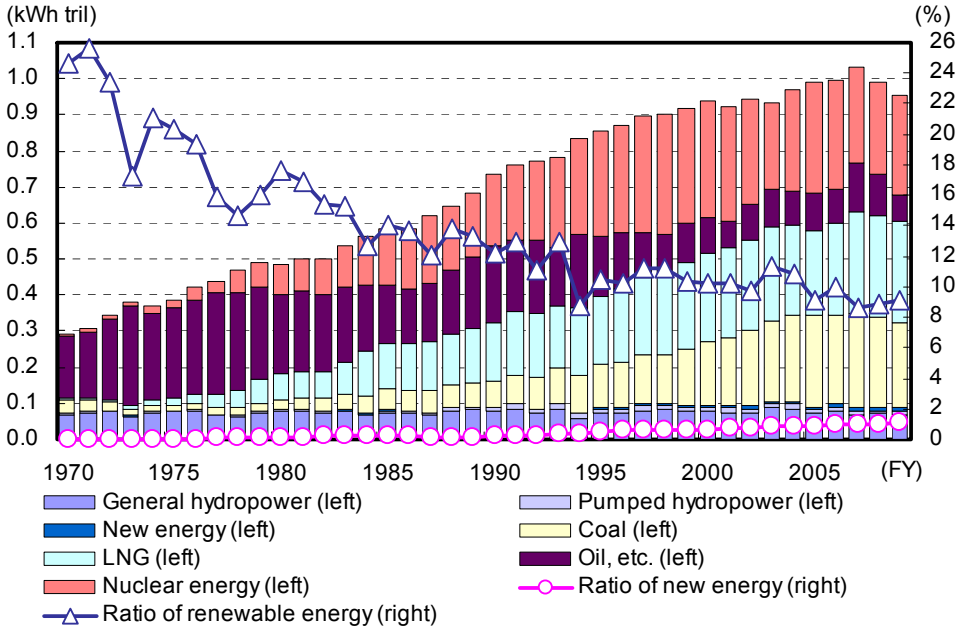
In 2009, Japan generated 278.5 TWh from nuclear power (29% of total electricity supply). However, 32% of Japan's nuclear power plants are currently not

15. Ten electric power companies: Hokkaido Electric Power, Tohoku Electric Power, Tokyo Electric Power, Chubu Electric Power, Hokuriku Electric Power, Kansai Electric Power, Chugoku Electric Power, Shikoku Electric Power, Kyushu Electric Power, and Okinawa Electric Power.

16. This includes power from operators other than the 10 electric power companies but the amount is tiny. The share of electricity in Japan from renewable energy sources increases slightly if energy supplied by independent power providers (IPPs) and that generated for own use is included.

functioning. This includes the Fukushima Daiichi nuclear power plant, which is to be decommissioned, as well as the Fukushima Daini, Onagawa, Tokai Daini, and Hamaoka nuclear power plants that were shut down after the quake. Together, Japan has lost 6.6% of its nationwide electricity generating capacity. Furthermore, in a growing number of cases the operators of reactors shut down for regularly scheduled inspections have not been able to reach agreement with local authorities to resume operations, so there are fears that Japan will have to endure major power shortages.

Power Generation by Energy Source (10 major power companies) **Chart 3.1**



Source: Ministry of Economy, Trade, and Industry; compiled by DIR.
Note: Through 1971: Nine power companies.

To resolve the power shortfall it will be necessary to curtail power consumption and supply power more efficiently. At the same time, shoring up Japan's electric power system and electric power capacity must be given the highest priority in order to restore healthy economic activity. Japan has various options to make up for the lost nuclear power capacity, including thermal power using fossil fuels such as LNG and renewable energy. Each of these options has its own advantages and disadvantages, so they must be examined from multiple perspectives, including the time required to construct facilities, additional import costs, and the environment.

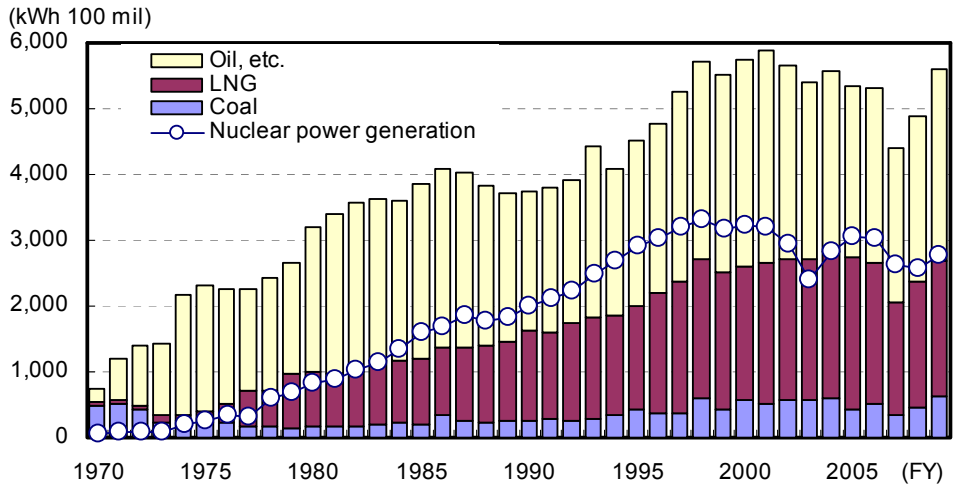
3.1.2 Replacement with thermal power will boost costs and CO2 emissions

Amount of additional power that could be generated at thermal plants far exceeds nuclear power output

The economy will be adversely affected if manufacturing activity continues to be curtailed by power shortages. In order to swiftly deal with the problem it is first necessary to determine whether existing power plants can be used to make up for the lost nuclear power capacity. Chart 3.2 shows the amount of additional power that can be generated by thermal power (coal, LNG, oil) and the actual amount of power generated by nuclear reactors. The amount of thermal power output that can be added far exceeds nuclear power output. For example, in 2009 there was only 63.6 TWh of spare capacity at coal-fired plants, but if LNG plants operated at full capacity (90% operating rate), 204.9 TWh of power could have been generated. Taken together, this approaches the 278.5 TWh generated by nuclear power plants, and the remaining amount could be covered by oil-fired plants, which are the most expensive to operate. However, to respond to peak electricity demand, the

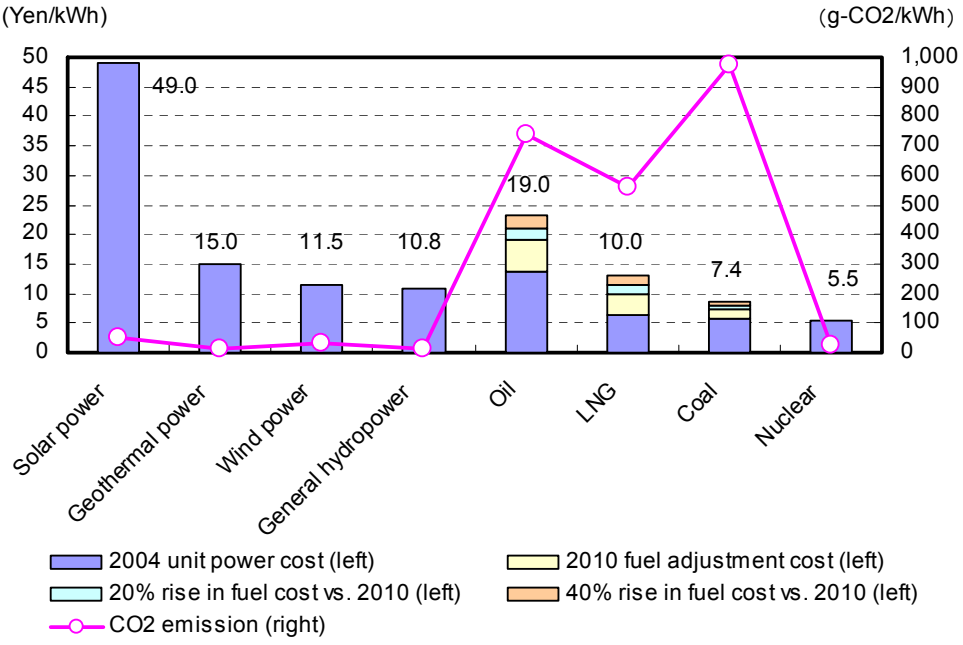
installation of new gas turbines, as well as demand control to restrain sudden surges in electricity usage, would be necessary.

Thermal Power Reserve Capacity by Energy Source vs. Actual Nuclear Power Generation **Chart 3.2**



Source: Ministry of Economy, Trade, and Industry; compiled by DIR.
Note: Reserve capacity: Subtracting actual power generation from power generation at maximum utilization rate (assuming 90% of capacity).

Unit Power Cost and Unit CO2 Emission **Chart 3.3**



Source: Ministry of Economy, Trade, and Industry; compiled by DIR.
Note: Unit power cost figures for oil, LNG, and coal include 2010 fuel adjustment cost.

Power generation cost could rise if thermal power used to cover entire nuclear power output

However, the disadvantages of thermal power are that the cost of fuel is higher than nuclear power and it is affected by energy prices. According to calculations made by the Federation of Electric Power Companies of Japan in 2004,17 the generating cost of thermal power—capital cost (construction cost), fuel costs, and operating/maintenance costs divided by power output—averages Y6.5/kWh for

17. Federation of Electric Power Companies of Japan, "*Moderu shisan niyoru kakudenngen no hatsuden kosuto hikaku*" (Model-Based Comparison of the Generating Costs of Various Power Sources), 16 January, 2004 (in Japanese).

LNG, Y5.8/kWh for coal, and Y13.7/kWh for oil. However, these calculations were performed using average fuel prices and foreign exchange rates for FY02. Chart 3.3 shows our calculations, which reflect the latest fuel prices and foreign exchange rates.18 According to our calculations, based on the latest data for 2010, the unit cost of thermal power is an average Y10.0/kWh for LNG (+Y3.6/kWh), Y7.4/kWh for coal (+Y1.7/kWh), and Y19.0/kWh for oil (+Y5.4/kWh).

Furthermore, if the price of fuel increases 20% (or 40%) compared with 2010, the unit cost of LNG rises to Y11.6/kWh (Y13.2/kWh), coal Y8.0/kWh (Y8.6/kWh) and oil Y21.1/kWh (Y23.1/kWh). With energy demand expected to continue to rise in emerging economies, the cost of generating electricity from these fossil fuels could exceed that of some renewable energy sources (Y15.0/kWh geothermal, Y11.5/kWh wind power, and Y10.8/kWh conventional hydropower).

Replacing all nuclear power output with thermal power would increase generating costs by Y2.7 trillion annually

Chart 3.4 shows the cost of replacing the power from all nuclear power plants (assuming they are shut down) with power from existing thermal power plants, based on the above calculation of generating cost using 2010 fuel costs. We calculate a total additional cost of Y2.7 trillion each year, broken down into Y2.0 trillion for LNG, Y0.5 trillion for coal, and Y0.2 trillion for oil. This Y2.7 tril includes an actual additional cost of Y2.0 trillion each year for fuel (Y1.7 trillion for LNG, Y0.2 trillion for coal, and Y0.1 trillion for oil). Carbon dioxide emissions would also increase by 180 million tons per year. Monthly household electricity bills would rise by Y906, or 13%.19 (This does not take into consideration any cost reduction from there being no nuclear power generation.)

Additional Cost and CO2 Emission Arising from Replacement of Nuclear Power Generation with Thermal Power Generation **Chart 3.4**

	LNG	Coal	Oil	Total
Power generation cost (Y bil/year)	2,049	471	189	2,709
Fuel cost (Y bil/year)	1,657	191	103	1,951
Fuel imports (LNG and coal: 0000 tons/year; oil: 0000 kl/year)	3,340	2,035	234	-
% share of 2010 overall imports	47.7	11.0	1.1	-
CO2 emission (0000 ton-CO2/year)	11,558	6,201	740	18,499

Source: Compiled by DIR based on various materials.
Assumption: Unit power generation cost to be Y10.0/kWh for LNG, Y7.4/kWh for coal, Y19.0/kWh for oil; unit CO2 emission to be 564g-CO2/kWh for LNG, 975g-CO2/kWh for coal, and 742g-CO2/kWh for oil; unit fuel cost to be Y49,592/ton for LNG, Y9,405/ton for steam oil, and Y43,826/kl for oil.

Thus, if electricity demand is curtailed, power shortages could be eliminated in the short term by using thermal power, albeit at some cost. In our view, because LNG-based thermal power has the most spare capacity and the lowest CO2 emissions, for the present it would be best to address power shortages by first expanding output from LNG-fired plants, and then turn to coal and oil if there are still shortages. When expanding or upgrading facilities, a valid strategy would be to replace existing thermal power facilities with highly efficient LNG combined cycle plants20 or integrated gasification combined cycle plants. And, although it is still expensive, in the longer term it would be worth considering shifting to cutting-edge coal-based thermal power that uses carbon capture and storage (CCS) technology.

18. Amount of fuel needed to generate 1 kWh of electricity assumed to be 0.163 kg/kWh for LNG, 0.320 kg/kWh for coal, and 0.235 l/kWh for oil.
19. To estimate additional per-household monthly electricity charges, we first calculated additional per-kWh cost shouldered by households by dividing additional power generation cost shouldered by households (32% of additional power generation cost) by the amount of electricity used by households. Then, we multiplied this by average household electricity usage per month (300 kWh).
20. A method of generating electricity that raises thermal efficiency by using a gas turbine engine to generate electricity, and then having steam produced using the engine's waste heat to drive another turbine and generate additional power. This is also called a hybrid system.

As we will discuss later in this section, over the medium to longer term we think the best mix will be achieved by shifting to renewable energy sources, in addition to thermal power.

3.1.3 Issues if nuclear power is to be replaced with renewable energy

Except solar, the generating cost of renewable energy is on par with thermal energy

The price of using existing thermal generating capacity to alleviate shortages will be electricity rate increases. In addition, CO2 emissions will increase and energy self-sufficiency will decline. Is it possible to address shortages and generating cost problems by expanding output from renewable energy sources?

Energy source cost comparison

As shown in Chart 3.3, except for solar, the generating cost of renewable energy is about the same as thermal. Namely, the cost of solar power is Y49/kWh, hydropower Y10.8/kWh, wind power Y11.5/kWh, and geothermal Y15/kWh. By contrast, the cost of nuclear power is Y5.5/kWh. However, this does not include associated costs such as the cost of reprocessing spent fuel, the cost of accident-related compensation, and the cost of future safety measures. It also does not take into consideration what the government has spent on nuclear power generation up to now.[21] In other words, the Y5.5/kWh figure does not fully reflect such enormous indirect costs of nuclear power. Furthermore, uranium prices could potentially rise in the same manner as fossil fuel prices, so it is impossible to state unequivocally that power generation using renewable energy is more expensive.

If renewable energy were used to replace nuclear power, CO2 emissions would be half those of thermal power but generating costs would be 1.5 times higher

Chart 3.5 shows our calculation of what will happen to generating costs if renewable energy and some thermal power are used to replace all nuclear power (Case A1).[22] Generating costs would be about 1.5 times higher than if only thermal power were used to replace nuclear power (Case B) or if the status quo was maintained for nuclear power (Case C). And, although CO2 emissions would be lower than if only thermal power were used (Case B), CO2 emissions would be nine times higher than if the status quo was maintained for nuclear power (Case C). This is because the CO2 emissions from nuclear power generation are lower than some forms of renewable energy. Thus, in order to lower overall CO2 emissions it is necessary to either increase reliance on nuclear power or increase renewable energy and decrease reliance on thermal power.

Therefore, we also examined the case (A2) in which we assumed that the same amount of renewable energy is used as in Case A1, but nuclear power is reduced to one-third the current level, so the proportion of thermal power is lower. In this case, the CO2 reduction benefit is much greater than if only thermal power is used (Case B) or if the status quo is maintained for nuclear power (Case C). Furthermore, additional generating costs are not much different than if nuclear power were totally scrapped (Case A1).

21. Oshima, Kenichi (2010), *"Genshiryoku wa hontoni yasuinoka: keizaiteki yuisei nikansuru kento"* (Is Nuclear Power Truly Cheap? An Examination of Economic Advantage), Chapter 2, the political economics of renewable energy," Toyo Keizai Shinpo-sha (in Japanese).
22. This assumes that wind and solar power capacity is increased tenfold. We also assumed additional power to be produced from conventional hydropower and geothermal sources, as discussed below. We used a per-unit generating cost of Y10.7/kWh for nuclear power, a figure calculated by Ritsumeikan University Professor Kenichi Oshima.

Additional Cost and CO2 Emission Arising from Replacement of Nuclear Power Generation: (A1) 100% Replacement, and (A2) One-third Replacement — Chart 3.5

(A1) 100% replacement		*Alternative energies*										*Reference*	
		Oil	LNG	General hydropower	Wind power	Geothermal power	Solar power	*Nuclear power*	Replacement with thermal and renewable energy (A1)	(A1) / (B)	(A1) / (C)	100% replacement with thermal energy incl. oil (B)	2009 nuclear power generation (C)
Power generation capacity	(0000 kW/year)	-	-	1,427	2,283	1,436	2,378	0	-			14,573	4,885
Alternative power generation	(100 mil kWh/year)	276	478	500	400	881	250	0	2,785			2,785	2,785
Unit power generation cost	(Yen/kWh)	7.4	10.0	10.8	11.5	15.0	49.0	10.7	-			-	10.7
Emission coefficient	(g-CO2/kWh)	975	564	11	29	15	53	24				-	24
Additional power generation cost	(Y bil/year)	205	478	540	460	1,321	1,225	0	4,228	1.56	1.42	2,709	2,980
Additional CO2 emission	(0000 ton-CO2/year)	2,696	2,696	55	116	132	133	0	5,827	0.31	8.72	18,499	668

(A2) One-third replacement		Oil	LNG	General hydropower	Wind power	Geothermal power	Solar power	*Nuclear energy*	Replacement with thermal and renewable energy (A2)	(A2) / (B)	(A2) / (C)	100% replacement with thermal energy incl. oil (B)	2009 nuclear power generation (C)
Power generation capacity	(0000 kW/year)	-	-	1,427	2,283	1,436	2,378	1,631	-			14,573	4,885
Alternative power generation	(100 mil kWh/year)	-90	-156	500	400	881	250	1,000	2,785			2,785	2,785
Unit power generation cost	(Yen/kWh)	7.4	10.0	10.8	11.5	15.0	49.0	10.7	-			-	10.7
Emission coefficient	(g-CO2/kWh)	975	564	11	29	15	53	24				-	24
Additional power generation cost	(Y bil/year)	-67	-156	540	460	1,321	1,225	1,068	4,392	1.62	1.47	2,709	2,980
Additional CO2 emission	(0000 ton-CO2/year)	-878	-878	55	116	132	133	240	-1,080	-0.06	-1.62	18,499	668

Source: Compiled by DIR based on various materials.
Notes: 1) Nuclear power generation cost per unit based on 1970-2007 avg estimated by Professor Kenichi Oshima, Ritsumeikan University.
2) Oil excluded from alternative energies.

One nuclear reactor equivalent to 450 of Japan's biggest photovoltaic power plants or 1,750 wind turbines

When it comes to renewable energy, wind power and solar power have the disadvantages of generating only small volumes of electricity and being greatly influenced by the natural environment. For example, there are great limitations on solar power and wind power in terms of location. Nuclear reactors have lately become bigger, and there are many that now boast a capacity of 1 GW. By contrast, the Ogishima photovoltaic power plant currently under construction in Kawasaki City that is said to be among the largest in Japan has a rated capacity of 13 MW, and the Koriyama-Nunobiki Kogen Wind Farm, also said to be among the biggest, has a total output of 66 MW (33 2-megawatt turbines). If we multiply the operating rates for nuclear power plants, photovoltaic power plants, and wind farms (70%, 12%, and 20%, respectively) by these figures, it would take about 450 photovoltaic power plants of this size and 1,750 2-megawatt wind turbines to produce the same amount of electricity as one nuclear reactor.

Vast area would be needed for solar and wind power to make up for nuclear power

In terms of land area, it would take a photovoltaic power plant covering 88 km^2 or a wind farm covering four times that area, 350 km^2, to equal a single nuclear reactor (assuming that 15 m^2 is required for solar panels generating 1 kW, and 100 m^2 is required for wind turbines generating 1 kW). By comparison, the area inside the Yamanote train line encircling Tokyo is about 65 km^2.

If all of Japan's nuclear power plants were decommissioned, it would require photovoltaic power plants covering roughly the same area as Yamanashi Prefecture (4,274 km^2), or 85,482 wind turbines covering the same area as the southern Kanto region (Tokyo, Kanagawa, Chiba, and Saitama) plus Nara Prefecture (a combined 19,540 km^2, or 4.5% of Japan's land mass) to make up for the lost power. In fact, there are geographic differences in the number of hours of sunlight and the amount of wind, so solar and wind power facilities can only be located in certain areas of Japan, and hence from a practical standpoint it would be hard to achieve these numbers.

Right solar and wind power facilities have to be put in the right places

Of course, a fair amount of area can be used for solar power by placing equipment on the roofs of homes and office buildings and solar power-generated electricity would be useful to help meet sudden surges in demand to some extent. Meanwhile, wind turbines do not necessarily have to be placed on land, where there is limited surface area. Generating power offshore (offshore wind turbines) is another option. However, when it comes to solar energy, the government would provide subsidies for feed-in tariffs and installation, and there are also concerns about the potential for enormous disposal costs decades later when the equipment is scrapped. Furthermore, the cost of installing offshore wind turbines is said to be 2-3 times higher than the cost on land. Costs could fall dramatically depending on how the technology develops, but for now these methods of generating power are still expensive. To minimize the public burden as much as possible, the idea must be to put the right solar and wind power facilities in the right places.

Electricity generation control

Low operating rates are another issue. Solar equipment does not generate power at night or when it is raining, and wind equipment does not generate power when there is too little wind. Nuclear power plants provide a stable supply of electricity, and thermal power is used to adjust for fluctuations in demand. If nuclear power is replaced largely with solar and wind power, the supply of electricity will become less stable. Unless enormous storage batteries are developed, shoring up supply to correspond to demand fluctuations through thermal power will require extremely sophisticated control technology.

3.2 Supply of energy revolving around geothermal power and small and medium-sized hydropower projects

In addition to the problems that we have already discussed, using renewable energy increases a variety of costs related to the transmission lines at each location. Consequently, it would be best to use renewable energy in distributed ways that are suited to the local weather and natural features. So which renewable energy candidates are best-suited to Japan's natural environment? In this section we will focus on smaller hydropower and geothermal power projects, and how these can be pivotal sources of electricity over the medium to longer term.

3.2.1 Hydropower, a renewable energy that is both old and new

Hydropower well-suited to Japan's natural environment

Hydropower has always been a source of electricity that is well-suited to Japan's weather and natural features. This is because Japan is surrounded by the sea, and as the massive amounts of water in the atmosphere run into the steep terrain an updraft is created that forms clouds, which means that huge volumes of rain and snow fall in the mountains throughout the year.

Generating capacity and output both leveling off

As shown in Chart 3.6, Japan currently produces just 83.5 TWh/y of electricity from hydropower (8.7% of total output). There is a fairly large amount of hydropower capacity (46.37 GW, or 19.2% of total capacity), but conventional hydropower facilities, which provide power constantly, account for just 20.73 GW (8.6%) of this amount.23

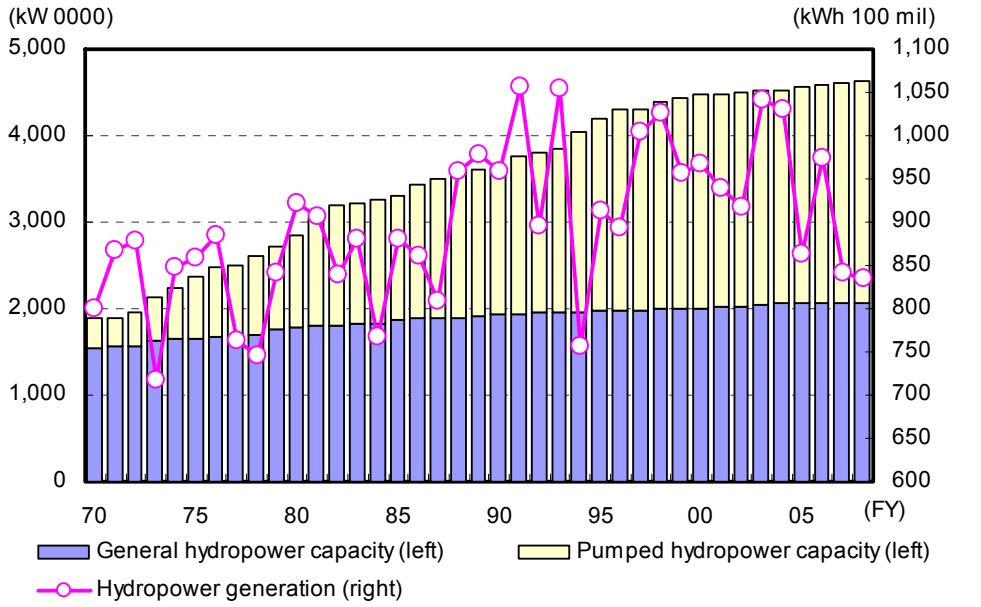
One reason for the dearth of conventional hydropower capacity is that there is less and less room to develop major hydropower projects. In recent years the developable places have become remoter and smaller, and because many would not

23. Pumped-storage hydropower accounts for more than half of all hydropower capacity, but it cannot provide a constant supply of electricity. Pumped-storage hydropower serves the function of storing surplus electricity from nuclear power plants at night and other times, since it is hard to adjust output from these plants. Because they are often built where there is not a constant flow of water, the operating rate is only 3% (2008).

be economically viable using current technology, and the construction of large dams could cause environmental destruction, development costs have been rising.

The amount of electricity generated has also been declining because of restrictions on the amount of water needed for conventional hydropower. In the 1950s, when hydropower was in the mainstream, the operating rate was higher than 60% but it is now below 40%. To increase the amount of electricity generated it is necessary to ensure that a certain volume of water falls a certain distance, but doing this decreases the volume of water flowing down a river, and could prevent the river from functioning normally. As a result, the River Act restricts the volume of water that can be taken for hydropower to ensure that a certain volume of water continues to flow down rivers.

Hydropower Capacity and Generation **Chart 3.6**



Source: Federation of Electric Power Companies of Japan; compiled by DIR.

Still room to develop small and medium-sized hydropower facilities

However, there is still room to develop small and medium-sized hydropower facilities, and there is less of a burden on the environment. According to a survey by the Agency for Natural Resources and Energy regarding potential hydropower, including projects already under construction, Japan can increase its generating capacity by another 50 TWh (36.2 TWh of which would be smaller run-of-the-river hydropower projects that do not use dams). If Japan develops these smaller-scale hydropower facilities, it could cover 14.0% of its electricity needs with hydropower (83.5 TWh + 50 TWh / 955.1 TWh). If this were used to replace nuclear power, it could reduce the share of Japan's power generated from nuclear power plants from 29.2% (2009) to 23.9%. Furthermore, expanding the use of hydropower would increase the renewable energy share of total electricity to 14.4%.

Lowering generating cost the issue

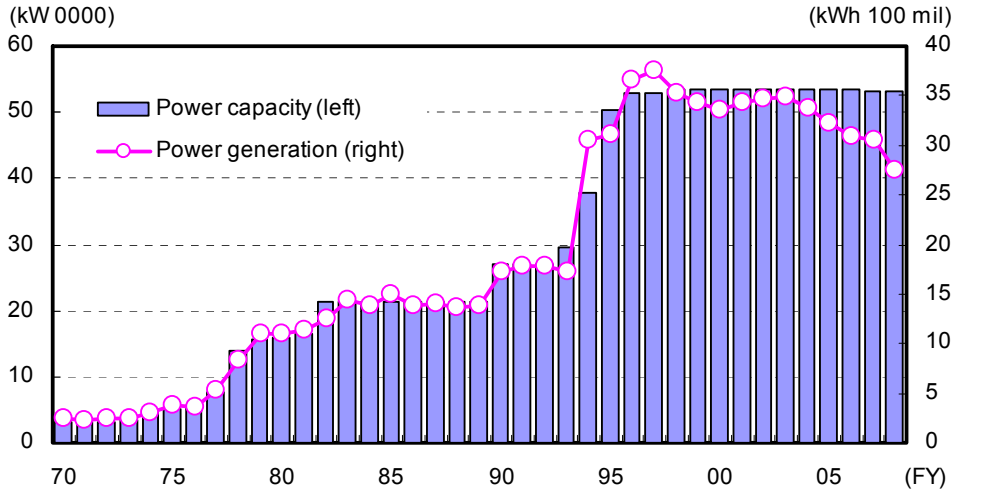
The issue is that the generating cost of these small and medium-sized hydropower projects is fairly high. Nevertheless, Japan's ample water resources allow it to obtain a relatively stable supply of water. Furthermore, it is possible to predict the volume of water from historical data. Therefore, hydropower can help ensure the stability of the country's supply of electricity. Additionally, because CO2 emissions are extremely small, the use of small and medium-sized hydropower facilities should be seriously examined as a source of renewable energy.

3.2.2 Japan blessed with substantial geothermal resources

Potential of Japan's geothermal power enormous

Geothermal is a promising renewable energy source in Japan, a land of volcanoes. According to the National Institute of Advanced Industrial Science and Technology, Japan has geothermal capacity (water at 150 degrees Celsius or higher) of 23.47 GW, giving it one of the world's biggest capacities for geothermal power, on par with Indonesia (27.79 GW in 2007) and the US (23.00 GW in 2007). If the 8.33 GW of electricity that can be generated from lower temperature hot springs (53-120 degrees Celsius)24 is added to this figure, Japan has a total geothermal power capacity of 31.80 GW.

Geothermal Power Capacity and Generation **Chart 3.7**



Source: Ministry of Economy, Trade, and Industry; compiled by DIR.

Obstacles to development of geothermal power

However, as shown in Chart 3.7, the current capacity of Japan's geothermal power facilities is only 530 MW (0.2% of total capacity),25 and there have been no new projects developed since the Hachijojima geothermal power plant in 1999. Furthermore, these facilities generate only 2.8 TWh/y of power, which is just 0.3% of total power output. Many of the areas where there are ample geothermal resources are within designated national parks or quasi-national parks, and therefore under the National Parks Act cannot be developed (about 4.25 GW of geothermal resources are located outside these designated parks). Additionally, many of these areas are located adjacent to places where there are hot spring baths, so there is strong opposition from local hot spring operators who are concerned that the hot springs would be depleted. Furthermore, the initial cost of construction is Y1 million per kW, which is expensive compared to other sources (Y200,000/kW for wind power, Y370,000/kW for solar power, and Y450,000/kW for nuclear power). Geothermal power does not receive financial assistance under either the Renewables Portfolio Standard Law26 or the Act on the Promotion of New Energy Usage,27 which are intended to promote more widespread use of new energy technologies, and therefore the cost is not coming down. Because of this, the development of new geothermal facilities is at a standstill.

24. Hot spring power is a method of generating electricity in which the turbine is rotated by vaporizing a fluid with a boiling point below 100 degrees Celsius, such as ammonia water or pentane, thus allowing electricity to be generated from a low-grade heat source (low-temperature steam or hot water). This is also sometimes called binary power.
25. This also includes private power from the Matsukawa geothermal power plant operated by Tohoku Hydropower & Geothermal Energy.
26. Act on Special Measures Concerning New Energy Usage by Electric Utilities, enacted April 2003.
27. Enacted June 1997.

Characteristics of Renewable Energy	Chart 3.8
Solar energy	• Current high cost of power generation relative to other energy sources is expected to decline going forward. • Installation of solar systems for residential and non-residential use likely to increase. • The broad industry base has the potential for new job creation and economic effect.
Solar heat	• High energy efficiency • New systems and technology have to be developed for utilizing heat for hot-water supply and air conditioning.
Wind power	• Relatively low electricity generation cost makes wind power viable for business operation. • New technology will likely enhance introduction of wind power systems. • Restrictions on location (certain intensity of wind and consistency over time required, scenery, being hit by birds, noise) likely to boost development cost. • The broad industry base has the potential for new job creation and economic effect.
Biomass	• Being used for various purposes (source for electricity power generation and utility gas, alternative for oil). Cost varies widely depending on type of biomass and how it is used. • Stable procurement has to be solved. • Depending on policy measures, (1) imports of biomass materials may increase, having an adverse impact on domestic biomass industries, and (2) competition will arise for biomass as a source of electricity generation and heat utilization, and also for other purposes. • Bio fuel can be mixed with conventional fuel (gasoline, diesel oil, jet fuel), and practical use at an early stage is likely. At the same time, bio fuel has to be utilized in a form that will maintain environmental sustainability, reduce green house gas emission in terms of life-cycle analysis, respond to energy security, and lower energy costs. • To avoid conflict with biomass as a source of food, it is important to use non-edible cellulose (wood, grass).
Hydropower	• Accounts for 35% of energy obtained domestically. • Electricity generation is stable, supported by mature technology. • Small to medium-sized hydropower generation attracting attention. • Severe restrictions on location which will likely increase electricity generation costs going forward.
Geothermal	• Electricity generation stable, supported by mature technology. • Japan is endowed with abundant geothermal sources, centering on hot spring sites. However, no geothermal power plants have been built recently. • Restrictions on location (scenery, hot springs as source of tourism revenue) likely to boost development costs.

Source: Agency for Natural Resources and Energy; compiled by DIR.

New technologies to push geothermal power ahead

However, the National Parks Act restrictions require only that the landscape not be ruined, and new technologies, such as hot dry rock geothermal power (HDR) and enhanced geothermal systems (EGS),28 are being developed that do not directly compete with hot springs. Not only that, but also Japan's geothermal power plant technology is extremely advanced. In fact, generation equipment is being exported to New Zealand and the US. While the initial cost of geothermal power is high, the maintenance cost is low. It is claimed that the unit cost of the power generated is around Y9/kW if a plant is operated over a long period of time.29 The CO2 emissions are as low as for hydropower.

Geothermal power could be a base source of electricity to replace nuclear power

The biggest difference between geothermal power and other renewable energy sources is its stable operating rate of about 70%. This means that it could have a role to play as a base source of electricity to replace nuclear power. Taking these factors into overall consideration, we believe that geothermal has enormous potential as a source of renewable energy.

28. Hot dry rock geothermal power is a method of generating electricity that rotates a turbine using steam or hot water that is artificially generated by injecting water from the surface into hot rocks 1-3 km below the surface. Hot spring baths use the steam and hot water that is stored in geothermal reservoirs, so hot dry rock geothermal power does not compete with hot spring baths. EGS uses hot dry rocks that are even deeper underground, and is being developed in countries like Germany that are in non-volcanic regions ill-suited to geothermal power.

29. Central Research Institute of Electric Power Industry (2003), *"Mishiyo chinetu shigen no kaihatsu ni mukete: ko-on gantai hatsuden eno torikumi"* (Developing Underutilized Geothermal Resources: Hot Dry Rock Geothermal Power), CRIEPI Review No. 49 (in Japanese).

Renewable energy share could be boosted to nearly 24% with just geothermal and hydropower

At present, about 40%, or 12.58 GW of Japan's geothermal resources could be readily developed (4.25 GW of geothermal resources outside designated parks and 8.33 GW of hot spring power geothermal resources). If these resources were used to generate geothermal power, they could add 88.1 TWh/y of new electricity supply (9.2% of total power output). If this, along with 50.0 TWh/y of added hydropower, were used to replace nuclear power, the share of electricity provided by nuclear power could be reduced from 29.2% (2009) to 14.7%. And the share of electricity provided by renewable energy sources would jump to 23.6%. Although it would take some time to develop geothermal power, it appears that it would be very possible to achieve the goal set by Prime Minister Kan (20% of electricity from renewable energy sources by the early 2020s) if it was used along with new energy technologies like solar and wind power.

Share of electricity from renewable energy could be increased to nearly 30% by reviving underutilized resources and developing solar and wind power

As we have shown, Japan could increase the share of electricity from renewable energy and curtail the use of nuclear power simply by taking a fresh look at underutilized resources. But, by also using solar and wind power, increasing the share of electricity generated from renewable energy sources to 30% over the longer term becomes well within the realm of possibility.

3.3 Energy policy for the medium to longer term

In this section we have mainly discussed ways to shore up the supply of electricity, and the figures that we have presented assume that there is no major change in demand for power. But, at the same time, homes and businesses should be asked to step up energy conservation efforts so that power usage does not rise. If Japan is successful in curbing demand, it will become less necessary to shore up supply. When looking at the power shortage problem, measures to curb power demand are at least as important as the supply side of the discussion.

3.3.1 Encouraging commercial and residential sector (households, offices, services) energy conservation

Future trends in commercial and residential sector (homes, offices, services) energy consumption

As shown in Chart 3.9, Japan's industrial sector, including manufacturing, has curbed energy consumption since the 1973 oil shock (consumption is 90% the 1973 level). By contrast, energy consumption in homes, business offices, and services, and in the transportation sector (trucking) has since continued to rise (consumption is up 150% from 1973 in the commercial and residential sector, and up 90% in the transportation sector).

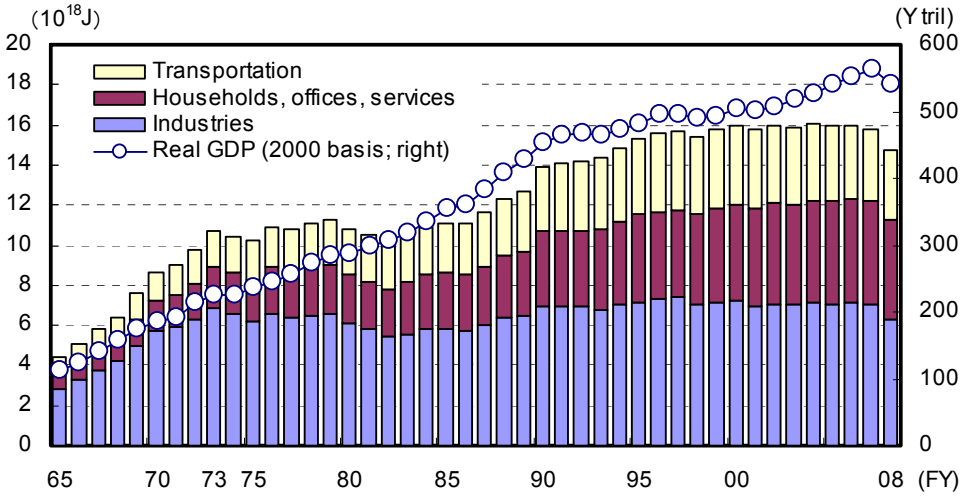
How can power demand be restrained when society is aging and the standard of living is rising?

Furthermore, the electricity to total energy consumption ratio has been climbing year after year (Chart 3.10). On the other hand, the rate at which electricity usage is rising has been gradually declining (Chart 3.11). This suggests that headway is being made in energy conservation in a variety of areas. Going forward, electricity consumption is expected to rise as the share of energy from electricity continues to rise as the population ages and as Japan's economy gets back onto a growth track. But the earthquake has dramatically raised awareness of the need to save electricity. As demonstrated by the shift from incandescent light bulbs to LED lights, there is potential for the commercial and residential sector to curb the amount of power consumed.

In our view, programs designed to encourage further energy conservation in the commercial and residential sector, such as the recently ended eco-point program for consumer electronics, are an effective means for curbing demand for electricity in this sector. Another effective tactic is to smooth out demand for electricity by adopting peak load pricing (setting prices according to volume of demand at different times) for those times when there are sudden surges in demand. Supplying

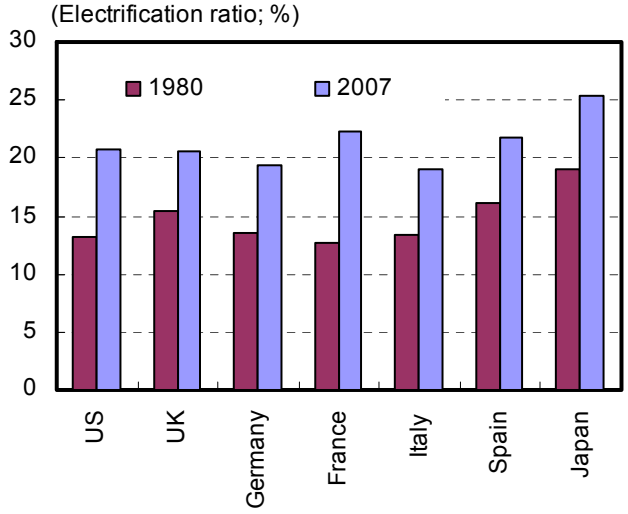
electricity more efficiently through the use of smart grid technology and hastening the development of storage batteries will also be important.

Final Electricity Consumption by Sector **Chart 3.9**



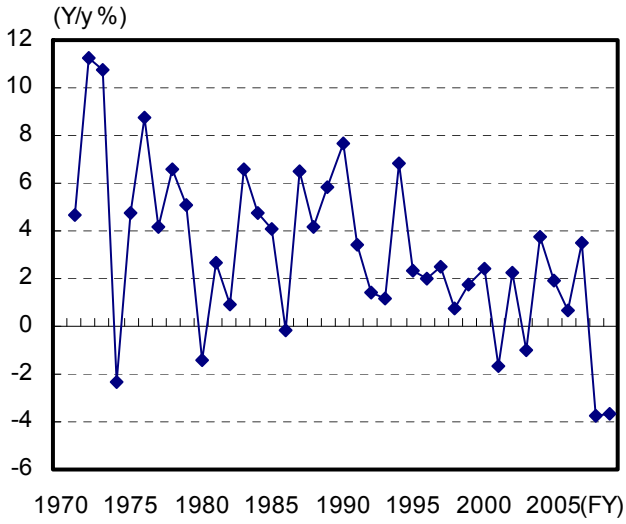
Source: Agency for Natural Resources and Energy; Institute of Energy Economics, Japan; compiled by DIR.
Note: J: joule. 1 megajoule = 0.0258 x 10^{-3} kiloliter of crude oil equivalent.

High Dependency on Electricity in Japan **Chart 3.10**



Source: International Energy Agency; compiled by DIR.
Note: Electrification rate: rate of electricity consumption to final energy consumption.

Electricity Consumption Growth Slowing in Japan **Chart 3.11**



Source: Agency for Natural Resources and Energy; compiled by DIR.

3.3.2 Increasing the use of renewable energy has major benefits

While there are short-term costs associated with the shift to renewable energy, there are also major benefits over the medium to longer term. For example, demand for components and other items used in construction will rise. If domestic demand grows there will be a ripple effect that causes income to rise, and this should offset the national cost of deploying renewable energy.30 Over the medium to longer term, if Japan is able to accumulate technology and expertise by investing in renewable energy, it will gain a comparative advantage in renewable energy and it

30. However, public support such as subsidies and feed-in tariffs merely represents a domestic income transfer. The contribution to economic growth comes from the short-term and long-term ripple effects.

will be able to export related products and technologies. This sort of national strategy would not only reduce Japan's dependence on fossil fuels and uranium and contribute to its energy security, but it would also help curb purchases of CO2 emission rights, curtailing income outflows. As countries around the world grapple with global environmental issues and move to abandon nuclear power, Japan will boost its presence on the world stage if it can successfully take on the challenge of renewable energy.

3.3.3 Summary: Electricity shortages and Japan's energy policy

Develop renewable energy suited to Japan's natural environment, while encouraging commercial and residential sector energy conservation

In order to address the power shortages that have arisen due to the nuclear power plant incident, in the short term Japan will have to expand the use of LNG, which has low CO2 emissions. Over the medium to longer term it will have to promote renewable energy sources that put only a small burden on the public, such as geothermal and small and medium-sized hydropower, as well as improve the generating efficiency of thermal power. On top of that, solar and wind power (especially offshore) should be used to generate power at peak times, and the right equipment should be put in the right places, such as placing equipment where wind conditions are favorable. The order of priority must be determined by taking an overall view of cost, in terms of both time and money, of building up the supply of electricity and the burden on the environment.

Although nuclear power has low CO2 emissions, the cost of reprocessing spent fuel and other costs is quite high, so generating costs are actually not that low. The costs of the various new energy technologies vary widely, so the power sources in which public and private resources will be invested must be strategically chosen, while keeping an eye on technological innovation.

To meet future electricity demand while easing the public burden, it will be important to choose renewable energy sources that are suited to Japan's natural environment, improve the efficiency of thermal power, and promote energy conservation (the use of smart grid technology).

Taking these factors into overall consideration, the cost of renewable energy is not necessarily that high. Especially if weight is given to curbing CO2 emissions, the use of renewable energy should rapidly expand in the future. On the other hand, given the earthquake-awakened awareness of the high generating costs of nuclear power, it would be fairly difficult to expand reliance on this form of power as contemplated in the government's existing energy plan. Nevertheless, CO2 emissions from nuclear power are extremely low. And there are limitations on the supply of renewable energy (site restrictions dictated by weather and natural features). Therefore, for now a realistic strategy would be to keep nuclear power (with a higher level of safeguards) alongside renewable energy, and push to expand renewable energy as much as possible.

4. Integrated Reform of Social Security and Tax Systems

4.1 In a hyper-aged society, improving efficiency of benefits paid to seniors a prerequisite for increasing tax burden

4.1.1 Status of debate over a consumption tax hike and characteristics of Japan's social security system

On track to raise consumption tax rate to 10% by 2015

On 14 December 2010, the cabinet approved "promotion of social security reform," and on 2 June 2011, the Council for Intensive Discussion on Social Security Reform, a body established under the government/ruling party's headquarters for social security reform, released its blueprint for social security reform. The plan calls for the consumption tax to be gradually increased to 10% by FY15. However, at the time of writing this report, *Japan's Medium-term Economic Outlook: June 2011*, the proposal was still being debated by the body that is responsible for hammering out the final draft of the legislation. The government's Tax Commission has also begun separately deliberating tax policy reform.

Keeping size of increase down a condition for any increase in burden

The prospects for policy reform are not necessarily favorable due to the complicated decision-making process, but in view of the extreme aging of the population, it will be impossible to avoid a certain increase in the tax burden. The main focus of attention will be the actual timing and size of the consumption tax increase. But if businesses and the working-age population have to shoulder too much of the burden of Japan's hyper-aged society, it could hinder the expansion of income to be distributed (economic growth). Even if that were not the case, a more efficient social security system is essential for overcoming the problem of a hyper-aged society, and should be a precondition for any increase in the tax burden.

Japan's retiree-centric social security system

The ratio of Japan's social security expenditures to GDP was 10.7% in FY90, one of the lowest levels among advanced economies. However, by FY08 the figure had risen to 19.3%, putting it above the average for advanced economies (according to OECD data). Almost all growth represented payments to retired generations. Chart 4.1 is an international comparison of changes (GDP ratio differences) in redistributive expenditures, including social security, from 1990 to 2005. In this chart, distributions to retired generations represent mainly pension benefits, while unclassified outlays include medical benefits. Most of the increase in Japan's medical costs is for care for the elderly. It must be said that Japan does not place much importance on redistribution to the working-age population of today nor to the children who represent Japan's future.

Policy reform addressing inter-generational inequity

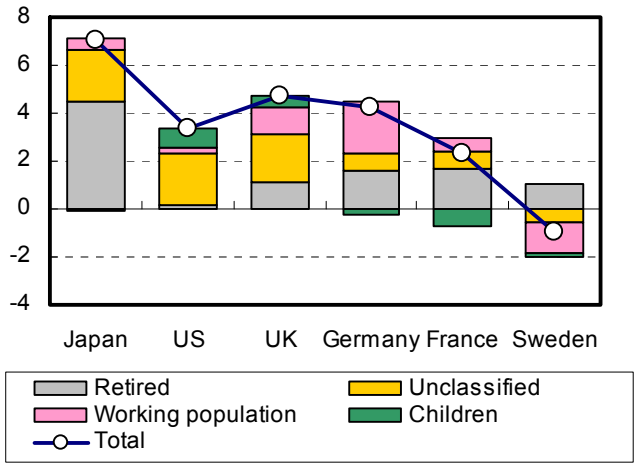
The most harmful effect of the combination of Japan's aging society and its pay-as-you-go-financed social security system (the working-age population paying for the retired population) is the resulting intergenerational inequity. A progressively heavier social security burden falls on younger generations and at the same time benefits will have to be cut to somehow maintain the system. The situation becomes progressively worse for younger generations, in terms of both the burden they will shoulder and the benefits they will receive. This intergenerational inequity is a problem that is already occurring. Because the clock cannot be turned back it is impossible to make this problem go away, and it is also fair to say that this problem cannot solely be debated in terms of social security. However, even if intergenerational inequity is corrected only slightly, if policy reform is stymied for this reason, the present and future working population will be insufficiently

persuaded and it will become hard to maintain the social security system. The problem of people refusing to remit their pension contributions is a sign of this.

Shift from Confucian to mutually beneficial system needed

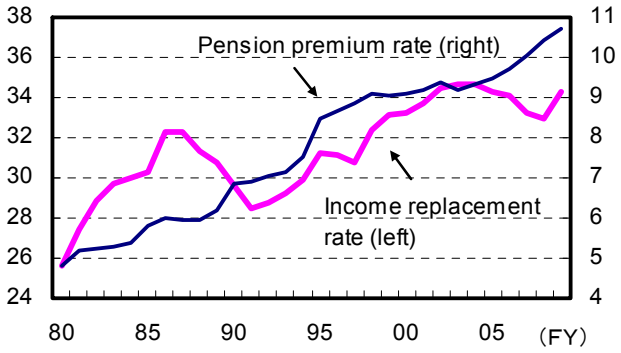
A system under which the government implements generous redistribution measures and provides ample social insurance is generally considered a social democratic system. The free market mechanism does not do a good job of sharing the risk of unemployment, as the Japanese labor market is still rigid and tightly regulated. However, the current social security system is not really a social democratic one. Instead, it could be called Confucian. Under Confucianism, the first step is to love the preceding generation and practice filial piety, and people must be respectful and courteous to their elders. While people hold these values dear, in an age in which the elderly account for some 40% of the population, it is clearly becoming difficult to maintain a social security system in which there is not a mutually beneficial relationship between the working-age population and the retired population.

Income Redistribution-related Government Spending by Beneficiary (% pt) **Chart 4.1**



Source: OECD; compiled by DIR.
Note: Change from 1990 to 2005 in terms of % of GDP; spending for children from 1995 to 2006.

Income Replacement Rate and Pension Premium Rate Viewed from Macroeconomy (%) **Chart 4.2**



Source: Cabinet Office; compiled by DIR.
Note: Income replacement ratio = (aggregate pension benefits / population over 60) / (employee compensation + mixed income) / population aged 15-59). Pension premium rate = aggregate premiums / (employee compensation + mixed income).

4.1.2 Pensions

Pay-as-you-go system difficult with hyper-aged population

It is not easy to maintain a pay-as-you-go public pension system in a hyper-aged society. In addition to rising medical and nursing care costs, how is it possible to increase the pension burden without having an adverse effect on the economy? The reforms to the pension system enacted in 1999 suspended the wage indexing of pension benefits, and the 2004 reforms introduced macroeconomic-indexing, reducing effective benefits corresponding to the increase in longevity and decrease in the size of the working-age population (CPI-indexing was not fully implemented). Even so, the burden is sure to increase up to FY17, and there are growing concerns about the sustainability of the system.

Maintaining income replacement rate means retired population is also guaranteed the fruits of the working population's efforts

Under the current law, if the income replacement rate (pension benefits as a percentage of pre-retirement income) falls below 50% for the model pension at time of benefit eligibility, macroeconomic-indexing will be suspended and the benefits and tax burden reconsidered. The government has made a strong commitment to this 50% replacement rate, rather than a set pension amount. This is the same as saying that the government guarantees the retired population will receive any increase in productivity from a shrinking workforce. If the minimum replacement rate is set at an unreasonable level for a hyper-aged society, there is a risk that the increased burden on the working population will be untenable.

Income replacement rate raised over time

Everyone retires sooner or later and it is wonderful to have a generous pension, but accomplishing this solely by increasing the burden on a shrinking working-age population is a problem. As the retired population grows and the working-age population shrinks, the contribution rate has necessarily risen. However, there have not been sufficient efforts to curb the rise in the contribution rate, so the average replacement rate has been rising over time, as shown in Chart 4.2. The contribution rate has been rising not only because of the increase in the number of seniors, but also because the standard of living for the retired population has been rising, relative to the working-age population.

Income replacement rate an indicator that warrants attention in many respects

Working people have had disposable income reduced in order to raise this replacement rate, but higher does not mean better when it comes to the replacement rate. The replacement rate for the model pension was higher in the 2009 actuarial review than at the time of 2004 pension reform, but this was only because wages had fallen. If wages of those who are currently working do not trend upward, pensions will not rise if the replacement rate is constant. But, if wages do move upward, even if the replacement rate falls slightly, pension benefits will rise. If the working-age population is to shoulder the increased burden, its wages have to rise. If the burden on businesses and the working-age population increases too much and impairs economic activity and the desire to work, the capacity of the working-age population to shoulder this burden will not increase and pension beneficiaries will also lose.

Room to hold down public pensions

Japan's public pensions are not tiny when compared with either the US (with its high level of incomes) or Sweden (with its well-developed social safety net). According to the 2010 Family Income and Expenditure Survey (Ministry of Internal Affairs and Communications), non-working elderly husband-wife households receive a monthly public pension of Y207,000. This is 1.3X the Y160,000 needed for expenditures like food, utilities, and health care. Furthermore, to the extent that the eligibility age for benefits in Japan is low and average life expectancy is long, the amount paid is made even larger. In principle, Japan raised the eligibility age for benefits to 65 as part of 1985 pension reform, but it is taking half a century to put this into effect. The average life expectancy of people who are 60 has already risen some 20% since 1985. In order to contain the growing burden in a hyper-aged society and maintain the pension system, it will be necessary to make pension benefits somewhat more modest.

4.1.3 Medical insurance

Rising medical care costs for the elderly

The average longevity of Japanese has risen more than expected. However, as people live longer, it is increasingly necessary to control risk accompanying an aging society from a social and public perspective. Along with the growing number of seniors, demand for medical care increases and the cost of purchasing medical services and pharmaceuticals will rise. Medical care costs for those over 75 already account for some 30% of national medical care costs, and costs for those over 65 more than 50%. As shown in Chart 4.3, in recent years medical care costs have risen only for the elderly.

Per-patient cost for seniors rising despite various efforts

Behind growing medical care costs for the elderly is the growing number of seniors, though per-capita medical care spending on seniors has declined. While the incidence of requiring medical treatment has declined thanks to early treatment, longer term prescriptions, etc., supported by advances in medicine, the per-patient cost for seniors appears to have risen. Today, Japan faces medical-related problems—shortages of obstetricians and pediatricians nationwide, and of hospital facilities and physicians in provincial areas. From a macroeconomic and insurance finance perspective, however, how to cover the medical care costs of a hyper-aged society is a pressing issue.

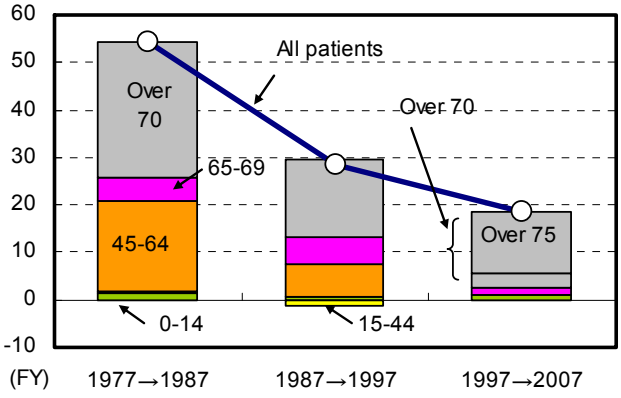
Medical care industry growing but how to shoulder the cost a separate issue

Today, a financing system that supports the cycle in which longer lives lead to greater demand for medical care is required. Demand for medical care naturally grows as people age but who will shoulder the cost burden is a separate issue. The National Council on Social Security, established by the government in 2008, has estimated that if Japan improved its medical care services, such as functionally enhancing acute care services, total medical expenses would increase from 8.9% of national income in FY07 to 11.5-12.2% in FY25. The additional financial burden (insurance premiums and taxes) is equivalent to more than 4-percentage points in terms of consumption tax rate. While there is little opposition to improving medical care, it is uncertain whether there is really any resolve among the citizenry to shoulder this cost.

Japan's national medical care costs not high but large portion publicly shouldered

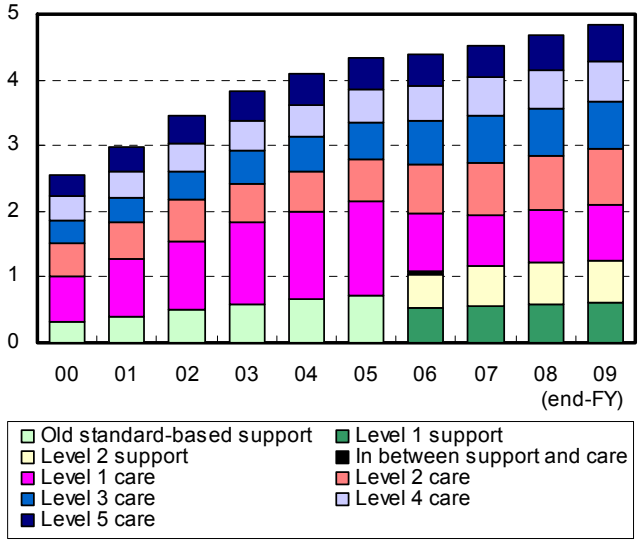
Japan's medical care spending is rising by about 3-4% (Y1 trillion) each year, but it is currently equivalent to about 8% of GDP, still 1 point below the average of OECD member nations. Japan can be proud of a system that realized one of the world's lowest mortality rates and best health outcomes at relatively low costs. Meanwhile, the rate of medical care costs shouldered by the public sector (not individuals or private insurance) is relatively high at 82% (the OECD average: 72%). Nations with higher rates are limited to Northern European countries (Denmark, Norway, Sweden, etc).

Real Medical Care Costs
(% change during respective decade) **Chart 4.3**



Source: Ministry of Health, Labour, and Welfare; Cabinet Office; compiled by DIR.
Note: General practice (hospitalized and outpatients) basis. Deflated by the health and medical care deflator (SNA-based household spending basis). Not adjusted for public long-term care insurance introduced in FY00. For 1997-2007, the over 70 population is divided into 70-75 and over 75, reflecting change in medical care system for seniors.

No. of Those Covered by Public Long-term Care Insurance (mil) **Chart 4.4**



Source: Ministry of Health, Labour, and Welfare; compiled by DIR.

Reviewing efficiency in a government-made market indispensable

Because of heavy government involvement, the medical care field has the characteristics of a government-made market in which price and supply are not determined by market mechanisms. In any government-made market, not just medical care, it is vital to constantly check whether resources are being allocated efficiently. As the tax burden grows due to the extreme aging of society, rationalizing the supply side should be a prerequisite before increasing this burden. For example, in Japan the per-capita doctor visit rate is 1.8-1.9 times higher than in France or Germany, and 4.9 times higher than in Sweden. Furthermore, the number of hospital beds per person is extremely high in Japan, and the average length of a stay for acute care is also very long. The per-capita number of expensive medical equipment like MRI machines and CT scanners is also enormous. It has also been observed that medical remuneration has not come down in comparison to prices and wages; that private practice physicians are paid 1.8-2.0 times more than hospital physicians; and that the higher the per-capita number of beds in a region,

the higher the per-capita hospitalization costs for the elderly. As in other industries, there is room to improve the efficiency of medical care in Japan.

4.1.4 Long-term care insurance

No. of those receiving nursing care continues to grow

The number of annual actual beneficiaries of long-term care insurance grew from 2.87 million in FY01 to 4.69 million in FY09 (Chart 4.4). As of the middle of FY09 28.9% of men and 46.0% of women in their late 80s were beneficiaries. In 20 years the number of those who are at least 80 years old will more than double in size.

Introduction of long-term care insurance a turning point

Nursing care is a pressing concern for those in need of care and their families. People are not only worried that they themselves will need nursing care, but they are also worried that their family members will need care. This is the reason why the introduction of long-term care insurance, which allows people to receive professional nursing care by paying 10% of the cost, was such a turning point. Before the introduction of long-term care insurance, nursing care for the elderly was managed by local municipalities and the supply of services was tightly constrained, to the extent that in many cases it was dubbed “nursing care hell.”

Waiting lists for nursing care

Even today, there are constraints on the supply of special nursing care homes for the aged and other geriatric healthcare facilities, so elderly people are being wait-listed. According to the Ministry of Health, Labor and Welfare, 421,000 seniors were waiting to be admitted to special nursing care homes (as of Dec 2009). The waiting list number does not include those who had given up on being admitted and did not file application. Thus, there is presumably fairly large potential demand. Regulations on the opening of necessary facilities have hindered the development of the nursing care industry and amplified public concerns about nursing care.

Seniors paying for long-term care insurance but heavily dependent on intergenerational support

As is the case with pensions and medical care, long-term care insurance is also a pay-as-you-go system that is vulnerable in a hyper-aged society. Category 1 insured persons (over 65) pay their insurance premiums, but the burden on Category 2 insured persons (aged 40-64) is already heavy and expected to get heavier. A large portion of long-term care insurance is financed by public funds—this portion is shouldered by those who are working as long as the tax system depends mainly on the working-age population.

Reform on both sides of the equation necessary

The National Council on Social Security estimates that medical care costs as a percentage of national income will grow 1.3-1.4 times from 2007 to 2025, and nursing care costs 1.8-2.3 times. If insurance premiums are held at the current level (Y4,000/month on average), it will be necessary to increase the portion of benefits to be paid individually, limit the scope of insurance benefits, or adopt more stringent standards for authorizing nursing care (becoming more selective and concentrating on those with severe disabilities). Furthermore, if benefits are held at the current level (Y140,000/month per person on average) while beneficiaries are increasing, it will become necessary to increase premiums, expand the pool of insured persons to those in their 20s and 30s, or increase public expenditure by increasing the consumption tax.

Severe labor shortage problem

The nursing care field is also suffering a labor shortage. According to “2009 Basic Survey on Wage Structure” (Ministry of Health, Labor and Welfare), annual pay for a care manager is Y3.75 million, Y3.04 million for a welfare-facility nursing care worker, and Y2.70 million for a home health care worker, evidencing that pay is inadequate. And, nursing care pay is adjusted only once every three years. It is necessary to somehow address this area, which is largely not controlled by market mechanisms.

Productivity of nursing care services has to be improved

Expanding demand for in-home services could further exacerbate the labor shortage. The number of those receiving nursing home-based care grew 60% from 2000 to 2009, while those that received in-home care rose 187%. On the demand side, there is a strong need for in-home services. Policy measures are moving in the direction of realizing a wide variety of choices for in-home services, while also expanding nursing home-based services. While it is best if the elderly can receive individualized services in their own homes, such services tend to be bound to higher costs. In provincial cities where the elderly are sparsely distributed across a wide area, there are limits to in-home services because of the required travel time for care workers. The prescription for efficiently providing a variety of nursing care services at reasonable prices will be to achieve more compact cities through such means as building assisted-living facilities in city centers. It is claimed that it is hard to increase productivity of the labor-intensive nursing care industry, but much depends on the scheme used.

4.2 What to do for low-income individuals when consumption tax is increased

4.2.1 How to look at the regressivity of consumption tax

Regressive nature of consumption tax

One argument that has been raised against raising the consumption tax is the regressive nature of this tax. Chart 4.5 shows the estimated consumption tax and income tax (earnings-based income tax and individual inhabitant tax) burden for each income bracket in 201031. Chart 4.6 shows the tax burden ratio (the amount of tax paid divided by annual income) for each bracket. While the consumption tax is a fixed-rate proportional tax, income tax is a progressive levy. The consumption tax is considered regressive because the burden is heavier for lower income brackets and smaller for higher income brackets.

Consumption tax not regressive

But, as discussed by the Council for Intensive Discussion on Social Security Reform, this tax is only regressive when viewing income at a single point in time. A convincing argument can be made that lifetime income is what finances consumption, so if we ignore inheritances, taxes should be the same whether it is income or consumption that is taxed (meaning, at the very least, that consumption tax is not regressive). Indeed, many of those in lower income brackets (where the burden of the consumption tax relative to income is high) are those who are living on pensions. However, it is natural that retired generations have small income flow, and it is highly likely that those bearing a heavier burden are simply in this stage of life (that is to say, to a large extent the differing burdens can be explained by age). If there is substantial lifetime income (income earned during one's working years), and if one puts away a large amount of savings, the consumption tax burden will not be high during the working years. It should not be an issue if a person subsequently draws down savings after retirement for consumption, resulting in a high consumption tax burden. Just because there is a high level of consumption and low income does not necessarily mean that a person has little capacity to pay taxes.

31. The tax burden was estimated based on an all-household basis, which includes not only working households (wage earners), but also non-wage households such as self-employed households and pensioners, as well as single-person households. We divided annual income into quintiles because of the high error rate for fairly fragmented data. The Family Income and Expenditure Survey (Ministry of Internal Affairs and Communications) looks at income taxes and inhabitant taxes only for working households, so we interpolated the annual income and tax amounts for each quintile based on working households, and applied the all household-basis average annual income for each quintile. To take into account tax-free items in the calculation of the consumption tax burden, we deducted from consumer spending the following items: half of private rents, public rents, company-provided housing rents, ground rents, and other residential rents; half of medical treatment charges, dental treatment charges, maternity hospitalization charges, other hospitalization charges, tuition, textbooks, and religious contributions; half of funeral costs; and non-savings insurance premiums, donations, childcare costs, nursing care services, gifts, social costs, housing-related costs, other contributions, and care packages. Then, we added in asset purchases, which approximate to housing purchases, and then multiplied this amount by 5/105. (The expense categories that were multiplied by half are those that include both taxed and untaxed spending.)

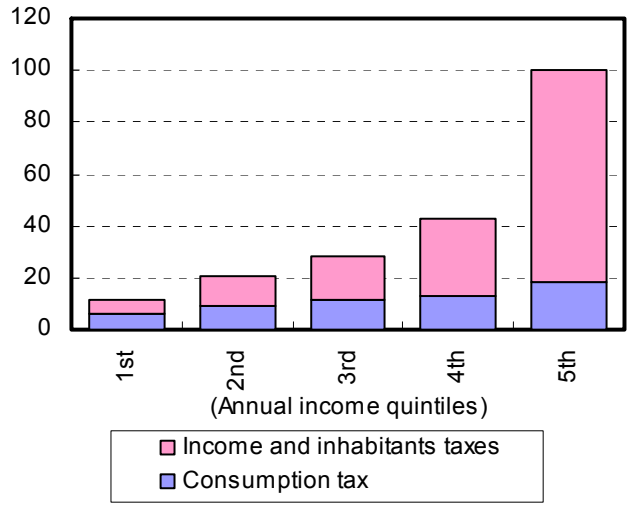
Politically necessary to do something for low-income individuals

However, the low income group (viewed at a single point in time) also includes those who are truly poor (and do not consume much). It is true that raising the consumption tax would put a heavier burden on those who are truly impoverished. When raising the consumption tax rate, it will be politically and economically necessary to make some sort of provision for those in low income brackets.

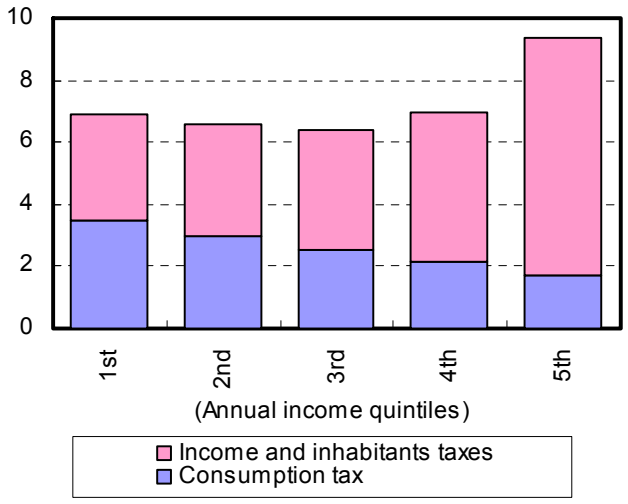
Propensity to consume for discretionary spending constant regardless of income level

The consumption tax burden is heavier for low-income individuals because their savings rate is low and they use a bigger share of their income for buying daily necessities. Differences in the propensity to consume by income bracket are mainly attributable to "non-discretionary expenses" (necessities with an expenditure elasticity of less than 1), while the propensity to consume for "discretionary expenses" (luxuries with an expenditure elasticity of 1 or higher) is virtually constant, regardless of income level. In other words, the large proportion of spending on daily necessities relative to income is what causes the consumption tax to be regressive. Differences in the consumption tax burden by income bracket do not arise from luxury items and this leads to the notion that daily necessities should be exempt from taxes, or taxed at a lower rate, as a way of addressing the regressivity of the tax.

2010 Tax Burden per Household (Y 0000/year) **Chart 4.5**



2010 Tax Burden Ratio per Household (% of annual income) **Chart 4.6**



Source: Ministry of Internal Affairs and Communications; compiled by DIR.
Note: All households.

4.2.2 Effect of reduced tax rate

Case of reduced tax rate to be applied for foods

Therefore, we looked at how the consumption tax burden would change if the consumption tax rate is raised to 10% across the board, and also the case where the tax rate is raised to 10% but that on foods (excl. eating out and alcoholic beverages) and home purchases is kept at 5%. The results are shown in Chart 4.7.

Structural weakness in income tax progressivity emerges when consumption tax rate raised

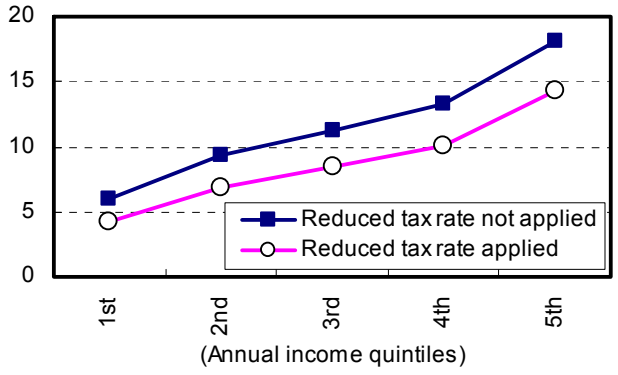
If the consumption tax rate is raised to 10% and other conditions remain constant, the resulting increase in the consumption tax burden is Y59,000 for the first quintile, Y112,000 for the third quintile, and Y181,000 for the fifth quintile. Assuming that there is no change in the income tax burden, this results in a regressive tax structure, based on the combined burden of consumption and income taxes. (As shown in Chart 4.8, the burden on the first quintile would be 10.4%, while it would be 9.0% for the third quintile.)

Reduced tax rate to have limited effect

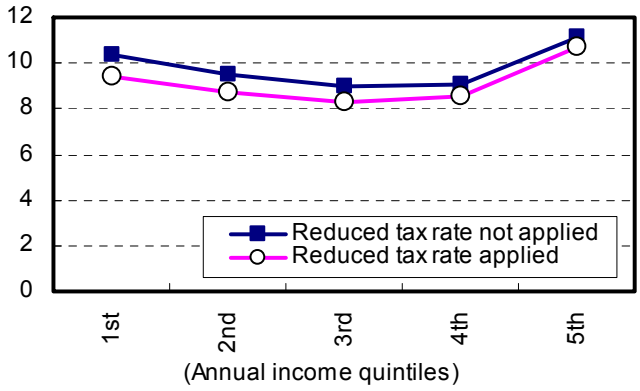
If a reduced tax rate is applied for certain necessities, the increase in the consumption tax burden is Y43,000 for the first quintile and Y84,000 for the third quintile—a less-than-expected capacity to hold down the tax burden. Although the

regressive tax structure is alleviated to some extent by introducing a reduced tax rate on certain necessities, it is not completely resolved. Even if the tax rate on everyday foods is not increased, the effect is extremely limited.

Increases in Consumption Tax Payments per Household When Tax Rises to 10%
(Y 0000/year) **Chart 4.7**



Tax Burden Ratio per Household When Consumption Tax Rises to 10%
(% of annual income) **Chart 4.8**



Source: Ministry of Internal Affairs and Communications; compiled by DIR.
Note: Reduced tax rate (5%) applied to foods (excl. eating out and alcoholic beverages) and residential house acquisition. 2010 all households.

Limited range of reduced tax rate a problem

The first reason why a reduced tax rate would not function as expected is because the range of items for abatement is limited to certain daily necessities. For the first quintile the percentage of taxable spending that is eligible for the reduced tax rate is just 28.5%, and for the second quintile 26.5%. Propensity to consume for non-discretionary expenditures is fairly high in low-income brackets, so if regressivity is to be alleviated through a reduced tax rate, this reduced tax rate will have to be either applied to more items or the rate itself will have to be lower. However, if the abatement is applied too widely, functioning of the consumption tax will be impaired.

High-income individuals also benefit from abatement

The second reason that abatement would not function as envisioned is that its benefits would also reach high income individuals. For the fifth quintile the percentage of taxable spending that is eligible for the reduced tax rate is 21.2%, and in yen terms the amount is 2.3X higher than that for the first quintile. In other words, the reduced tax rate would also have the effect of lowering taxes for upper income groups.

Adoption of reduced tax rate unlikely

Many proponents are reticent about adopting a reduced tax rate because it would mitigate regressivity very little in exchange for the sacrificed tax revenue. Furthermore, the political cost of determining what items should be subject to the abatement (what are daily necessities?) could become enormous, and the disadvantage of making the tax system more complicated cannot be ignored. Moreover, a number of issues would have to be considered, including the need for an effective invoice method in order to accurately calculate the credit for taxes on purchases under multiple tax rates, the increased administrative burden on businesses, and how to handle parties that are exempt from taxes.

Help for truly low-income individuals should be designed into tax policy and social security system

The mainstream argument is that differences in the tax burden by income bracket cannot be viewed only from the perspective of the consumption tax. If we accept that the consumption tax is regressive, this can be addressed through policies on income tax and other taxes. A persuasive solution would be to create a taxpayer identification number system and use it to implement a refundable tax credit.

Social insurance premiums regressive

Instead of income tax, which low income groups do not bear much, adjusting social insurance premiums is something that merits consideration. A portion of the social insurance premium is on a fixed amount basis and the other on a fixed rate basis (this is based on the concept that the insured receive the same benefits regardless of income). Thus, social insurance also puts a fairly heavy burden on low income groups. As a result, the burden of social insurance premiums can be seen as fairly regressive. Social insurance premiums are paid mainly by the working-age population, and the retired population, which appears to have little income, pays hardly any. Therefore, adjusting this system could be a means of helping the truly poor.

4.3 Simulation using a macro model

4.3.1 Macroeconomy and consumption tax hike

Relationship between consumption tax hike and macroeconomy

Besides the issue of the regressive nature of the consumption tax, the Council for Intensive Discussion on Social Security Reform is also delving deeper into its relationship to the economic climate. The experience of other countries underscores the fact that increasing taxes does not bring about a recession, and that when it comes to the timing of a tax hike, it is more important to focus on economic change rather than level of the economy. One argument says that a tax hike should be implemented immediately before a surge in economic momentum (because of worries that if a tax hike is carried out after a surge, it will weaken momentum). However, in reality it is hard to determine the stage of the current economy and the effect on the economy also depends on the size of the tax increase. Moreover, once taxes are actually raised, there is no way to compare what happens to what would have happened in the absence of a tax hike.

Simulation based on DIR medium-term macro model

Here, we consider the results of a consumption tax rate hike simulation undertaken using DIR's rebuilt medium-term macro model. In this simulation, we looked at three cases: (a) consumption tax rate hike to 8% in FY14 and to 10% in FY15; (b) consumption tax rate hike in one jump to 10% in FY15; and (c) no increase in the consumption tax rate at all.

Economy to worsen if tax is increased

If the consumption tax rate is increased, demand would shrink and economic growth fall in the short term. A consumption tax hike would reduce real household income, and drag down the economy by curbing consumption.

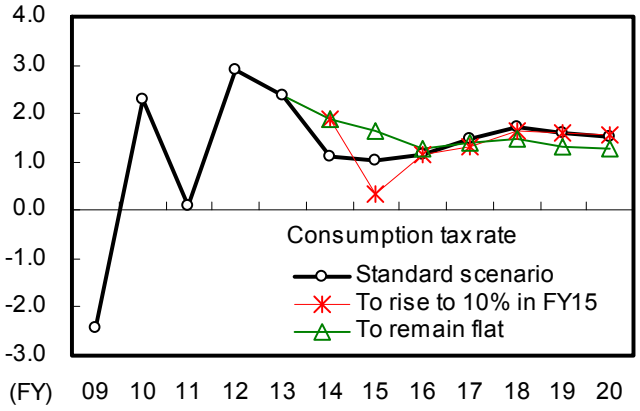
In the medium to long term, positive effect of increasing sustainability of social security expected

However, the model suggests that raising the tax in the mid-2010s could have a positive effect over the medium to long term. As shown in Chart 4.9, economic growth rates are higher in the latter half of our forecast period under cases (a) and (b) than case (c). This model does not take into account the boost in confidence arising from improved sustainability of the social security system thanks to an increased tax burden. If this is also taken into consideration, a fair and necessary tax increase should be implemented. At the very least, this shows that the Japanese economy can handle a tax increase of this degree.

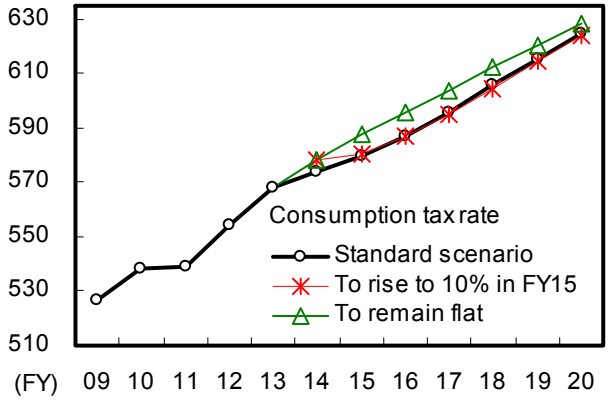
Debt-to-GDP ratio to rise even higher if no tax increase implemented

If there is no tax increase (case c) the primary balance deficit will remain at around 3% of GDP for a long time, and the debt-to-GDP ratio will keep climbing (charts 4.11 and 4.12). Completely avoiding a tax increase would clearly make Japan's fiscal woes even more serious. In any case, as we have already discussed (1.3.5 Public finance and interest rates), at the current level of annual spending, if the consumption tax rate is increased to 10% it would still be impossible to reach a primary balance surplus by FY20 or stabilize or reduce the debt-to-GDP ratio to become fiscally sound.

Real GDP (y/y %) **Chart 4.9**

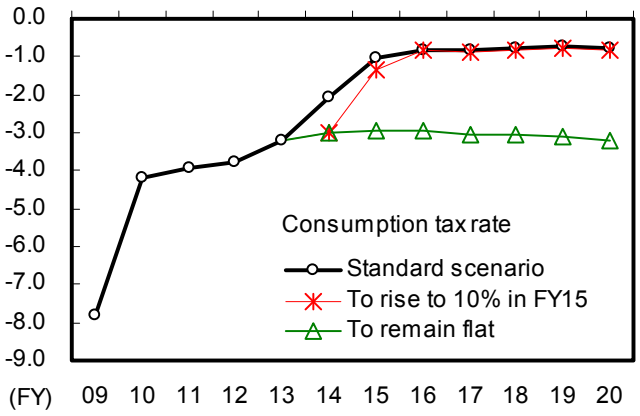


Real GDP (2000 prices; Y tril) **Chart 4.10**

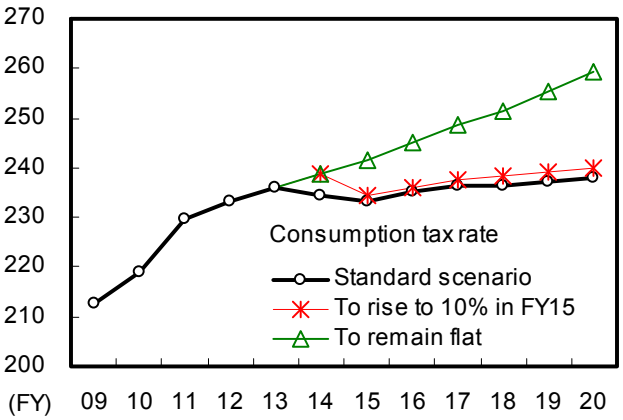


Source: Compiled by DIR based on DIR medium-term macroeconomic simulation model.
Note: Standard scenario: Consumption tax to rise to 8% in FY14 and to 10% in FY15.

Primary Fiscal Balance
(central and local governments; % of nominal GDP)
Chart 4.11



Government Debt
(central and local governments; % of nominal GDP)
Chart 4.12



Source: Compiled by DIR based on DIR medium-term macroeconomic simulation model.
Note: Standard scenario: Consumption tax to rise to 8% in FY14 and to 10% in FY15.

Pre-set conditions

No distinct difference was seen between case (a), in which the tax is raised in stages, and case (b), in which it is raised all at once. However, this is probably largely due to the characteristics of our medium-term model, where demand-side factors are moving in a short-term cycle on the long-term trend of supply-side factors. As we have discussed above, from a practical standpoint it is hard to know just when and by how much to increase taxes. From the perspective of striking a balance with the economic climate, we think it would be worthwhile to consider establishing some pre-set conditions under which a tax hike would be suspended. In other words, the tax will be changed according to plan unless the conditions are violated.

4.3.2 Price-indexed public pensions

Price-indexed pensions in principle

Because public pensions represent the living costs of retired generations, they are basically designed so that the nominal benefit amount is increased if prices rise (thereby maintaining the effective benefit level). In contrast, macroeconomic-indexing is a system under which effective benefits are reduced if the working-age population shrinks or if average life expectancy rises. (Macroeconomic-indexing was never implemented as the economy has been under deflationary pressure.)

In reality, effective benefits have risen

But in reality, despite deflation, rather than lowering nominal benefits as stated in the law, the government has adopted a policy of increasing effective benefits. Pension benefits are now 2.5% higher than the level originally intended. Therefore, pension benefits have to be reduced immediately by this amount.

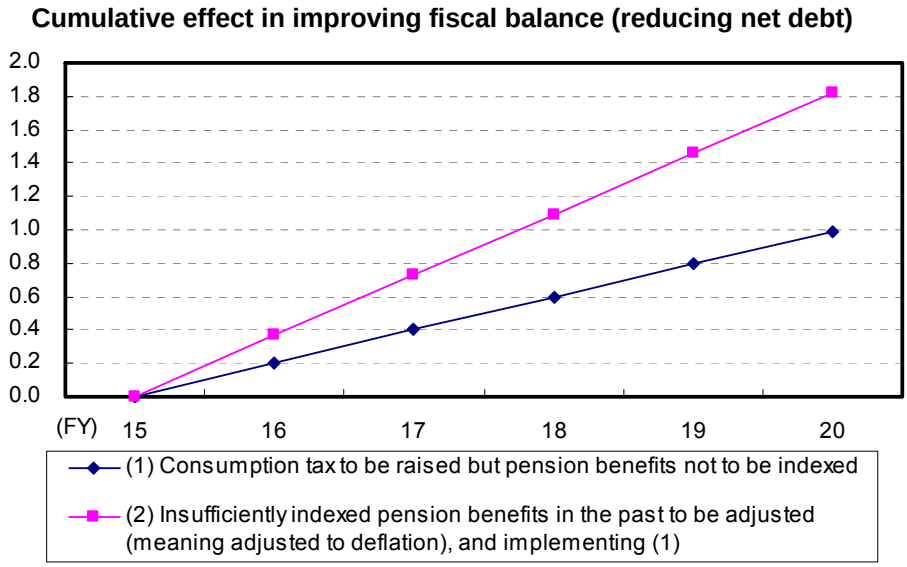
Adjusting pension benefits for inflation caused by consumption tax hike pointless

Then, when prices rise following a consumption tax rate hike, pensions should not be adjusted for this inflation because the objective of a consumption tax hike is to make the nation as a whole support the social security system. If nominal social security expenditures are increased by a corresponding amount, social security beneficiaries would end up not bearing the cost of social security, making the tax increase pointless. When raising the consumption tax in order to keep the public pension system going, the goals of this increase will not be accomplished unless it is decided that the pension price-indexing provision will not be invoked to cover the inflation caused by the consumption tax. Under the Council for Intensive Discussion on Social Security Reform's blueprint for social security reform, the consumption tax rate is also raised to cover "growth in social security expenditures accompanying the consumption tax increase," and this means that the consumption tax rate increase would only grow bigger in the future.

Effects on fiscal balance of optimally indexed-pensions

Chart 4.13 shows the estimated budgetary impact if benefits are optimally adjusted for prices. An optimal adjustment for prices is not essentially a benefit cutback, and it is necessary to adjust the overshooting portion of benefits when the tax burden increases. If benefits do not increase when prices rise after a consumption tax rate hike is implemented, it would reduce the real benefit. However, when intergenerational inequity remains, beneficiaries also have to bear the burden to some extent to maintain steady benefit payments over the long term (in other words, to avoid a plunge in benefits).

Cumulative Effect of Optimally Indexed Pensions on General Government Fiscal Balance (% of nominal GDP) **Chart 4.13**



Source: Compiled by DIR based on DIR medium-term macroeconomic simulation model.
Assumption: 5% pt rise in consumption tax in FY15.

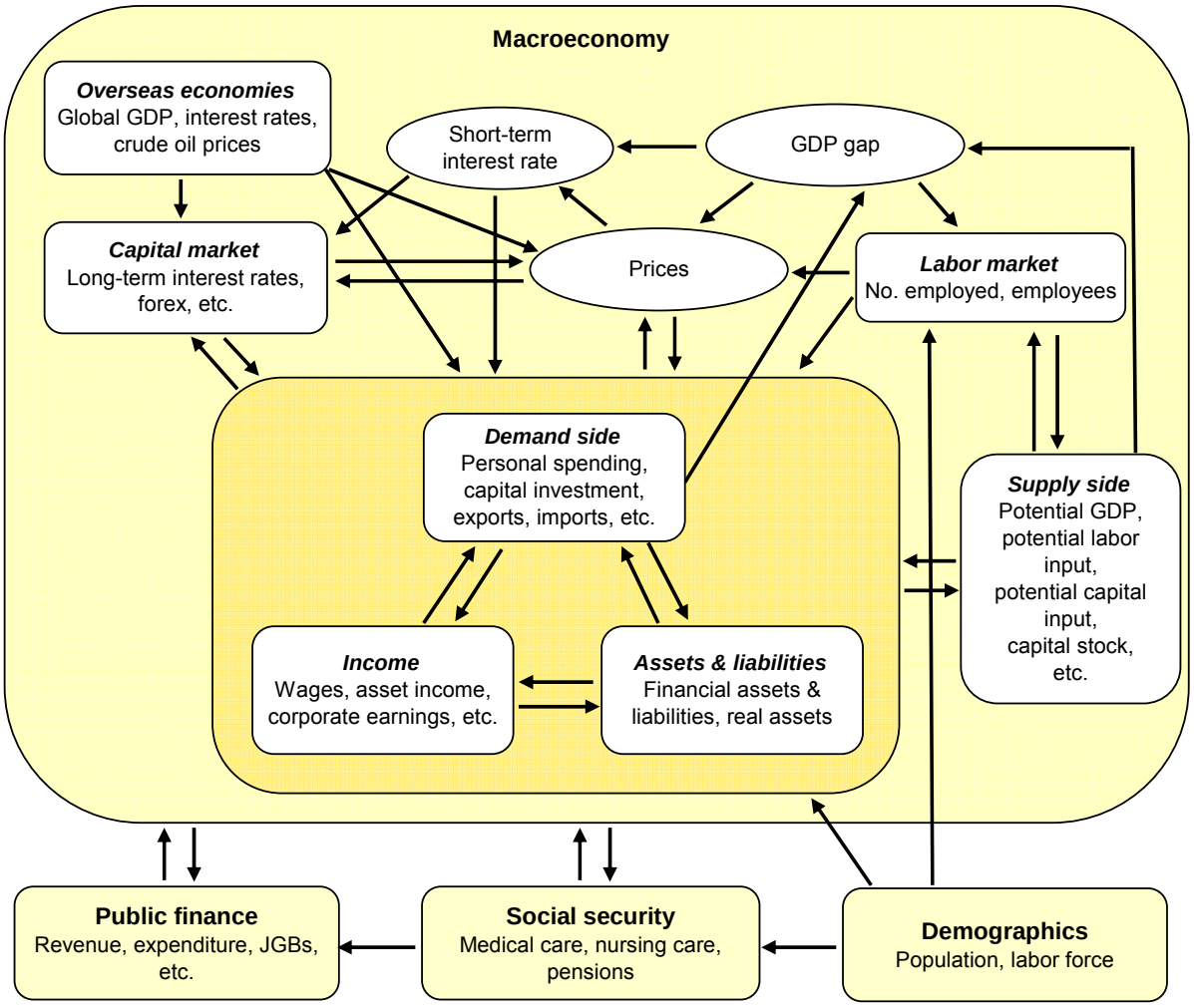
5. Overview of Model and Simulation Results

In this section, we provide an overview of DIR's medium-term macro model and discuss the effects on Japan's economy under four different scenarios, including a consumption tax hike. For this report we have rebuilt the model to make it easier to simulate the effects of future policies, while at the same time drawing a picture of the Japanese economy in recent years.

Structure of DIR medium-term macro model

The DIR medium-term macro model comprises roughly 400 equations (of which about 70 are estimating equations) and about 550 variables (of which about 150 are exogenous variables). An overview of the model is shown in Chart 5.1. If real GDP changes, the GDP gap (rate of deviation between potential GDP and actual GDP) changes, which affects prices and short-term interest rates, effects of which will, in turn, spread to other areas, such as financial markets. Such a change in each variable occurs simultaneously and the expected value of each variable is generated by running the model. We treated foreign economic and demographic data as exogenous variables—for instance, the future values of global GDP reflect IMF and DIR forecasts. Mainly for demand components, the estimating equations incorporate not only variables that explain short-term changes (impact of employee compensation on consumer spending) but also terms that adjust deviation from long-term equilibrium based on economic theory.

Conceptual Image of Daiwa Medium-term Macro Model **Chart 5.1**



Source: Compiled by DIR.

Four scenarios

Using the DIR medium-term macro model, we carried out simulations to determine the effect on the real economy under four scenarios: (1) a 1%-pt hike in the consumption tax; (2) a $10/bbl rise in the price of crude oil (WTI); (3) a 1%-pt drop in global economic growth; and (4) a 1%-pt rise in the long-term interest rate. The results are shown in Chart 5.2. There are some points to consider when interpreting simulation results.

Points to consider when interpreting simulation results

First, we assumed that the effects under each scenario would persist throughout the estimation period. For example, in the case of a 1%-pt hike in the consumption tax, the tax rate will not return to the original rate the following year. Instead, the rate hike will remain in effect in the future. The exception to this is a 1%-pt rise in the long-term interest rate—the margin of rise is for only one year (change in the rate from the second year is determined endogenously as an outcome of the model). Figures in Chart 5.2 show the degree of impact on each component and represent deviation from the standard scenario (what would have occurred in the absence of the event simulated in each scenario). For example, the chart shows that if the consumption tax is raised 1% point, the effect on real GDP is –0.27% in the first year and –0.28% in the second year. This means that real GDP will be 0.27% lower in the year when the consumption tax rate is raised than it would otherwise have been, and that it will be another 0.01%-point lower (–0.28% minus –0.27% lower) in the second year.

Next, it is assumed that the short-term interest rate is in positive territory when any of the four scenarios arises. The short-term interest rate is currently zero, and if the economy is adversely impacted under such circumstances, the adverse effect would be exacerbated to the degree that the short-term interest does not decline. Because these simulations are performed based on the assumption that there is room for the short-term interest rate to decline, when there is a negative impact on the economy the short-term interest rate will simultaneously decline, leading to a decline in the long-term interest rate, and this will have the effect of buoying the economy through a weaker yen and increased investment.

Lastly, simply multiplying assumptions by a constant to change the alternative conditions did not yield substantially different results. For example, if the simulation is performed for a 5%-pt rise rather than a 1%-pt hike in the consumption tax, the resulting real GDP deviation was –1.02%. This is close to 5X the deviation shown for the fifth year in the first scenario presented in Chart 5.2. Accordingly, by simply multiplying the simulation results by a constant that corresponds to the desired condition, it is possible, to some degree, to grasp the effect on the real economy.

Simulation Results — Chart 5.2

(1) 1%-pt hike in consumption tax rate

	Real GDP								Nominal GDP	GDP deflator	Potential GDP	GDP gap
		Private final consumption	Private housing investment	Private capital investment	Government final consumption	Public fixed capital formation	Exports	Imports				
	(Deviation from standard scenario; %)											
1st year	-0.27	-0.49	0.00	0.00	-0.61	0.43	0.00	-0.72	0.49	0.76	-0.10	-0.16
2nd year	-0.28	-0.41	-0.41	0.24	-0.66	0.46	0.09	-0.48	0.46	0.75	-0.11	-0.18
3rd year	-0.30	-0.48	-0.57	0.18	-0.49	0.49	0.18	-0.39	0.42	0.72	-0.11	-0.19
4th year	-0.27	-0.49	-0.75	0.29	-0.50	0.45	0.22	-0.30	0.41	0.69	-0.10	-0.17
5th year	-0.21	-0.46	-0.75	0.47	-0.50	0.37	0.22	-0.21	0.45	0.66	-0.07	-0.14

	Unemployment rate	Y/$	CPI	Short-term interest rate	Long-term interest rate	Current balance	Fiscal balance	Primary balance
							(Central & local governments)	
						(% of nominal GDP)		
	(Deviation from standard scenario; %)			(Deviation from standard scenario; % pt)				
1st year	0.03	0.32	0.78	-0.15	-0.07	0.19	0.33	0.33
2nd year	0.04	0.60	0.74	-0.19	-0.08	0.19	0.45	0.43
3rd year	0.05	0.71	0.74	-0.16	-0.07	0.22	0.46	0.43
4th year	0.06	0.65	0.71	-0.10	-0.04	0.23	0.49	0.45
5th year	0.06	0.59	0.69	-0.10	-0.04	0.24	0.52	0.47

(2) $10/bbl rise in crude oil prices (WTI)

	Real GDP								Nominal GDP	GDP deflator	Potential GDP	GDP gap
		Private final consumption	Private housing investment	Private capital investment	Government final consumption	Public fixed capital formation	Exports	Imports				
	(Deviation from standard scenario; %)											
1st year	-0.02	0.01	0.00	0.00	-0.10	0.04	0.00	0.05	-0.20	-0.18	-0.01	-0.01
2nd year	-0.06	-0.08	0.11	-0.22	0.00	0.09	0.01	-0.16	-0.26	-0.20	-0.02	-0.03
3rd year	-0.07	-0.11	-0.10	-0.26	-0.04	0.11	0.02	-0.27	-0.31	-0.23	-0.03	-0.04
4th year	-0.08	-0.13	-0.21	-0.32	-0.03	0.12	0.06	-0.35	-0.35	-0.27	-0.04	-0.04
5th year	-0.09	-0.15	-0.23	-0.34	-0.06	0.11	0.10	-0.41	-0.39	-0.30	-0.04	-0.04

	Unemployment rate	Y/$	CPI	Short-term interest rate	Long-term interest rate	Current balance	Fiscal balance	Primary balance
							(Central & local governments)	
						(% of nominal GDP)		
	(Deviation from standard scenario; %)			(Deviation from standard scenario; % pt)				
1st year	0.00	0.03	0.00	-0.01	-0.01	-0.22	-0.06	-0.06
2nd year	0.01	0.08	-0.01	-0.03	-0.02	-0.19	-0.09	-0.08
3rd year	0.01	0.19	-0.05	-0.07	-0.03	-0.16	-0.08	-0.08
4th year	0.01	0.30	-0.09	-0.09	-0.05	-0.14	-0.08	-0.08
5th year	0.01	0.35	-0.13	-0.09	-0.04	-0.12	-0.07	-0.06

Source: Compiled by DIR based on DIR medium-term macroeconomic model.

(3) 1%-pt drop in global economic growth

	Real GDP								Nominal GDP	GDP deflator	Potential GDP	GDP gap
		Private final consumption	Private housing investment	Private capital investment	Government final consumption	Public fixed capital formation	Exports	Imports				
	(Deviation from standard scenario; %)											
1st year	-0.57	-0.12	0.00	-1.89	0.05	0.92	-3.75	-2.25	-0.68	-0.11	-0.22	-0.35
2nd year	-0.78	-0.14	-0.15	-2.32	-0.03	1.18	-4.84	-3.40	-1.03	-0.26	-0.33	-0.46
3rd year	-0.85	-0.22	-0.18	-2.30	-0.05	1.22	-5.38	-4.01	-1.26	-0.41	-0.38	-0.47
4th year	-0.84	-0.28	-0.25	-2.14	-0.13	1.12	-5.87	-4.49	-1.38	-0.55	-0.41	-0.43
5th year	-0.78	-0.29	-0.25	-1.90	-0.19	0.96	-6.46	-4.99	-1.42	-0.65	-0.41	-0.37

	Unemployment rate	Y/$	CPI	Short-term interest rate	Long-term interest rate	Current balance	Fiscal balance	Primary balance
							(Central & local governments)	
						(% of nominal GDP)		
	(Deviation from standard scenario; %)			(Deviation from standard scenario; % pt)				
1st year	0.07	0.69	-0.10	-0.32	-0.16	-0.22	-0.15	-0.14
2nd year	0.11	1.57	-0.27	-0.54	-0.26	-0.18	-0.18	-0.17
3rd year	0.13	2.22	-0.42	-0.60	-0.29	-0.13	-0.14	-0.13
4th year	0.14	2.38	-0.57	-0.51	-0.25	-0.09	-0.06	-0.07
5th year	0.14	2.25	-0.71	-0.42	-0.20	-0.06	0.02	-0.01

(4) 1%-pt rise in long-term interest rates

	Real GDP								Nominal GDP	GDP deflator	Potential GDP	GDP gap
		Private final consumption	Private housing investment	Private capital investment	Government final consumption	Public fixed capital formation	Exports	Imports				
	(Deviation from standard scenario; %)											
1st year	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
2nd year	-0.27	-0.34	-1.61	-1.97	0.43	0.42	0.02	-0.92	-0.31	-0.04	-0.10	-0.16
3rd year	-0.61	-0.62	-2.82	-3.71	0.34	0.90	0.13	-1.78	-0.76	-0.15	-0.27	-0.35
4th year	-0.87	-0.92	-3.38	-4.28	0.23	1.16	0.34	-2.14	-1.18	-0.31	-0.43	-0.45
5th year	-1.04	-1.22	-3.65	-4.55	0.07	1.27	0.60	-2.34	-1.54	-0.50	-0.56	-0.49

	Unemployment rate	Y/$	CPI	Short-term interest rate	Long-term interest rate	Current balance	Fiscal balance	Primary balance
							(Central & local governments)	
						(% of nominal GDP)		
	(Deviation from standard scenario; %)			(Deviation from standard scenario; % pt)				
1st year	0.00	0.10	0.00	0.00	1.00	0.00	-0.19	-0.19
2nd year	0.03	0.48	-0.05	-0.15	0.92	0.17	-0.59	-0.54
3rd year	0.08	1.21	-0.16	-0.38	0.80	0.37	-0.84	-0.72
4th year	0.11	2.03	-0.31	-0.56	0.72	0.53	-0.99	-0.76
5th year	0.14	2.67	-0.48	-0.63	0.68	0.68	-1.08	-0.74

Source: Compiled by DIR based on DIR medium-term macroeconomic model.

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Attention
This cover letter is an unofficial translation. The official document is in Japanese.

Inspected

Notification Items Regarding Advertising etc.

(Notification items pursuant to Article 37 of the Financial Instruments and Exchange Law)

If you decide to enter into a business arrangement with our company based on the information described in materials presented along with this cover letter, we ask you to pay close attention to the following items.

- In addition to the purchase price of a financial instrument, our company will collect a trading commission* for each transaction as agreed beforehand with you. Since commissions may be included in the purchase price or may not be charged for certain transactions, we recommend that you confirm the commission for each transaction.
  In some cases, our company also may charge a maximum of ¥ 2 million (including tax) per year as a standing proxy fee for our deposit of your securities, if you are a non-resident.
- For derivative and margin transactions etc., our company may require collateral or margin requirements in accordance with an agreement made beforehand with you. Ordinarily in such cases, the amount of the transaction will be in excess of the required collateral or margin requirements.
- There is a risk that you will incur losses on your transactions due to changes in the market price of financial instruments based on fluctuations in interest rates, exchange rates, stock prices, real estate prices, commodity prices, and others. In addition, depending on the content of the transaction, the loss could exceed the amount of the collateral or margin requirements.
- There may be a difference between bid price etc. and ask price etc. of OTC derivatives handled by our company.
- Before engaging in any trading, please thoroughly confirm accounting and tax treatments regarding your trading in financial instruments with such experts as certified public accountants.

* The amount of the trading commission cannot be stated here in advance because it will be determined between our company and you based on current market conditions and the content of each transaction etc.

When making an actual transaction, please be sure to carefully read the materials presented to you prior to the execution of agreement, and to take responsibility for your own decisions regarding the signing of the agreement with our company.

Corporate Name: Daiwa Securities Capital Markets Co. Ltd.
Financial instruments firm: chief of Kanto Local Finance Bureau (Kin-sho) No.109
Memberships: Japan Securities Dealers Association
Financial Futures Association of Japan
Japan Securities Investment Advisers Association
Type Ⅱ Financial Instruments Firms Association