

Japan: Selected Issues

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JAPAN

Selected Issues

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Approved by the Asia and Pacific Department

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I. JAPAN'S POTENTIAL OUTPUT AND PRODUCTIVITY GROWTH¹

A. Introduction

1. **Japan's economic re-awakening over the past four years raises the question of whether the country's potential output growth rate may now be higher.** Structural adjustments to the imbalances of the so-called “Bubble” years have strengthened fundamentals. At the same time, an aging population complicates the challenge of ensuring strong self-sustaining growth. With Japan's birth rate well below the population's replacement rate, the working-age population in fact has been contracting since 2000, and the elderly dependency ratio (the share in the working age population of people at least 65 years old) is now the highest among industrial countries. With a declining labor force, per capita income growth will depend critically on higher productivity.²
2. **This chapter tries to shed light on the determinants of Japan's current long-term growth and estimate—and speculate about—future potential growth.** More specifically, it seeks to assess the current level of potential output growth, the determinants of productivity growth, and the likely impact on productivity growth and potential output of reforms undertaken in recent years.
3. **The empirical results indicate that potential output growth in Japan is likely to have picked up in recent years and is likely to be in the range of 1¼ to 2 percent in the years immediately ahead.** Higher total factor productivity (TFP) growth has helped offset a declining contribution of capital inputs and a negative contribution of labor inputs. The results also suggest that product market competition, openness, and research and development (R&D) investment are key determinants of productivity growth. At the same time, structural unemployment, which remains historically high at around 4 percent, is directly related to the generosity of the unemployment insurance system (the level of out-of-work benefits relative to in-work wages and salaries) and the aging of the labor force.
4. **The potential gains from reforms are significant.** The findings suggest that going forward, the removal of lingering labor and product market distortions—cutting excessive domestic regulation, strengthening the anti-trust framework, and further liberalizing trade (specifically, agricultural)—together with increased returns on R&D investment, could raise total factor productivity and hence potential output growth. Further efforts to liberalize the labor market to reduce structural unemployment (e.g. reducing the negative effects of unemployment benefits on work incentives) could also provide a significant boost to output.

¹ Prepared by Papa N'Diaye.

² A recent government-sponsored report “Japan's 21st Century Vision” sets out the importance of raising productivity and reaping the benefits of globalization to avoid deteriorating living standards.

B. What is Potential Output Growth?

5. **There is a plethora of studies on Japan's potential output growth.** Depending on the methodology used, results differ markedly both with respect to the estimated potential growth rate and the contributions of key structural factors.³ Estimates of potential output growth recently prepared by official agencies range between 1½ to 2 percent. This diversity in estimates stems mainly from the fact that potential output is an unobserved variable and can only be inferred indirectly.⁴

6. **The methodology used here combines filtering techniques to estimate trends along with estimation of a structural model encompassing accounting and structural relationships from economic theory.** Potential output is considered as the level of output that would emerge from the production function, given the current levels of fixed inputs and levels of variable inputs consistent with stable inflation (Annex I).

7. **Regression analysis produces parameter estimates that are significant with signs consistent with economic theory** (Table I.1). The estimated system consists of four basic structural equations (see Annex II)— an aggregate production function, a Phillips curve, an equation to estimate the non-accelerating inflation rate of unemployment (NAIRU), and an Okun's law relating the unemployment gap to the output gap—and several identities.⁵ In particular:

- In the *aggregate production function*, total factor productivity depends on research and development intensity (as measured by R&D spending in relation to GDP), markups (as measured by the ratio of operating profits to sales net of cost of sales), and import penetration (as measured by the ratio of imports to domestic demand). R&D intensity suggests a positive impact of innovation; markups indicate a positive effect of competition; import penetration attributes a positive effect to openness.⁶ These results are consistent with recent empirical evidence on the determinants of total factor productivity in Japan at the firm level (Okada, 2005).
- The *Phillips curve* equation relates inflation to the past values of the output gap, terms of trade shocks (changes in import prices and oil prices), and expected inflation. The estimated inflation dynamics are related positively, but weakly, to the output gap, corroborating evidence of a flat Phillips curve. The sacrifice ratio—the cumulative change in output required to change inflation permanently by one percentage point—is estimated at 8.7, around fivefold estimates for the United States. The direct pass-through of oil

³ See for example Hayashi and Prescott (2002) and Fukao, Inui, Kawai, and Miyagawa (2003).

⁴ See also Citrin (1991) and Bayoumi and Collyns (1999).

⁵ The system of equations (1)-(18) in Annex II has been estimated with the constrained maximum likelihood procedure applying the methodology described in Laxton and N'Diaye (2002) and Benes and N'Diaye (2004) over the period 1964:Q1-2005:Q4.

⁶ Innovation is often perceived as the main channel through which competition and openness affect on productivity growth.

prices to headline CPI inflation appears small at about 0.1 percent for every 10 percentage points' change in oil prices, in line with Japan's efficiency in oil consumption. The direct pass-through of import prices is five fold that of oil prices, but still small and consistent with the share of imported goods in the CPI.

- The *NAIRU* specification relates the structural unemployment rate to the share of the old in the labor force, the replacement ratio (defined as the ratio of unemployment benefits to wages and salaries), and the past unemployment rate. The generosity of the unemployment insurance system would naturally tend to increase search time between jobs and the reservation wage, and the aging of the labor force tends to worsen skills mismatches, increase rigidities through seniority based-pay scales and lower reallocation of workers.
- The *Okun's law* relationship links changes in the unemployment rate to those in the output gap. Cyclical fluctuations in the product market bring about adjustments in the labor market, although very slowly in comparison with other advanced economies (the estimate for Japan is 0.01; comparable estimates for other advanced economies range between 0.1–0.2).

Table I.1. Key Structural Equations

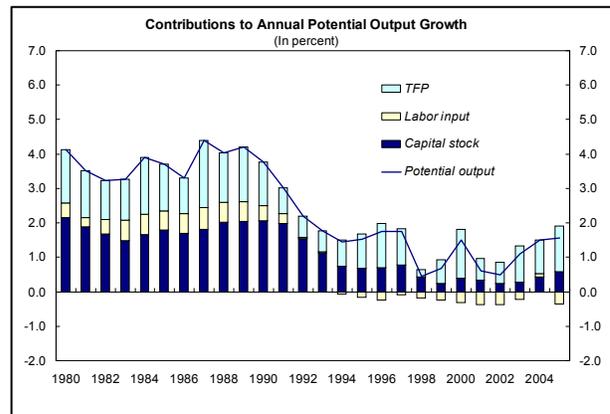
Explanatory Variables	TFP	Structural Unemployment	Phillips Curve	Okun's law	Resource Utilization
	TFP	NAIRU	CPI inflation	Unemployment Gap	Capacity Utilization
CPI inflation at (t-1)			0.18 (3.9) *		
CPI inflation at (t-2)			0.37 (3.6) *		
CPI inflation at (t-3)			0.17 (3.7) *		
CPI inflation at (t-4)			0.27 (n.a.)		
Change in Import Prices			0.05 (2.3) *		
Change in Oil Prices			0.01 (2.4) *		
Output Gap			0.07 (2.3) *	0.01 (2.3) *	0.04 (2.8) *
Output Gap at (t-1)					
Change in Output Gap			0.00 (n.a.)		
Unemployment Gap					
Unemployment Gap at (t-1)				0.81 (23.8) *	
TFP at (t-1)	1.00 (n.a.)				
Change in R&D Intensity at (t-4)	1.08 (2.0) *				
Change in Mark-up	-1.12 (-4.8) *				
Import penetration	0.02 (2.8) *				
NAIRU at (t-1)		1.00 (n.a.)			
Change in Replacement Ratio		0.03 (2.5) *			
Share of Old in Labor Force		0.10 (3.0) *			
Capacity Utilization at (t-1)					0.97 (76.1) *
Sacrifice ratio			8.7		

Notes: Staff estimates; figures in parenthesis are T-statistics; * denotes 5 percent significance level; ** denotes 10 percent significance level.

8. **Regarding the estimates of potential output and its components, the key results are as follows** (Figures I.1–I.3).

- Potential output growth is estimated to have increased steadily since 2001, reaching about 1.6 percent in 2005, from around 1 percent in 2001. Nonetheless, potential output growth remains well below estimated levels attained during the 1980s, where it was close to 4 percent.

- The pick-up in potential output is mainly attributable to a rise in total factor productivity growth—the outcome of an improved use of resources and increased competition. TFP growth is estimated to have accelerated to 1¼ percent in 2005, from less than ¼ percent in 1998. The positive contribution of total factor productivity to potential output growth has helped offset a declining contribution of capital inputs and a negative contribution of labor inputs.



- The contribution of the capital stock has been declining since the collapse of the investment bubble in the early 1990s. Growth in the capital stock now contributes just over ½ percentage point to potential output growth compared with more than 2 percentage points in the early 1990s. This decline reflects in part corporate sector restructuring which has involved delaying new investment and disposing of old or inefficient capital stock.
- Labor inputs continue to contribute negatively to potential output growth. The contribution of employment, which has been declining since 1990, has been negative since the mid-1990's, reflecting a shrinking working-age population since 1999, a plateau in trend labor force participation rate since 2000, and a secular rise in structural unemployment. The negative contribution of employment has been partly offset by a positive contribution of the number of hours worked, as a result of a recent pick up in full-time job growth.
- These results are somewhat sensitive to the measure of the capital stock (Figure I.4). The capital stock series used in the estimation above is from the Japan Industry Productivity database and differs from the official SNA series calculated by the Cabinet Office. It is based on a perpetual inventory method and corrects for the depreciation in the economic value of the capital stock.⁷ This depreciation can be relatively rapid in the IT-related

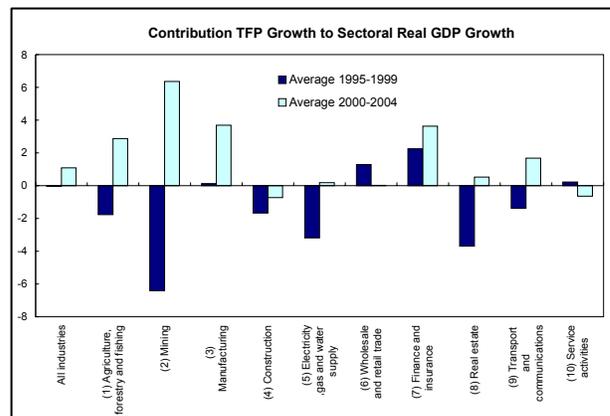
⁷ The data were provided by the Bank of Japan. The official capital stock series assumes that additional investment is fully productive for a fixed number of years and is then eliminated. See Hara and others (2006) for greater details.

sectors, which have grown in importance during the 1990s, and not accounting for it could lead to an overstatement of the level and returns of the capital stock. Indeed, using estimates of the Cabinet Office capital stock in lieu of those from the Japan Industry Productivity database yields slightly higher potential output growth (by 0.1–0.2 percentage points) and smaller contributions from total factor productivity growth.

C. What are the Determinants of Productivity?

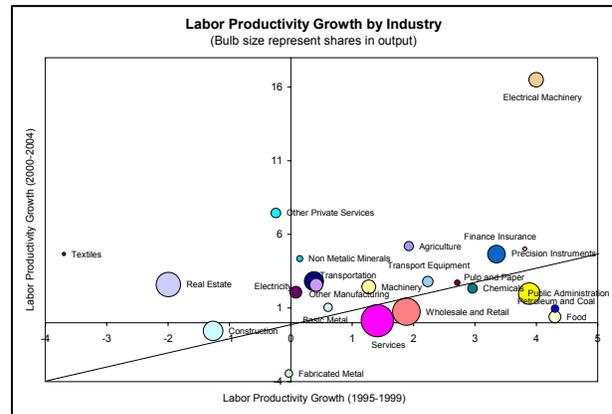
9. **Sectoral data suggests that the recent pick up in total factor productivity growth reflects improvements across most sectors of the Japanese economy, particularly manufacturing.** Part of the improvements in sectoral TFP are likely to reflect Japan’s cyclical recovery since the 5-year averages used in this analysis have not been detrended. Nevertheless, some key trends emerged:

- Productivity growth in the manufacturing sector averaged $3\frac{3}{4}$ percent between 2000 and 2004, up from almost zero percent on average between 1995 and 1999. Within the manufacturing sector, there have been large improvements in TFP growth in information technology (IT)-related sectors such as the “electrical machinery, equipment and supplies”, “precision instruments”, and “machinery.” These developments are consistent with the findings by Jorgenson and Motohashi (2005) that the IT sector’s contribution to aggregate productivity growth has increased after the mid-1990s.



- The real estate industry, which represents over 10 percent of GDP, also contributed significantly to the rise in productivity growth. Total factor productivity growth in the real estate industry recovered to an average of $\frac{1}{2}$ percent during 2000–2004, compared with $-3\frac{3}{4}$ percent during 1995–1999. The finance and insurance industry, which accounts for over $6\frac{1}{4}$ percent of GDP, added significantly to the faster momentum in aggregate TFP.
- However, gains in aggregate TFP growth have been somewhat held back by developments in the wholesale and retail and “other services” sectors industries, which now account for just over a third of total output and slightly under 50 percent of total employment. This negative impact is reinforced by developments in the construction industry, which continues to contribute negatively to aggregate productivity growth, albeit to a lesser extent than during 1995–1999.

10. **In general, improvements in TFP growth have translated into labor productivity gains in most industries, despite less capital deepening.** Capital deepening (defined as growth in capital input per hours worked) slowed, reflecting the well-known structural problems in the banking and corporate sectors.



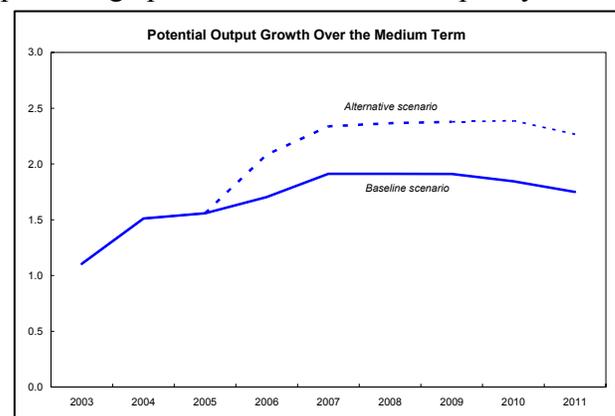
D. What is the Likely Impact on Potential Output of Reforms Undertaken in Recent Years?

11. **The empirical analysis suggests that the recent improvement in total factor productivity stems in part from greater product market competition, higher openness, and increases in R&D spending in relation to GDP.** Regression results in Table I.1 above suggest that reducing mark-ups by 1 percentage point stimulates TFP growth by about the same amount; raising import penetration by 10 percentage points increases TFP growth by about $\frac{1}{4}$ percentage point; and increasing R&D intensity by one percentage point raises TFP by broadly the same amount.

12. **With reforms, potential output growth could be raised further.** The results suggest that, going forward, the removal of lingering product market distortions—e.g. cutting excessive domestic regulation, strengthening the anti-trust framework, and further liberalizing trade (specifically, agricultural)—together with R&D investment could raise total factor productivity, and hence potential output growth.

13. **How such reforms above might spur potential output growth can be illustrated by contrasting two scenarios over 2006–2011.**

- In a baseline scenario (Table I.2), it is assumed that total factor productivity growth returns to its 2000–2005 average of around 1 percentage point. With no excess capacity utilization, the capital stock is assumed to rise in relation to GDP at around its trend rate of about 2 percentage point a year in net terms, contributing positively to potential output growth. The contribution of labor input to potential output growth remains negative, reflecting demographic trends. Indeed, the projected rise in the labor force participation rate (from about 78 percent to around 80 percent by 2011) is not enough to compensate for the adverse impact of the



decline in the working age population. Moreover, reflecting the rising share of the elderly in the labor force, the “natural” unemployment rate rises, reducing over time the contribution of labor to potential output growth. As a result, potential growth declines to 1.7 percent by 2011, after peaking at 1.9 percent in 2008–09.

- In the alternative scenario (Table I.3), while the baseline assumption on the evolution of the capital stock is maintained, it is assumed that product market reforms lead to greater competition, higher openness, and greater R&D intensity.
 - Competition improves, with mark-ups declining at the same pace as the average of the past 5 years. Trade intensity rises, with import penetration assumed to increase broadly in line with trend, helping to close part of the gap vis-à-vis other OECD countries.⁸ In contrast, because Japan has one of the highest level R&D expenditure in relation to GDP (currently around 3.5 percent), ranking third after Finland and Sweden, it is assumed that R&D intensity remains at current levels.⁹
 - Under such assumptions, total factor productivity growth is lifted by about $\frac{1}{4}$ percentage points relative to the baseline scenario.
 - In addition, the scenario assumes a moderate increase in female participation rate (currently around 61 percent) toward that of the average of the United States and the United Kingdom (around 69 percent). Female participation rate increases relative to the baseline scenario by $2\frac{3}{4}$ percentage points to 64 percent over the projection period, adding around $\frac{1}{4}$ percentage more to potential output growth.
 - Overall, potential output growth rises by about $\frac{1}{2}$ percentage point relative to the baseline scenario, reaching 2.3 percent by 2011.

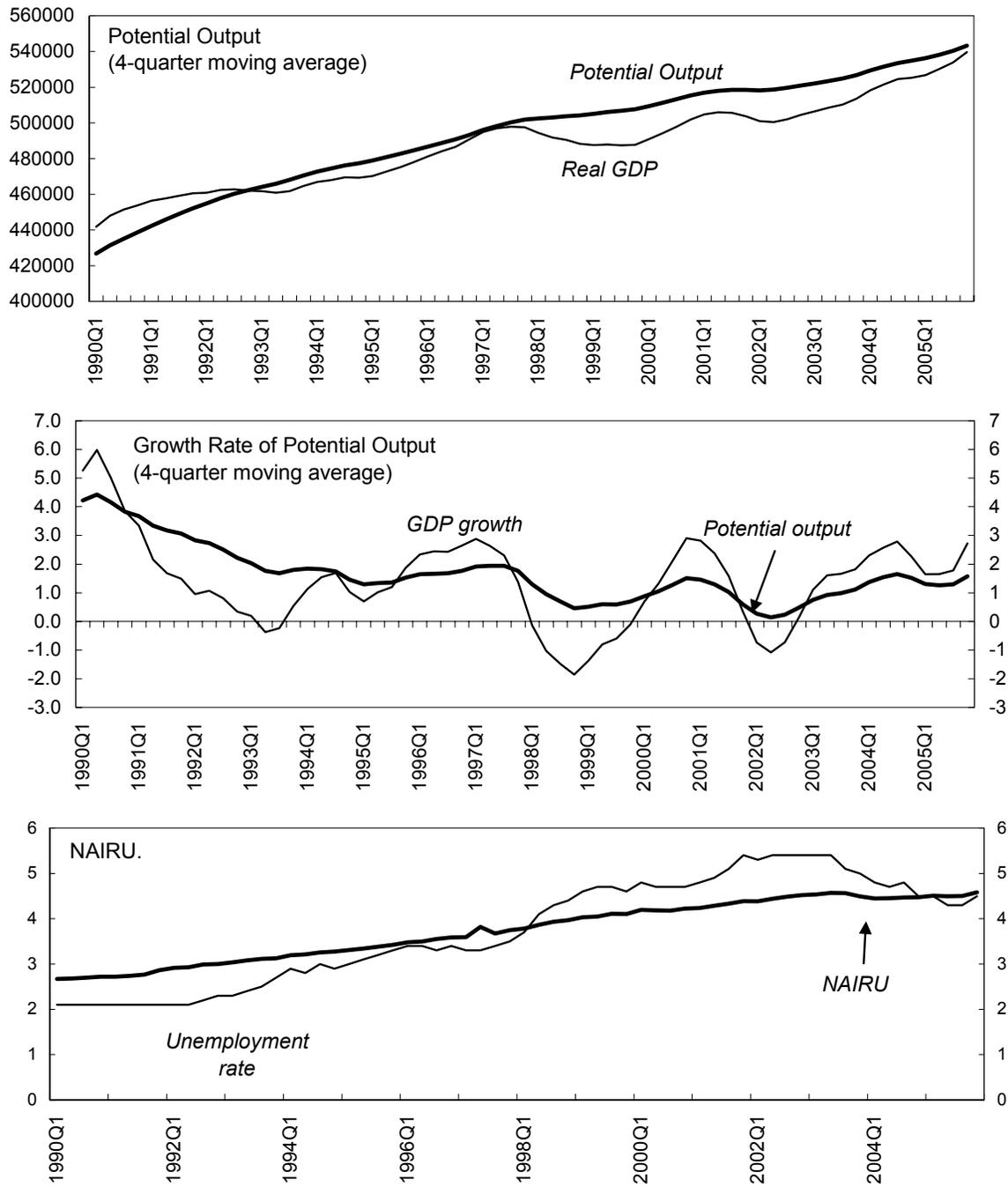
14. **The estimated magnitude of the impact of structural reforms on longer-term growth is very much in line with other recent estimates.** Indeed one official report (METI, 2006) considers that greater competition, efficiency gains in public services, and further IT diffusion and R&D could boost longer-term growth to $2\frac{1}{4}$ percent (from its current level of $1\frac{1}{2}$ to 2 percent). This order of magnitude of the potential gains from reforms is however at the lower bound of dynamic medium-term payoffs estimated in various studies, that range from 0.3 to 2.4 percentage points.¹⁰ Nevertheless, even under conservative assumptions on the size of the payoffs, it is clear that further structural reforms could go a long way to help Japan respond to the challenges posed by its aging population and support strong growth and higher living standards in the years ahead.

⁸ Japan has the lowest level of import penetration amongst OECD countries notwithstanding growing trade linkage with China and other Asian economies. See OECD (2006).

⁹ The OECD average R&D intensity is 2.2 percent based on 2003 data.

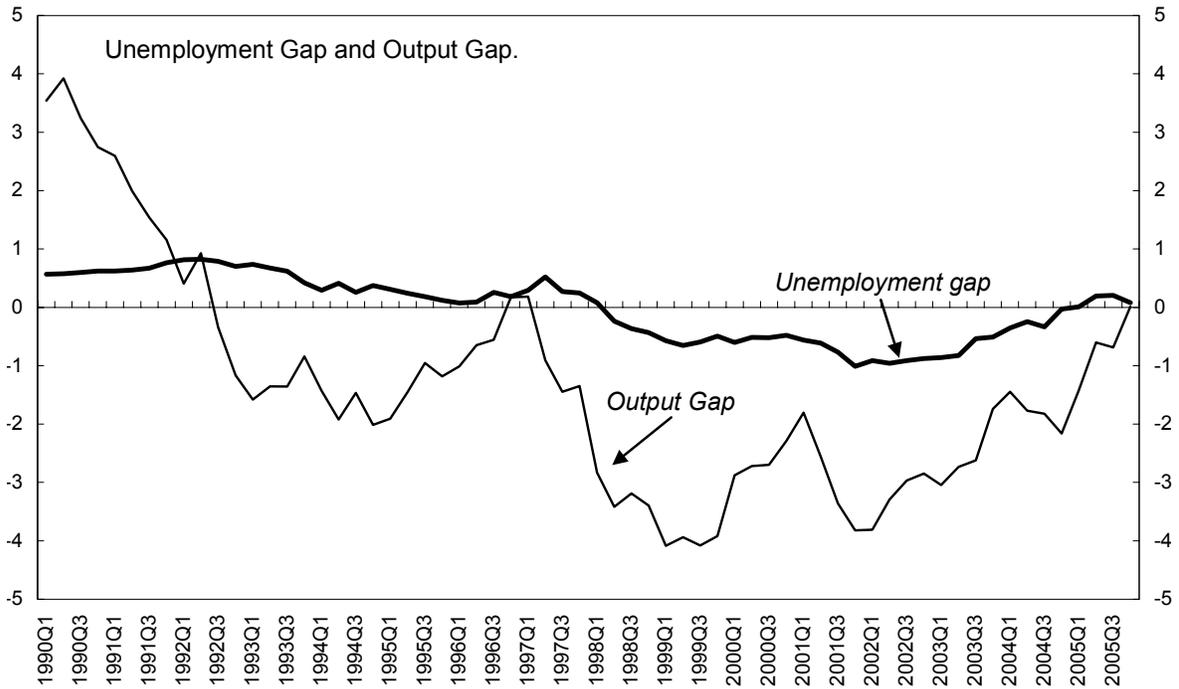
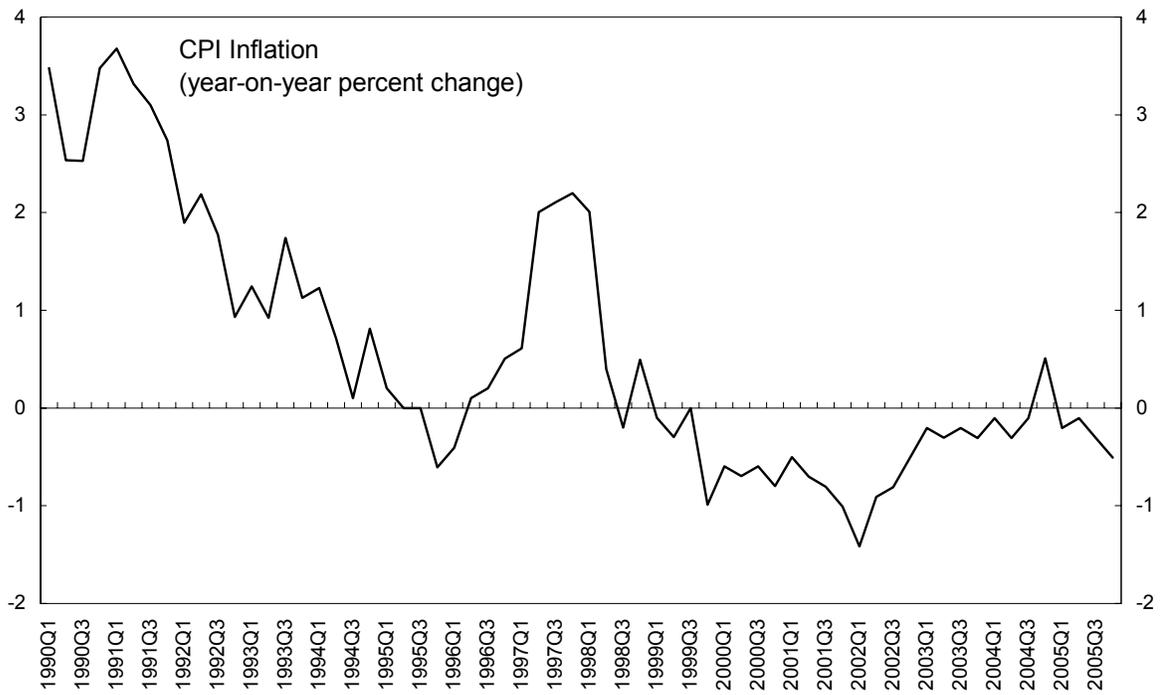
¹⁰ See IMF country report No. 04/247, Japan Center for Economic Research (2003), Shimpo and Nishizaki (1997), Bradford (2003), OECD (2004), and Hayashi and Prescott (2002).

Figure I.1. Japan: Potential Output and NAIRU



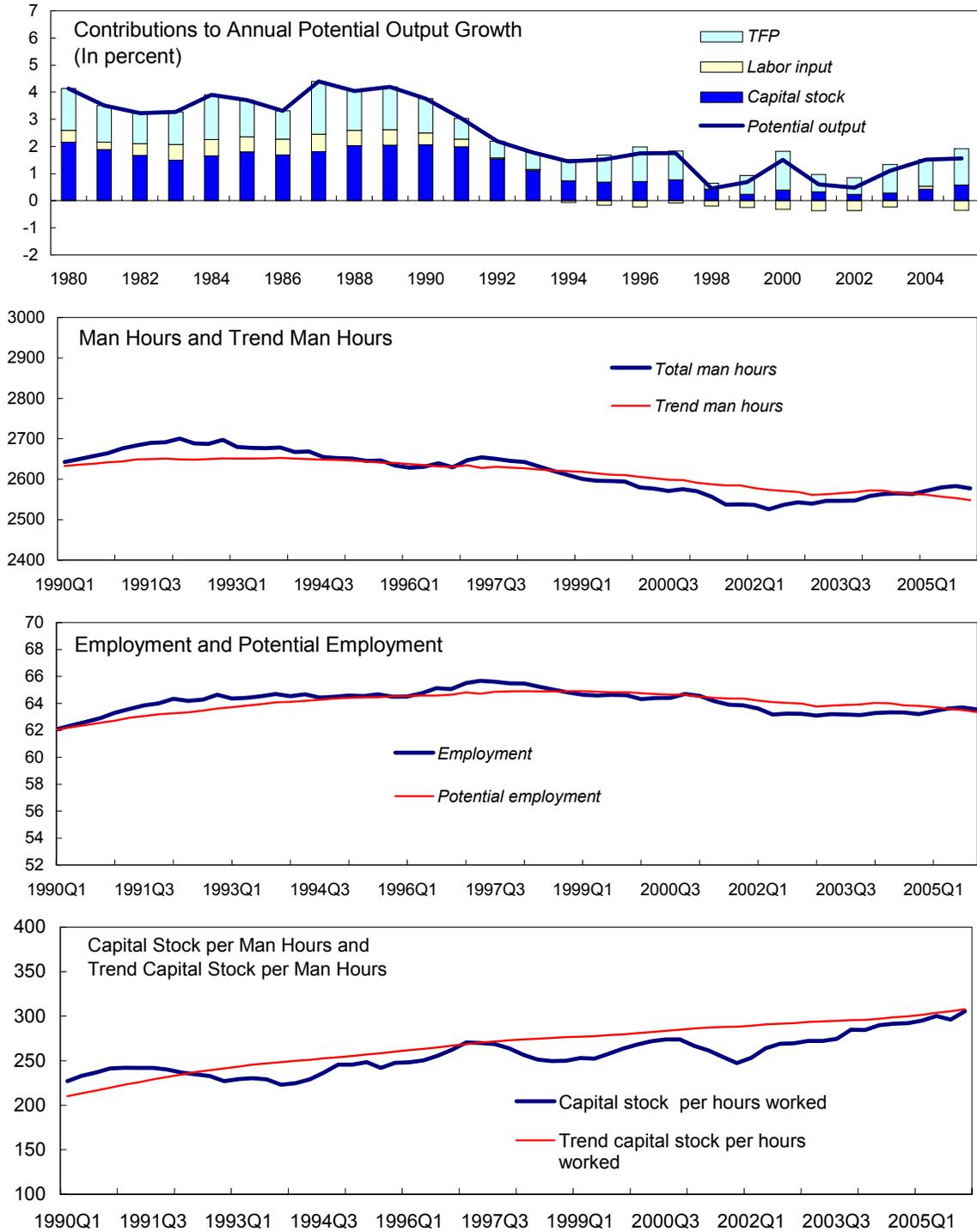
Source: Staff estimates.

Figure I.2. Japan: Inflation, Unemployment Gap, and Output Gap



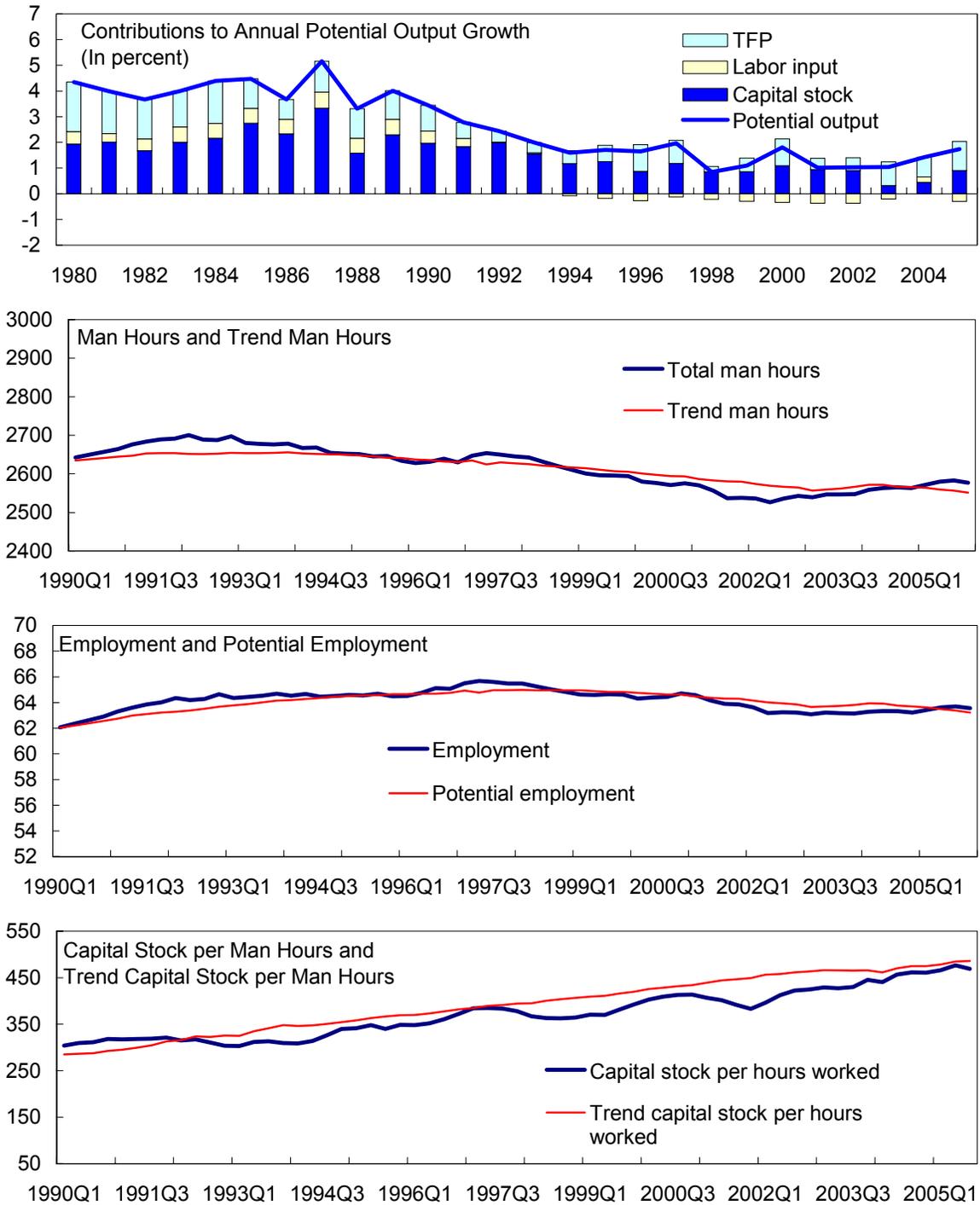
Source: Staff estimates.

Figure I.3. Japan: Potential Output and its Components-Baseline



Source: Staff estimates.

Figure I.4. Japan: Potential Output and its Components-Sensitivity Analysis



Source: Staff estimates.

Table I.2. Baseline Scenario

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
							Projections					
Potential output Growth	1.5	0.6	0.5	1.1	1.5	1.6	1.7	1.9	1.9	1.9	1.8	1.7
<i>Of Which:</i>												
Capital stock	0.4	0.3	0.2	0.3	0.4	0.6	1.0	1.2	1.2	1.2	1.1	1.1
Labor input	-0.3	-0.4	-0.4	-0.2	0.1	-0.4	-0.4	-0.2	-0.2	-0.2	-0.2	-0.3
TFP	1.4	0.6	0.6	1.0	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0

Source: Staff Estimates.

Table I.3. Alternative Scenario

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
							Projections					
Potential output Growth	1.5	0.6	0.5	1.1	1.5	1.6	2.1	2.3	2.4	2.4	2.4	2.3
<i>Of Which:</i>												
Capital stock	0.4	0.3	0.2	0.3	0.4	0.6	1.0	1.2	1.2	1.2	1.1	1.1
Labor input	-0.3	-0.4	-0.4	-0.2	0.1	-0.4	-0.2	0.0	0.0	0.0	0.0	-0.1
TFP	1.4	0.6	0.6	1.0	1.0	1.3	1.4	1.1	1.2	1.2	1.2	1.3

Source: Staff Estimates.

Annex I: Analytical Approach

1. **One way of estimating potential output is the production function approach which links output to inputs of labor and capital and total factor productivity.** Under this approach, the current level of potential output is thought to be that which would emerge from the production function, given the current levels of fixed inputs and sustainable levels of variable inputs. Several institutions and prominent economists have followed this route in estimating potential output and its determinants for Japan with marked differences in the sophistication of the production function or disaggregation of data used.
2. **However, it has been found that, in practice, not much is added to the precision of the measures as the uncertainty in pinning down potential output is simply transferred into uncertainty about total factor productivity.** In essence, this uncertainty arises from how the sustainable levels of the factor inputs are derived as well as data uncertainty, including the aggregation of data across industries. For example, while both the Cabinet office (CAO) and the Bank of Japan (BoJ) use the traditional production function approach to estimate potential output, the two institutions differ (until recently) in how they define the factor inputs that are necessary for producing one unit of potential output, resulting in markedly different potential output estimates. The CAO defines potential output as that which would emerge from the production function, given the current levels of fixed inputs and sustainable levels of variable inputs; while the BoJ defined (until recently) potential GDP as the level of output that would result from variable inputs at full capacity.
3. **Another way of estimating potential output is to use some variant of a filtering technique.** What this means is that time-series techniques are used to fit trend lines through the data, and these trends provide the measures of the underlying “equilibrium” values. The trend lines are used to define “gaps”—deviations of actual observed values from these trends—that are, in turn, used to describe the dynamics of, say, inflation or the process of any other variable of interest. The trend lines are determined, at least in part, by their ability to represent these processes.
4. **The methodology we use combines the two approaches described above, the production function and a filtering technique.** It uses information from both the supply side and the demand side to condition the estimates of potential output. The essential idea behind this approach is that we can profit from considering more than just the data on output. In particular, since we know that there is a link between labor input and output, it may be useful to exploit information about the degree of excess demand in the labor market. Similarly, the behavior of inflation informs us about the likely existence of excess demand/supply in the product market.
5. **Our methodology treats the filtering problem as a small system,** where the estimates of potential output, trend labor participation, hours worked, capacity utilization, the NAIRU, and some of the parameters of the dynamic model are determined simultaneously, allowing us to account for interactions among unemployment, output, variables inputs, and inflation. The resulting trend-estimates of output, variable inputs, and unemployment rate should be seen as the levels that can be employed without causing inflation to rise or fall.

6. The system consists of four structural equations (see Annex II)—including a production function, a Phillips curve, and a NAIRU, an Okun’s law—and several identities.

- The production function, equation (4), links output to hours worked, capital, and total factor productivity, with the share of hours worked and capital fixed at their 1995–2002 average of about 2/3 and 1/3, respectively. At potential, hours worked is the product of working age population, trend participation rate, trend average hours worked, and one minus the NAIRU. The trend participation and average hours worked as well as the NAIRU are determined simultaneously, consistent with stable inflation. At the same time, the potential capital stock series is the product of the capital stock and the trend capacity utilization rate. The capital stock series is from the Japan Industry Productivity database. Total factor productivity depends on research and development intensity, the degree of competition, the degree of openness, and past realizations of total factor productivity.
- The Phillips curve, equation (2), relates inflation to expected inflation, terms of trade shocks (changes in import prices and oil prices), and the past values of the output gap. The influence of excess demand is captured through the output gap. This model is a backward-looking autoregressive model that has been employed extensively to estimate the parameters of reduced-form expectations-augmented Phillips Curves. Inflation expectations are modeled as a pure distributed lag of past inflation, with a restriction that the coefficients sum to one. The influence of import prices and oil prices pass-through are also added to the inflation process. It is important to stress that, because it is the inflation expectations series that matters in the Phillips Curve, an alternative specification for the inflation expectations process would alter our gap estimates.
- The NAIRU equation, equation (7), relates the unemployment rate to the share of old in the labor force, the replacement ratio, and past unemployment rate. The first variable aims to capture the impact of demographic changes on structural unemployment, while the second variable aims to capture that of the generosity of the unemployment insurance system. In particular, this later variable captures how high replacement ratio can raise the structural unemployment rate by lowering the gap between the income from work and the income received on support. It does not, however, fully represent the generosity of the unemployment system as it does not account for conditions on benefits eligibility, such as the minimum amount of time spent in employment required and requirements of enrolling in various schemes for certain groups. The effects of hysteresis in the labor market are captured through the past unemployment rate that introduces some persistence in the dynamics of unemployment. Indeed, it appears that employment protection legislation that complicates hiring and firing decisions raises the average duration of unemployment and the proportion of long-term unemployment (Alain de Serres 2003).
- The Okun equation, equation (8), links the movements in unemployment to those in output gap. Some degree of persistence in the dynamics of the unemployment gap is

captured by the presence of the lagged values of unemployment gap. By the same token, the resource utilization equation (equation 11) links the capacity utilization rate to the output gap, with excess demand translating into tight capacity.

Annex II. Model's Equation

(1) Output decomposition

$$y_t = \bar{y}_t + \frac{ygap_t}{100}$$

(2) Phillips Curve Equation

$$\pi_t = \psi_1 \pi_{t-1} + \psi_2 \pi_{t-2} + \psi_3 \pi_{t-3} + (1 - \psi_1 - \psi_2 - \psi_3) \pi_{t-4} + \psi_5 \pi_t^{imp} + \psi_6 \pi_t^{oil} + \beta ygap_t + \Omega \Delta ygap_t + \varepsilon_t^\pi$$

(3) Unemployment rate

$$unr_t = \bar{u}_t - ugap_t$$

(4) Stochastic Process for Potential Output

$$\bar{y}_t - \lambda \bar{k}_t - (1 - \lambda) \bar{n} \bar{h}_t = \rho_1 [\bar{y}_{t-1} - \lambda \bar{k}_{t-1} - (1 - \lambda) \bar{n} \bar{h}_{t-1}] + \rho_2 \Delta RD_{t-4} + \rho_3 \Delta mkp_t + \rho_4 imp_t + \varepsilon_t^{\bar{y}}$$

(5) Potential Capital Stock

$$\bar{k}_t = k_t + \bar{c} \bar{u}_t$$

(6) Stochastic Process for the Output gap

$$ygap_t = \delta_1 ygap_{t-1} + \varepsilon_t^{ygap}$$

(7) Stochastic Process for the NAIRU

$$\bar{u}_t = \bar{u}_{t-1} + \mu_1 \Delta rrep_t + \mu_2 old_t + \varepsilon_t^{\bar{u}}$$

(8) Stochastic Process for the unemployment gap

$$ugap_t = \phi_1 ugap_{t-1} + \mu ygap_t + \varepsilon_t^{ugap}$$

(9) Capacity Utilization

$$cu_t = \bar{c} \bar{u}_t + cugap_t$$

(10) Stochastic Process for Trend Capacity Utilization

$$\bar{c} \bar{u}_t = \bar{c} \bar{u}_{t-1} + \varepsilon_t^{\bar{c} \bar{u}}$$

(11) Stochastic Process for the Capacity Utilization Gap

$$cugap_t = \theta_0 cugap_{t-1} + \theta_1 ygap_t + \varepsilon_t^{cugap}$$

(12) Potential Labor Input

$$\bar{n}\bar{h}_t = pop_t + \bar{h}_t + \bar{p}\bar{a}\bar{r}\bar{t}_t + \ln(1 - \bar{u}_t) \approx pop_t + \bar{h}_t + \bar{p}\bar{a}\bar{r}\bar{t}_t - \bar{u}_t$$

(13) Hours Worked

$$h_t = \bar{h}_t + hgap_t$$

(14) Stochastic Process for Trend Hours Worked

$$\Delta\bar{h}_t = \Delta\bar{h}_{t-1} + \varepsilon_t^{\bar{h}}$$

(15) Stochastic Process for the Hours Worked Gap

$$hgap_t = \varepsilon_t^{hgap}$$

(16) Participation Rate

$$part_t = \bar{p}\bar{a}\bar{r}\bar{t}_t + partgap_t$$

(17) Stochastic Process for Trend Participation Rate

$$\Delta\bar{p}\bar{a}\bar{r}\bar{t}_t = \Delta\bar{p}\bar{a}\bar{r}\bar{t}_{t-1} + \varepsilon_t^{\bar{p}\bar{a}\bar{r}\bar{t}_t}$$

(18) Stochastic Process for the Participation Rate Gap

$$partgap_t = \varepsilon_t^{partgap}$$

Definition of Variables

y is the (100 times) the logarithm of real GDP (2000 base), spliced using 1993 SNA data before 1994.

\bar{y} is the (100 times) the logarithm of potential output growth

$ygap$ is the output gap

π is (400 times) the quarterly percent change in the CPI index (using the difference in logarithms as an approximation)

π^{imp} is (400 times) the quarterly percent change in the implicit import deflator (using the difference in logarithms as an approximation)

π^{oil} is (400 times) the quarterly percent change in the World Economic Outlook crude oil price index defined as a simple average of three spot prices: Dated Brent, West Texas Intermediate, and the Dubai Fateh in US dollars (using the difference in logarithms as an approximation)

k is the capital stock (alternatively from the JIP database and the Nomura database).

\bar{k} potential capital stock

h is the average weekly hours worked

\bar{h} potential hours worked

$part$ is the participation rate

\bar{part} is the trend participation rate

u is the unemployment rate

\bar{u} is the NAIRU

$\Delta rrep$ is the change in the replacement rate defined as the ratio of unemployment insurance benefits to salaries and wages.

old is the share of old

pop is the working age population

cu is the capacity utilization rate

$cugap$ is the capacity utilization gap

References

- Bayoumi, Tamim and Charles Collyns, 1999, “Where are we going? The Output Gap and Potential Growth,” in T. Bayoumi and C. Collyns, eds., *Post-Bubble Blues –How Japan Responded to Asset Price Collapse*, International Monetary Fund.
- Benes, Jaromir and Papa N’Diaye, 2004, “A Multivariate Filter for Measuring Potential Output and the NAIRU: Application to the Czech Republic,” International Monetary Fund, Working Paper series No. 04/45.
- Bradford, Scott, 2003, “Paying the Price: Final Goods Protection in OECD Countries,” *The Review of Economics and Statistics*, February 2003.
- Citrin, Daniel A., 1991, “Potential Output and the Natural Rate of Unemployment: Recent History and Medium-term Prospects,” unpublished manuscript, International Monetary Fund.
- De Serres, Alain, 2003, “Structural Policies and Growth-A Non Technical Overview,” Organization for Economic Cooperation and Development, Working Paper series No. 355.
- Fukao, Kyoji, Tomohiko Inui, Hiroki Kawai, and Tsutomu Miyagawa, 2003, “Sectoral Productivity and Economic Growth in Japan: 1970-98: An Empirical Analysis Based on the JIP Database,” ESRI Cabinet Office, Discussion Paper Series No. 67.
- Hara, Naoko, N. Hirakata, Y. Inomata, S. Ito, T. Kawamoto, T. Kurozumi, M. Minegishi, and I. Takagawa, 2006, “The New Estimates of Output Gap and Potential Growth Rate,” *Bank of Japan Review* No. 2006-E-3.
- Hayashi, Fumio and Edward Prescott, 2002, “The 1990s in Japan: A Lost Decade,” *Review of Economic Dynamics* 5(1), pp 206–235.
- Japan Center for Economic Research, 2003, “Regulatory Reform and Demand Creation,” December 2003.
- Jorgenson, Dale and Kazuyuki Motohashi, 2005, “Information Technology and the Japanese Economy,” *Journal of the Japanese and International Economies*, vol. 19, pp 460–481.
- Laxton, Douglas and Papa N’Diaye, 2002, “Monetary Policy Credibility and the Unemployment Inflation Tradeoff: Evidence from 17 Industrial Countries,” International Monetary Fund, Working Paper series No. 02/220.
- Ministry of Economy, Trade and Industry, 2006, “New Economic Growth Strategy Interim Report,” March.
- Organization for Economic Cooperation and Development, 2004, *OECD Economic Surveys: Japan*, Volume 2003/18.

Organization for Economic Cooperation and Development, 2006, OECD Economic Surveys: Japan, Forthcoming.

Shimpo, Seiji, and Nishizaki, Fumihara, 1997, "Measuring the Effects of Regulatory Reform in Japan: A Review," Economic Planning Agency.

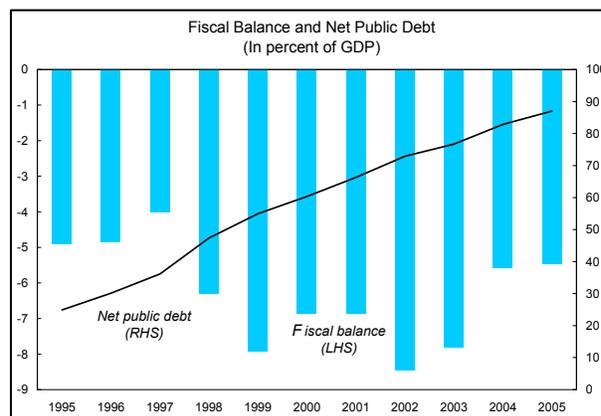
Okada, Yosuke, 2005, "Competition and Productivity in Japanese Manufacturing Industries." *Journal of the Japanese and International Economies*, vol. 19, pp 586-616.

II. STRATEGIES FOR FISCAL CONSOLIDATION IN JAPAN¹¹

A. Introduction

1. Japan's key fiscal challenge is to put public finances on a more sustainable footing.

Large government budget deficits have boosted Japan's net public debt to over 85 percent of GDP, one of the highest in the OECD. In the years ahead, rising health and elderly care costs will add strain to public resources. The Cabinet Office estimates that in the absence of further policy adjustments, social security expenditure will reach 22 percent of GDP by 2025, up from about 18 percent of GDP in 2005.¹² As a result, the government's net debt could continue to rise. Rising debt could increase interest rates, lower investment, and ultimately hamper growth in the context of population aging.



2. **The authorities are committed to addressing these risks by achieving a primary balance of the general government (excluding social security) by 2011.** Although the government has not yet announced a detailed plan on how to attain this target, there is a growing consensus that consolidation would contain a mixture of both expenditure and revenue measures. The debate focuses on how to design a successful adjustment, while minimizing the output costs. A menu of options to underpin consolidation will be unveiled in the forthcoming releases of the “Roadmap for Income-Expenditure Reform” and the Basic Policies for FY2006.

3. **This chapter investigates the macroeconomic implications of alternative fiscal strategies that differ in the composition, pace, and timing of the measures.** It uses a two-country version of the IMF's Global Fiscal Model (GFM), calibrated to the Japanese economy. Specifically, the chapter poses the following questions:

- What are the output costs of expenditure cuts versus selected tax increases?
- What is the effect of a more ambitious consolidation that aims at stabilizing the debt to GDP ratio by achieving a primary surplus for the general government (excluding social

¹¹ Prepared by Dennis Botman, Hali Edison, and Papa N'Diaye.

¹² The 2004 reform of the pension system will help contain longer-term pension outlays by streamlining the benefits and gradually increasing the contributions of employees and employers. Most of the demand on the budget will be related to healthcare.

security) rather than at achieving a primary balance?

- What is the trade-off between a gradual and a stop-and-go adjustment?
- What are the gains from a revenue-neutral shift from corporate taxation to consumption taxation?
- What are the international spillovers of fiscal consolidation in Japan?

4. **The main findings are:**

- Lowering social transfers has a less negative impact on growth than other measures. Amongst possible tax measures, raising the consumption tax entails the smallest output cost. (Given the limited room for further reducing transfers, there is a need to increase taxes and or reduce other expenditures.)
- An ambitious consolidation that stabilizes the debt ratio involves greater long-term benefits than an adjustment that just targets a primary balance.¹³ Such a strategy carries only somewhat larger short-term output costs.
- A less front-loaded or a stop-and-go approach limits short-term output costs, but also reduces longer-term benefits.
- Shifting from corporate taxation to consumption taxation facilitates fiscal adjustment by spurring growth.
- The spillovers to the rest of the world from consolidation in Japan are positive in the medium term, albeit modest.

B. Analytical Framework

5. **The framework used is a two-country version of the IMF's Global Fiscal Model (GFM) calibrated to the Japanese economy.** GFM is a macroeconomic model developed specifically to examine a range of fiscal issues.¹⁴ In GFM, fiscal policy affects both aggregate demand and aggregate supply. Aggregate demand responses result from the absence of debt-neutrality and consumers' impatience—i.e. their preference for immediate rather than deferred consumption. Aggregate supply responses arise *inter alia* from the distortionary effects of payroll and corporate income taxes.

6. **In GFM, fiscal policy matters because of the following departures from Ricardian equivalence:**

¹³ The GFM imposes a fiscal reaction function that re-establishes debt sustainability in the very long run. The simulations in this paper focus on benefits over a shorter policy horizon (about 25 years).

¹⁴ See Botman and others, 2006, for details on the micro-foundations of the model.

- Consumers have finite horizons. As a result, even temporary changes in fiscal policy may affect consumption because any offsetting future action required by the government's intertemporal budget constraint is (perceived to be) borne by future generations.
- Taxes are distortionary because labor supply and capital accumulation decisions are endogenous and taxes are proportional rather than lump-sum.
- A fraction of consumers are liquidity constrained. Liquidity constrained consumers do not save and cannot borrow. Therefore, any change in fiscal policy that affects their disposable income immediately changes their consumption as well.

7. **The model has been parameterized to reflect key macroeconomic features of Japan** (Tables II.1 and II.2). In particular, the ratios of consumption, investment, government spending, wage income, and income from capital relative to GDP are set to their current values. Similarly, key fiscal variables—revenue to GDP ratios from taxation of corporate, labor, and personal income and consumption tax, as well as government debt and current government spending—have been calibrated to Japan's fiscal structure.¹⁵

8. **Other main aspects of the model are:**

- Consumption and production are characterized by constant elasticity of substitution functions. Firms and workers have some market power, so that prices and wages are above their perfectly competitive levels.
- There are traded and non-traded goods that allow for a bias toward domestic goods in private or government consumption.
- There are two factors of production—capital and labor—which are used to produce traded and non-traded goods. Capital and labor can move freely between sectors, but are not mobile internationally.
- Investment is driven by a Tobin's Q relationship. Because of adjustment costs, firms respond sluggishly to differences between the discounted value of future profits and the market value of the capital stock.
- Wages and prices are fully flexible. The central bank targets monetary aggregates.
- There are two kinds of financial assets, government debt (traded internationally) and equity (held domestically). International trade in government debt implies the equalization of nominal interest rates across countries over time. However, real interest rates across countries could differ because of the presence of non-traded goods and home bias in consumption.

¹⁵ Other structural parameters have been calibrated using evidence from Laxton and Pesenti (2003) and Batini and others (2005).

9. **Notwithstanding some simplifying assumptions, the framework provides a strong basis for analysis.** The model does not allow for nominal rigidities, productive public investment, and multiple tax rates for each type of tax. Nonetheless, the framework provides a good platform for discussing the relative merits of alternative fiscal consolidation measures.¹⁶ In particular, the structure of the model permits an assessment of the following options: (i) lower government transfers; (ii) lower government spending;¹⁷ (iii) higher workers' social security contribution; (iv) higher employers' social security contribution; (v) higher personal income taxes; (vi) higher corporate income taxes; (vii) higher consumption taxes; or (viii) a package that combines some expenditure reductions and some tax increases.

C. Alternative Fiscal Adjustment Strategies

Composition

10. **A primary balance could be attained by 2011 through expenditure or tax measures—or a combination of both.**¹⁸ The needed adjustment amounts to about ½ percent of GDP on average per year for five years. As shown in the table below, if the adjustment relies only on one type of measure, substantial changes will be necessary. For example, to reach a primary balance by 2011, as the authorities intend, would require: a doubling of the consumption tax rate to 10 percent; a 5 percentage-point increase in the corporate income tax; or about a 25 percentage-point cut in spending on goods and services of the central government's general account (as defined in the table). On the whole, given the size of the necessary adjustment, consolidation is likely to be accomplished through a combination of expenditure and revenue measures.

¹⁶ The model has been applied by IMF staff for background work for recent Article IV consultations with Canada, the United Kingdom, and the United States.

¹⁷ Government spending is defined here as all expenditure excluding social transfers and interest payments.

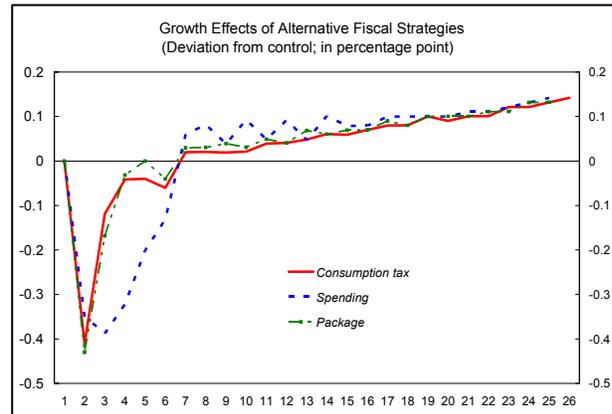
¹⁸ A primary balance for the general government (excluding social security) is the authorities' goal, but it will not stabilize the debt ratio.

Illustrative Fiscal Consolidation Measures (In percent)		
	Before	After
Revenue		
Consumption/Sales Tax (VAT)		
Actual rate	5.0	10.0
Effective rate	4.5	8.3
Revenue (in percent of GDP)	2.0	4.5
Corporate Income Tax (CIT)		
Actual rate		
Effective rate	7.5	12.5
Revenue (in percent of GDP)	2.6	5.1
Employers' Social Security Contribution (ESSC)		
Actual rate		
Effective rate	11.0	22.3
Revenue (in percent of GDP)	4.7	7.2
Personal Income Tax (PIT)		
Actual rate		
Effective rate	9.5	12.0
Revenue (in percent of GDP)	2.5	5.0
Workers' Social Security Contribution (WSSC)		
Actual rate		
Effective rate	20.1	27.6
Revenue (in percent of GDP)	5.6	8.1
Expenditure		
Spending on Goods and Services 1/		
in percent of GDP	6.2	3.7
percent change		-25.0 3/
Transfers 2/		
in percent of GDP	4.1	1.6
percent change		-54.3 3/
Notes to Table:		
1/ Includes education and science, energy measures, major foodstuff measures, national defense, miscellaneous, local allocation tax, special local allocation tax, transfer to the industrial investment special account, small business, economic assistance, and contingencies.		
2/ Includes social security and government employee pension and others.		
3/ Cumulative percent change 2006-2011.		

11. Simulations suggest that in the short run there may be modest differences in the output cost of the various options.

- A strategy based on reducing only social security transfers would be less damaging to economic growth than one based on cutting other spending or increasing taxes. In fact, reducing transfers acts like increasing a lump-sum tax and does not distort consumers' labor supply decisions. While demand falls along with households' after-tax income, aggregate supply is largely unaffected, limiting the decline in output. In addition, under the assumed parameterization, the real interest rate falls by more than with alternative consolidation measures. This in part reflects the fact that household demand is less biased toward consumption of non-traded goods than government spending (see below).

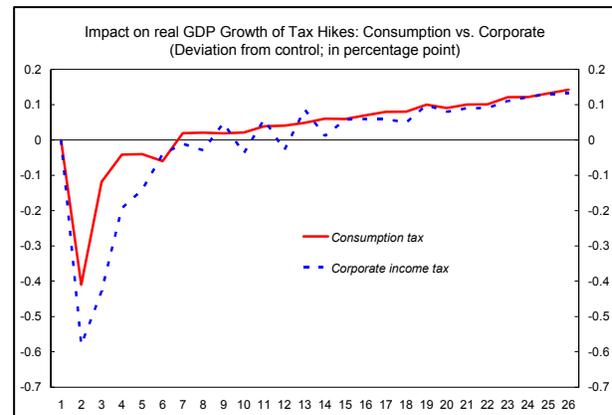
- An increase in the consumption tax has qualitatively similar effects to a cutback of social transfers. A higher consumption tax reduces demand and real interest rates, crowding in investment and limiting the decline in output. On the external front, lower imports and a real depreciation improve the current account.



- A reduction in government spending on goods and services decreases demand, particularly that of non-traded goods, and leads to a decline in the nominal interest rate and inflation. Inflation falls more than interest rates (because of the bias in public consumption toward non-traded goods), increasing the real interest rate and crowding out private investment. This reinforces the adverse effects of fiscal consolidation on output. On the external side, the real exchange rate depreciates, although by less than in the case of the consumption tax increase or a transfer cut, providing less support to the current account.
- Finally, a package of measures involving lower government spending, lower transfers, and a higher consumption tax would have an impact on growth that compares favorably with that of a strategy based solely on increasing the consumption tax rate or on reducing government expenditure.¹⁹ This result comes from the limited impact on growth of a consumption tax hike and a reduction in transfers (as described above) and is independent of the sequencing of these measures.

12. Among the revenue measures, a consumption tax increase has the least negative effect on output.

- This result stems from the fact that the tax base is the discounted stream of future income and accumulated savings—a broad concept of permanent income. With this tax base, there is less distortion in the consumption-leisure decision as a result of this tax increase, with smaller adverse effects on the



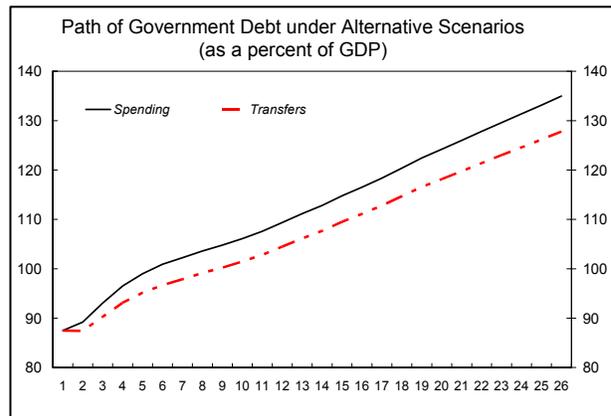
¹⁹ The package includes a reduction in spending of 0.5 percent of GDP during the first two years, followed by a lowering of transfers by 0.5 percent of GDP a year for the next two years, and a 1 percentage point increase in the consumption tax rate in the fifth year.

supply side.²⁰

- Raising the corporate income tax rate would involve larger short-term output costs than any other tax because it directly discourages investment (by raising the after-tax cost of capital) in addition to the negative impact on consumption (for those consumers who own capital).²¹ Overall, the effect of corporate taxation on the economy depends on the relative sensitivity of capital and labor to changes in the respective tax rates. The model is calibrated so that capital is more sensitive to taxes than labor, in line with empirical evidence.²²

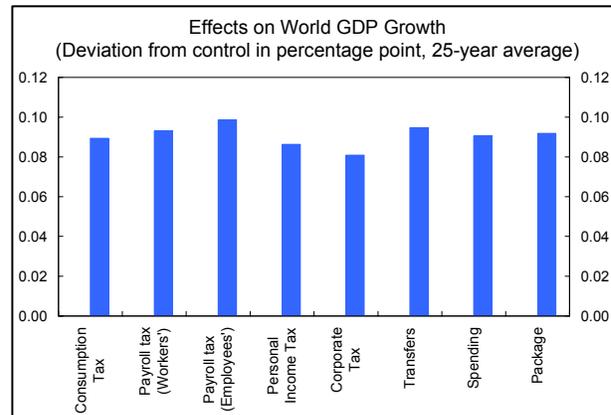
13. Different consolidation strategies have different implications for the debt ratio in the long run.

The consolidation scenario with transfers yields the lowest debt ratio (around 125 percent), mostly because of the smaller negative impact on output. Lowering government spending on goods and services, on the other hand, would generate the highest debt ratio (around 135 percent), as the real interest rate tends to be higher and GDP lower, mainly because of the bias in public consumption toward non-traded goods.



14. **The planned consolidation of 2½ percent of GDP over 5 years will have limited spillover effects to the rest of the world.** This result is largely invariant to the consolidation strategy. Spillover effects occur in the model through two channels: trade and financial.

- Initially, consolidation lowers Japan's demand for imports, which reduces foreign growth. However, given the share of the Japan's economy in world output, the effect on world output is small (trade channel).



²⁰ If consumption were to depend only on current income, then a consumption tax would be equivalent to a payroll tax and an increase will lead to a more pronounced withdrawal of labor effort and a larger supply side impact. The output cost would still be smaller than with a corporate income tax hike.

²¹ This result is in line with evidence from Baylor (2005).

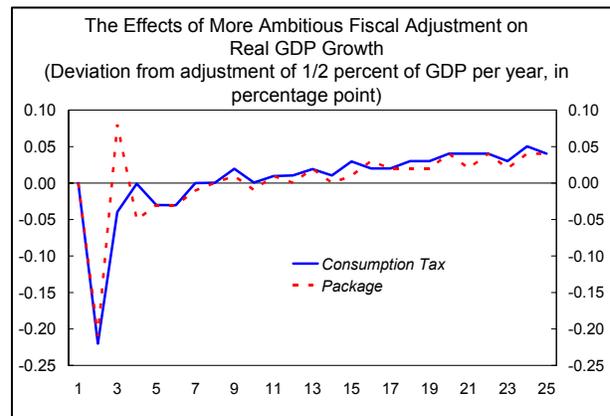
²² The model probably understates the sensitivity of investment to taxation as capital is assumed to be not internationally mobile.

- In the medium term, a lower debt ratio is associated with higher national savings, slightly lower world interest rates, and somewhat higher investment at home and abroad (finance channel).

Size, Pace and Timing of Adjustment

15. **A more ambitious consolidation than envisaged by the authorities would stabilize the debt ratio and secure longer-term gains.** Staff estimates indicate that

stabilizing the general government debt (excluding social security) would require achievement of a primary surplus of 1¼ percent of GDP or an average annual adjustment of at least ¾ percent of GDP. This adjustment entails somewhat larger output costs in the short run, but would raise longer-term growth: labor supply and consumption are stimulated in the longer term, relative to the baseline, because a lower debt ratio lowers the anticipated tax burden, and thus raises after-tax real wages. The positive effect on output is stronger the larger the effect of interest rate on consumption, which in turn depends on how much consumers discount future consumption.

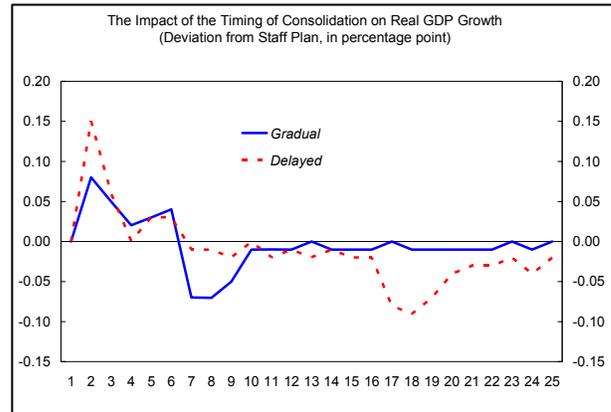


16. **The rest of the world would also benefit from additional fiscal consolidation in Japan since world interest rates would be lower.** Although consolidation in Japan reduces demand for imports, this effect is more than compensated by the decline in Japan’s demand for world saving, which creates financing room for additional capital spending in the rest of the world.

17. **Model simulations suggest that the timing of the adjustment also matters.** Two alternative scenarios to stabilize the debt ratio have been simulated: a gradual and a stop-and-go scenario. The gradual scenario envisages a sustained adjustment of ½ percent of GDP a year over nine years (to yield the primary surplus excluding social security necessary to stabilize the debt ratio). The stop-and-go scenario envisages a pause in the adjustment for three years (see table above). The chart above compares the different impact on growth of these two scenarios with that of a more ambitious consolidation (“Staff Plan”, see ¶ 15). The simulations suggest that a gradual adjustment may limit the short-term negative effects of consolidation on growth but also reduces the long-term benefits. This stems from the fact that the delayed adjustment yields higher debt, which in turn would crowd out private domestic and foreign investment through higher interest rates.²³

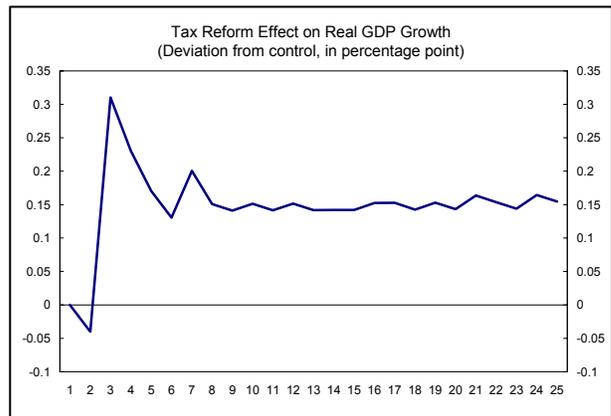
²³ This trade-off increases with the shortening of consumers’ planning horizon as future consolidation measures are less discounted. It should also be noted that GFM does not incorporate costs of price adjustment (menu (continued...))

Illustrative Consolidation Paths				
Year	Government Plan	Staff Plan	Gradual	Stop-and-Go
1	0.5	1	0.5	0.5
2	0.5	1	0.5	0.5
3	0.5	0.75	0.5	0.5
4	0.5	0.5	0.5	0.5
5	0.5	0.5	0.5	0.5
6	0	0.5	0.5	0
7	0	0	0.5	0
8	0	0	0.5	0
9	0	0	0.25	0.5
10	0	0	0	0.5
11	0	0	0	0.5
12	0	0	0	0.25



Tax Reform

18. **A tax reform that shifts the burden from direct to indirect taxation could support output growth.** The fall in corporate taxes spurs investment, and ultimately output growth. On the external side, the spillovers to the rest of the world would be positive, albeit modest. Moreover, a revenue-neutral shift to taxation of consumption also could be justified on intergenerational equity grounds since it would foster burden-sharing in the context of an aging population.



D. Sensitivity Analysis

19. **The results outlined above are sensitive to changes in the parameterization of the elasticity of labor supply and some aspects of consumption behavior.** In particular,

- Consolidation through expenditure reduction becomes less costly in terms of output if workers are more sensitive to changes in real wages. In this case, a payroll tax or a consumption tax increase would have a larger impact on their consumption-leisure decision.
- The longer the planning horizon of households or the more private consumption responds to the interest rate, the smaller the impact of fiscal consolidation on real interest rates,

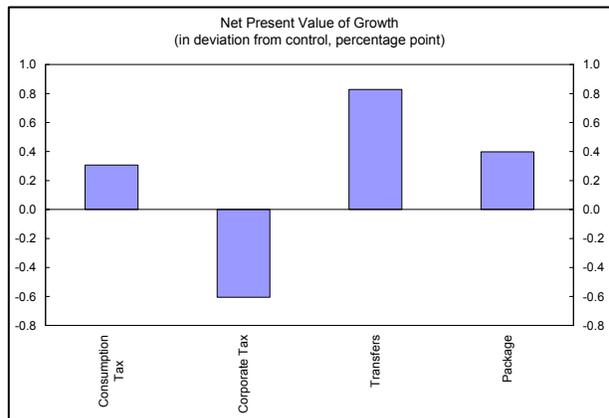
costs), which may provide an additional reason against a gradual increase particularly in the consumption tax rate.

output, and the current account.²⁴

- On the whole, however, the results are robust to changes in the behavioral parameters of the model.

E. Concluding Remarks

20. **The simulations presented in this chapter suggest that the design of fiscal adjustment matters for growth.** Net present value calculations indicate that the cumulative impact of consolidation on growth may be positive for strategies based on reducing transfers, increasing the consumption tax, or a combination of expenditure cuts and tax increases. The results also indicate that the cumulative impact may be negative for strategies based on raising corporate taxes or personal income taxes.



²⁴ The sensitivity of consumers to changes in interest rates depends on their degree of impatience, captured through the parameterization of the intertemporal elasticity of substitution. With a lower degree of impatience (higher intertemporal elasticity of substitution), consumption would be more sensitive to changes in interest rates, which implies that smaller changes to interest rates will be necessary to re-equilibrate world savings and investment flows.

Table II.1. Key Macroeconomic Variables in the Initial Steady State

	Japan	Rest of the World
Country size	11.5	88.5
% share of world real income	11.4	88.7
National expenditure accounts at market prices		
Consumption	57.0	51.5
rule-of-thumb	12.4	7.2
forward-looking	44.6	44.3
domestic	47.4	50.1
imported	9.5	1.4
Investment	18.1	18.7
for tradables	3.1	4.2
for non-tradables	15.0	14.6
domestic	15.1	18.2
imported	3.0	0.5
Government expenditures	22.7	30.0
Exports	14.4	1.6
of consumption goods	10.4	1.2
of investment goods	4.0	0.4
Imports	12.2	1.8
of consumption goods	9.1	1.3
of investment goods	3.0	0.5
Tradable/nontradable split		
Tradables	15.7	20.2
domestic	1.1	18.6
imported	12.3	1.9
net exports	2.3	-0.3
Nontradables	84.3	79.8
Factor incomes		
Capital	37.7	36.1
Labor	62.4	63.9
Interest rate		
Real short-term interest rate	2.0	2.0
Government		
Debt	87.5	40.0
Tax rates		
On workers' social security contribution (effective)	20.1	32.4
revenue as a % of GDP	4.8	11.7
On employers' social security contribution (effective)	11.0	11.0
revenue as a % of GDP	4.5	5.0
On corporate income		
revenue as a % of GDP	3.7	3.3
of which: on capital income	7.5	7.5
of which: revenue as a % of GDP	1.0	1.0
of which: on dividend income (profits)	7.5	7.5
of which: revenue as a % of GDP	2.7	2.3
On personal income	9.5	9.5
revenue as a % of GDP	7.5	7.1
On consumption (effective VAT rate)	4.4	6.0
revenue as a % of GDP	2.5	3.0

Source: IMF staff estimates.

Table II.2. Behavioral Assumptions and Key Parameters in the Initial Steady State

	Japan	Rest of the World
Behavioral assumptions subject to sensitivity analysis		
Planning horizon of consumers	20 years	12.5 years
Labor disutility parameters	0.92	0.92
Fraction of rule-of-thumb consumers	0.40	0.25
Intertemporal elasticity of substitution	0.33	0.33
Other key parameters		
Elasticity of substitution between capital and labor	0.93	0.93
Effective discount rate	0.92	0.92
Depreciation rate on capital	0.12	0.07
Capital adjustment cost parameters	1.00	0.60
Elasticity of substitution between varieties		
Tradables sector	4.85	7.67
Price markup over marginal cost	1.26	1.15
Nontradables sector	3.44	4.23
Price markup over marginal cost	1.41	1.31
Capital share in production tradables sector	0.42	0.42
Capital share in production nontradables sector	0.42	0.42
Utility from real money balances	0.02	0.02
Price stickiness parameters	0	0
Home bias in government consumption	yes	yes
Home bias in private consumption	no	no
Elasticity of substitution between traded and nontraded goods	0.75	0.75
Bias towards domestically produced tradables over nontradables	0.20	0.30

Source: IMF staff estimates.

References

- Batini, Nicoletta, Papa N'Diaye, and Alessandro Rebucci, 2005, "The Domestic and Global Impact of Japan's Policies for Growth," IMF Working Paper 05/209 (Washington, D.C.: International Monetary Fund).
- Baylor, Maximilian, 2005, "Ranking Tax Distortions in Dynamic General Equilibrium Models: A Survey," Working Paper 2005-06 (Ottawa: Department of Finance).
- Bayoumi, Tamin and Dennis Botman, 2005, "Jam Today or More Jam Tomorrow? On Cutting Taxes Now Versus Later," *Canada-Selected Issues*, IMF Country Report No. 05/116 (Washington, D.C.: International Monetary Fund).
- Bayoumi, Tamin and Dennis Botman, and Manmohan Kumar, 2005, "Effects of Social Security and Tax Reform in the United States," *United States-Selected Issues*, IMF Country Report No. 05/258 (Washington, D.C.: International Monetary Fund).
- Botman, Dennis and Keiko Honjo, 2006, "Options for Fiscal Consolidation in the United Kingdom," IMF Working Paper 06/89 (Washington, D.C.: International Monetary Fund).
- Botman, Dennis and Manmohan Kumar, 2006, "Fundamental Determinants of the Effects of Fiscal Policy," IMF Working Paper 06/208 (Washington, D.C.: International Monetary Fund).
- Botman, Dennis, Douglas Laxton, Dirk Muir, and Andrei Romanov, 2006, "A New Open Economy Macromodel for Fiscal Policy Evaluation," IMF Working Paper 06/45 (Washington, D.C.: International Monetary Fund).
- Laxton, Douglas, and Paolo Pesenti, 2003, "Monetary Rules for Small, Open, Emerging Economies," *Journal of Monetary Economics*, Vol. 50, No. 5, pp. 1109–52.

III. PRACTICAL ISSUES SURROUNDING THE NEW UNDERSTANDING OF PRICE STABILITY²⁵

1. **This chapter examines two issues surrounding the Bank of Japan’s understanding of price stability in the context of its new framework for monetary policy.** First, the range of inflation—zero to two percent—is lower than the inflation reference ranges used at other central banks. Second, while the range focuses on headline CPI inflation, other price indicators could also be useful in assessing medium-term inflation pressures. This chapter shows that inflation has indeed been lower in Japan than in most industrial countries, suggesting a lower range may be appropriate. It also examines a number of price indices and finds that core CPI performs well in describing the medium-term inflation outlook.²⁶

A. Japanese Inflation in the Historical and International Context

2. **Over much of the recent history, Japan’s inflation has been in the middle of the range of G-7 countries’ experiences** (Table 1). Japan has been somewhat unusual in that it has experienced periods of both substantially higher-than average and lower-than average inflation in the G7.

3. **During the 1960s—and for most of the 1970s, Japan’s inflation rate was significantly above the average due to a number of factors.** Importantly, the economy was growing robustly, and prices were converging to levels in the other industrial countries. At the same time, labor unions were strong—representing 35 percent of workers—and negotiated indexed wage contracts, which fueled cost-push inflationary pressures.

4. **Economic changes after the 1970s helped to spark a sharp disinflationary trend in Japan that was larger than in other industrial economies.** Cautious monetary policy, a decline in unionization, greater trade openness, an appreciating currency, and lower oil prices reduce inflation from a high of 23¼ percent in 1974 to 0 percent in 1987. While most

	1960	1973	1983	1995
	1972	1982	1994	2005
Japan	5.6	8.6	1.7	-0.1
Other G7 1/	3.2	10.2	4.1	2.4
Canada	2.8	9.6	3.8	2.0
France	4.4	11.0	4.0	1.6
Germany	2.9	5.2	2.4	1.5
Italy	3.9	16.6	6.9	2.7
United Kingdom	4.4	14.1	4.9	2.6
United States	2.8	8.7	3.6	2.5
Industrial Countries 2	n.a.	10.3	4.0	2.0

Source: Haver Analytics, WEO database, and staff estimates.
 1/ PPP weighted average inflation of the non-Japan G7. Weights prior to 1970 are based on 1970-1972 shares.
 2/ IFS definition. Not available prior to 1968.

²⁵ Prepared by Christopher Faulkner-MacDonagh.

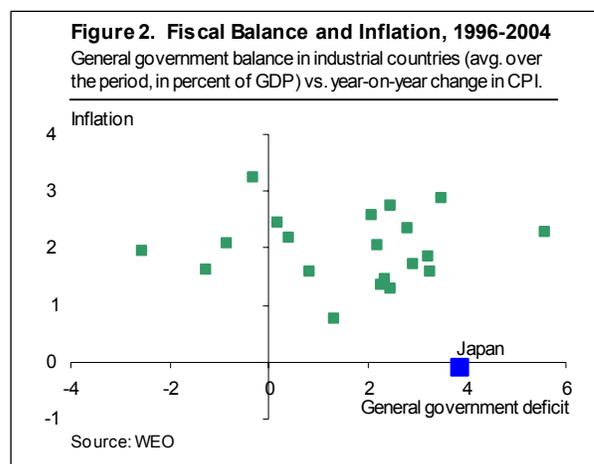
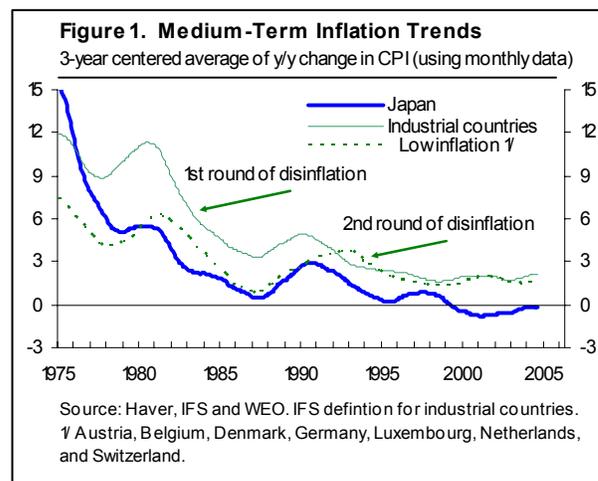
²⁶ For more discussion of the understanding, see the accompanying staff report. Since the understanding is defined over the medium to long-term, both headline and core CPI refer to the same concept. However, there is a need to explain how the current conjuncture is affecting *future* inflation.

industrial countries saw a decline in inflation, Japan's was the largest and fastest. Other countries, on average, saw a decline of only around 10 percentage points over same period.

5. **In most other advanced economies, inflation declined gradually through a two-stage process that left inflation at a low, but positive, level (Figure 1).** In the first round, medium-term inflation fell from above 10 percent in the late 1970s to an average near 4 percent in the late-1980s.²⁷ A second round of disinflation started in the mid-1990s and brought inflation down to around 2 percent, where it has remained over the past several years.

6. **Japanese inflation has been lower than in other advanced economies since the early 1980s.**²⁸ A substantial difference (around $2\frac{1}{4}$ percentage points) emerged during 1983–1994, even prior to Japan's decade of deflation. This difference was smaller in comparison to a group of relatively "low" inflation countries (Austria, Belgium, Denmark, Germany, Luxembourg, Netherlands, and Switzerland), but a gap of around $\frac{3}{4}$ percentage point existed over this period.

7. **Since the mid-1990s, inflation has converged across countries (excluding Japan) to near the levels of traditional "low" inflation countries.** Over the 1990s, most of the gap (of around $1\frac{1}{2}$ percentage points) between relatively "high" and relatively "low" inflation countries



²⁷ In this paper, medium-term inflation is measured by taking the three year centered moving average of the year-on-year changes. The latest data suggest that the average rate of medium-term inflation on this basis is 2 percent for all advanced economies— $1\frac{1}{2}$ percent for "low" inflation countries (Figure 1).

²⁸ This point is also made in Bank of Japan (2006).

disappeared. This convergence has occurred despite differing economic structures: across both small and large countries and with countries that have high and low fiscal deficits (Figure 2). Even the level of product regulation does not appear to have affected inflation.²⁹

8. **Reflecting these developments, central banks came to a broadly similar view regarding the desirable rate of inflation.** Most central banks surveyed in Mahadeva and Sterne (2002) and Roger and Scott (2005) have an inflation range above 1 percent and mainly in the range of 1–4 percent.³⁰ Central banks appear willing to keep inflation low, but not “too low.” This caution is partly explained by Japan’s deflation experience, but other central banks have faced operational difficulties, and recent research has highlighted the dangers of letting inflation drift too close to zero percent (WEO, 1999).

9. **The historical experience suggests that price stability in Japan would be consistent with inflation in the low end of the range of other industrial countries.** It is difficult to speculate when inflation in Japan would converge to the rates of “low” inflation countries. Notwithstanding the strong growth picture, the pace may be gradual, if Japanese inflation expectations are colored by the recent deflationary period (Fukui, 2006).

B. Methods for Identifying and Communicating Price Pressures

10. **Medium-term trends in the CPI now play an important role as a part of the BoJ’s understanding of price stability.** The CPI has a number of advantages over other indicators (such as the GDP deflator): it is available quickly and with high frequency, is not subject to frequent revision, is well-understood, and is immediately relevant to consumers.

11. **However, the usefulness of the CPI may be limited by statistical issues that impart an upward bias to measured inflation.** As a fixed weight index, the CPI uses expenditure shares that are updated infrequently (in Japan, every five years). This imparts an upward bias because it fails to account for the fact that consumers tend to substitute relatively less expensive items for expensive ones.³¹ For Japan, the BoJ has indicated that recent methodological changes have reduced the bias significantly, and some now estimate the bias at between 15–30 basis points (Nishimura, 2006). By comparison, the upward bias in the CPI in other countries remains more pronounced, at around ½–1 percentage points.

12. **Moreover, it is useful to glean additional information regarding underlying price developments by examining various other indices.** Because headline CPI is somewhat

²⁹ Results are from a simple regression of the average inflation rate for OECD economies from 1996–2004 on the level of product market regulations (both economy-wide and in the non-manufacturing sector) in 2003. Descriptions of the data are available in Conway, Janod, and Nicoletti (2005).

³⁰ The Reserve Bank of New Zealand had a target range of 0–2 percent until 1997, when it was extended to 0–3 percent, and then further lifted to 1–3 percent in 2002. The Swiss National Bank equates price stability as annual inflation of less than 2 percent. The ECB aims to keep inflation below, but close to, 2 percent over the medium term.

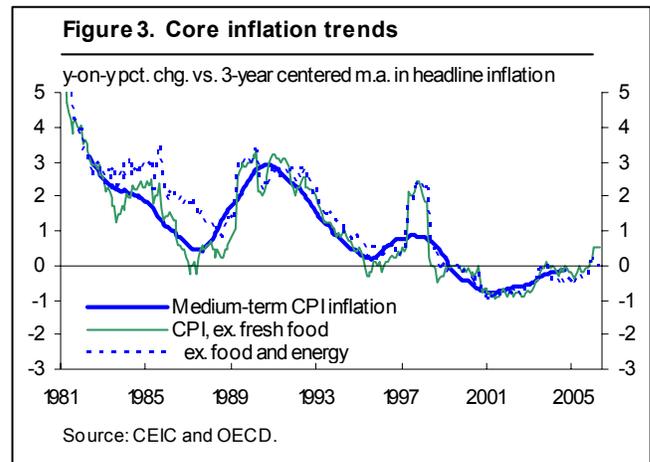
³¹ See Moulton (1997), who also provides a useful overview of other biases.

noisy and concentrated on just consumption goods, it is possible to miss unfolding price pressures in other sectors of the economy. Indeed, most central banks have found it useful to report on a variety of price indices, to reflect developments across the economy. Even inflation-targeting central banks that target the overall CPI inflation rate also look to a range of indicators to help guide and communicate policy (Whitesell, 2005), such as:

- **Core indicators:** trend inflation is derived by eliminating selected, volatile components of the CPI (such as fresh food or food and energy).
- **Multiple-price indicators:** price trends can also be discerned from an examination of a broad range of indices, such as the GDP price deflator and producer prices, which may reflect price pressures in various sectors.
- **Robust indicators:** recently, attempts have been made to measure underlying inflation through indices that are robust to economic changes or to excessive volatility.

Core indicators

13. **Different core inflation measures track medium-term trends well** (Figure 3). Core inflation manages to smooth out the data over most (but not all) of the transient spikes in the contemporaneous data. Indeed, the Japanese definition of core inflation, which excludes only fresh food, is marginally smoother than the traditional definition (CPI less food and energy). Importantly, they both indicate that at present medium-term inflation (as defined in Figure 1) is trending up.



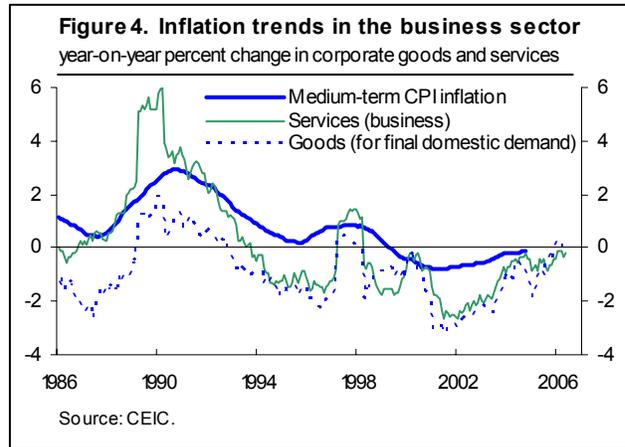
14. **The ease-of-calculation has made core measures a standard part of inflation analysis, but they are not without disadvantages.** Their chief advantage is their simplicity; they are easy to calculate, easy to understand, and widely used. This makes them useful for communication. However, this approach can prove problematic; first, core indices can exclude a large percentage of the overall index.³² Second, core CPI can still remain volatile. Finally, the composition of goods in the core CPI often does not have a theoretical justification.

Multiple-price indicators

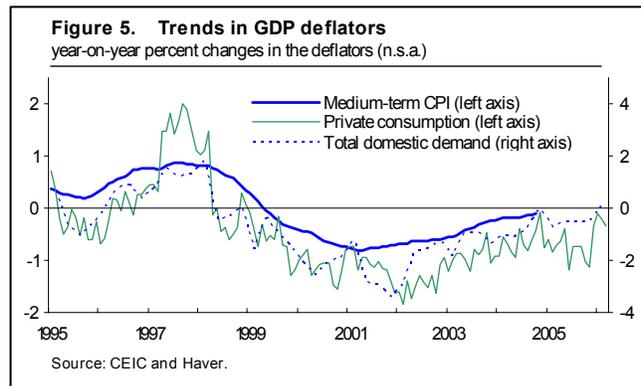
³² In Japan, fresh food comprises only 5 percent of the CPI, but in other countries many more items are excluded. For example, in the United States, the core CPI excludes just under 25 percent of the overall index.

15. **Because inflation pressures may develop in a specific sector of the economy, it is also useful to examine indices other than the CPI.** Since the CPI covers consumption goods, it may miss developments in the business or external sector. To help address this shortcoming, alternative indices such as the producer price index or GDP deflator can also shed light on current developments.

16. **Business sector indicators do not appear to match overall price developments well, but even these confirm that the effects of deflation are waning.** Japan has two price indices of the business sector (Corporate Goods Price Index, CGPI, and Corporate Service Price Index, CSPI) that measure prices paid and received by business for most goods and services.³³ While inflation in the business sector moves somewhat in line with medium-term CPI changes, there are gaps that persist over time (Figure 4). Indeed, during the late 1990s and into the early 2000s, they seem to show greater deflation than the headline measure of CPI. More recently, however, both the CGPI and CSPI are also trending upward.



17. **Similarly, GDP-based price indicators also follow trend inflation, albeit with more noise and a lag** (Figure 5). To understand developments in the broader economy, it can be useful to look at the deflators for private consumption expenditure and total domestic demand.³⁴ These GDP-based series show mild, ongoing deflation through 2005. However, this may be due to the broader range of goods included in the GDP-indices (for example, investment goods in the total domestic demand deflator) and methodological differences. (The GDP data are chain-weighted; the CPI is fixed-base.)



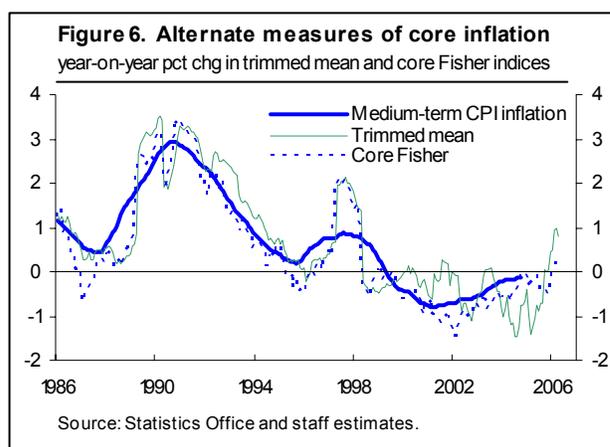
³³ The CGPI is comprised of the prices of goods traded among companies, including both domestically-traded goods (910 items, 74 percent of the index) and those that are exported (222 items, 14 percent of the index) and imported (293 items, 12 percent of the index). In a similar manner, the CSPI focuses on the prices of services traded among companies, although it excludes some services that are difficult to measure at a monthly frequency (such as imputed interest of financial services, wholesale, or retail trade) or services to individuals. It, too, includes domestic and imported services.

³⁴ These indices more closely reflect domestic price developments than the GDP deflator, because the latter includes the effects of import prices, but with a negative sign. A large increase in the price of imported oil shows up as a *drag* on the GDP deflator, even though consumers and businesses are paying higher prices.

18. **However, price indices from the business sector or the national accounts are more complex than CPI-based measures, which detracts from their usefulness.** GDP-based measures include a broader range of goods (for example, investment goods and government services), are subject to frequent revisions, and are available only with a long delay. All of these complications making their use difficult for policy makers, especially as real-time indicators. The business-sector price deflators can include the prices of intermediate goods, whose ultimate impact depends on how these goods are used in final production.

Robust price measurement

19. **Besides the core and multiple price indicator approaches, other analytical indices can be informative about underlying trends.**³⁵ The first approach, (the “trimmed mean” estimator) excludes those components of CPI that have the largest effect on the headline rate. This “trimmed mean” index assumes that large price changes reflect temporary shocks to the trend rate (Bryan and Cecchetti, 1994). The second approach constructs a Fisher chain-weighted price index, which closely approximates an “ideal” measure from consumer demand theory (Fisher, 1922). Notably, both match trend inflation well (Figure 6).



20. **However, the complexity of these indices can present additional communication challenges.** In particular, the novel approach to their construction and relatively new nature would pose communications difficulties. For example, some studies have shown that the best forecast of medium-term inflation (using the trimmed mean estimator) requires removing as much as 75 percent from the CPI. However, such trimming would likely lead to questions as to whether “too much” information is being discarded. Furthermore, these two estimators disagree about inflation developments since 2000, so even robust approaches can offer different views on trend inflation.

Evaluation of the Three Approaches

21. **A number of criteria can help serve as a guide to selecting which indicator is the most useful in assessing and communicating about inflation.** Roger (1998) and Wynne (1999) suggest that an ideal price index should be: timely, well-understood and trusted by the public, seldom revised, have a low or negligible bias, reflect the forward-looking component of inflation expectations, and be theoretically-based.

³⁵ See Appendix A for details on the construction of both indices. The results shown here remove the top and bottom 10 percent of the index that is the most volatile.

22. **By these criteria, core CPI ranks well** (Table 3). Core inflation lacks only a link to theory or an estimate of forward-looking price developments. However, the lack of such elements also means that the index is simple to understand. Furthermore, the estimated bias of core CPI is low, with a substitution bias of only around $\frac{1}{4}$ percent.³⁶

23. **Importantly, the core CPI approach also appears superior to every other approach, other than the trimmed mean.** The CGPI and CSPI may be nearly as useful as core indices; however, there can be substantial

deviations between consumer and producer price inflation. Meanwhile, the GDP-based measure (private consumption deflator) and Fisher chain-weighted indices are not likely to be readily understood by the general public. Furthermore, both indices are based on survey data and can be revised substantially over time. Only the trimmed mean estimate of inflation is available as readily as core CPI, but the estimated bias is marginally lower, and research has shown that it is not much better at forecasting future inflation than the core CPI. At the same time, it may be difficult for the central bank to explain and justify the trimming process. (For example, why certain items were excluded or why a trimming percentage was chosen.)

C. Summary

24. **This chapter examines the impact of Japan's inflation history on the new understanding of price stability.** The definition of price stability (zero to two percent) is lower than that used in other central banks. However, Japan's inflation has also been lower than in most industrial countries, occurring even prior to the onset of deflation.

25. **Second, the chapter also reviews several approaches to examining price developments and concludes that core inflation works well in explaining trend inflation.** The core and headline measures of CPI will agree over the medium-term, which is the reference period for the BoJ's understanding of price stability. Nevertheless, it can be useful to have a set of indicators to help explain the current conjuncture. In that regard, the core CPI is smooth and matches some estimates of trend inflation. It is also well-understood by the public, which is a useful feature in a price index that is used as part of a central bank's communication strategy.

Criteria	Approach				
	Core	Multi		Robust	
		CGPI CSPI	GDP	Trim	Fisher
Timely	Yes	Yes	No	Yes	No
Trustworthy					
Understood	Yes	?	?	No	?
Verifiable	Yes	Yes	No 1/	Yes	Yes
Track-record 2/	Yes	Yes	Recent	Recent	No
Constant	Yes	Yes	No	Yes	No
Robust	Yes	Yes	Yes	Yes	Yes
Substitution bias 3/	0.2	-1.4	-0.3	0.1	0.0
Theory-based	No	No	No	Yes	Yes
Forward-looking	No	No	No	?	?

1/ Detailed information on the GDP deflators are unavailable.
2/ Has been used extensively in public documents in Japan.
3/ Pct. pnt. difference from headline Fisher chain-weighted index (1995-present).
For CGPI/CSPI: geometric average of business services and final demand goods.
For GDP: difference between private consumption deflator and Fisher index.

³⁶ Estimates in Shiratsuka (1999) suggest that the substitution bias (which is corrected by a chain-weighted formula) accounts for around one-half of the total bias (substitution plus others). This gives an upper bound to the overall bias of the CPI index of possibly around $\frac{1}{2}$ percent.

Annex. Robust Measures of Trend Inflation

Fisher chain-weighted price index

1. **A significant source of bias in the CPI arises from the use of expenditure weights that are updated only periodically.** In Japan, the updating process occurs once every five years. (The next is scheduled for August 2006.) Over time, these weights will become less representative of current expenditure patterns, introducing errors.
2. **The chain-weighting procedure attempts to fix these shortcomings by using weights that are updated each period.** The resulting index is linked together with its level in the previous period, so the index is constantly freshened with weights reflecting the most recent data.
3. **While there are many chain-weighting approaches, the Fisher index turns out to have optimal statistical properties.** The Fisher chain-weighted index is a geometric average of a Laspeyres (previous period weights) and Paasche (current period weights) indices. Diewert (1976) shows that the Fisher version of chain-weighting does a better job at representing a true “cost-of-living” index than either the Laspeyres or Paasche indices.
4. **The Fisher CPI is constructed using monthly data starting in 1980.** First, detailed CPI data (on 598 items) are matched to 41 expenditure categories in the monthly *Family Income and Expenditure Survey* for worker’s households (from the Nomura Research Institute). Then, the expenditure and price series are seasonally-adjusted using the Census X12 seasonal adjustment process. A quantity series is calculated from the seasonally-adjusted price and expenditure data. Since the *FIES* expenditure data does not include a “fresh food” category, the “core” Fisher price index is calculated by excluding the two items: the one with the largest positive and the one with the most negative contribution to headline inflation, where the contribution to growth formula is taken from Whelan (2000). In general, the procedure typically results in excluding categories that account for around 5-10 percent of the overall index (similar to the core CPI).

Trimmed mean price index

5. **Not only does the CPI suffer from statistical biases, it is typically noisy—making it difficult to determine in “real-time” the underlying trend inflation rate.** Not only are the month-to-month changes in the CPI large, but the changes in individual price components can also be significant. Bryan and Cecchetti (1999) report that the standard deviation of the individual components of inflation are nearly six times higher than the average inflation rate. Shiratsuka (1997) also notes that the distribution of prices are non-normally distributed, with “fat-tails” (i.e., large deviations of the mean are common).
6. **This noisiness suggests that a weighted average is not the best measure of the mean of the distribution.** Noisy, or high variance, data suggests that the probability

distribution cannot be represented with an exponential probability density function (e.g., normal). Instead, the mean of these fat-tailed distributions may not be well-defined. In these cases, it is better to use an alternate estimator, such as the sample median.

7. **To address these statistical problems, Bryan and Cecchetti (1997) recommend taking a special weighted average of the index that excludes extreme values.** They also show that this statistical solution has useful economic and econometric properties. The trimmed mean is less noisy, allowing policy makers to overlook the monthly blips. It also provides a better forecast for inflation, typically even better than core inflation.³⁷ For Japan, Bryan and Cecchetti find that the optimal trimming excludes 76 percent of the sample (the 38 percent with the largest positive and negative inflation rates).

8. Table A.1 reports the results of the 15 products that are most likely to be trimmed.

Table A.1: Trimming Results: 15 most likely products to be trimmed, 1986-2005
Ranked by the percentage of months trimmed from the sample

	Trimming Frequency			Average Weight in CPI (4)
	Number of months		Percent of months trimmed (3 = 1+2/131 mo.)	
	Left (1)	Right (2)		
Fresh Vegetables	122	95	90.4	1.9
Clothing	103	110	88.8	2.8
Fresh Fruits	100	103	84.6	1.2
Fresh Fish & Shellfish	100	76	73.3	1.9
Shirts & Sweaters	96	57	63.8	1.4
Cut Flowers	68	59	52.9	0.4
Rent	14	104	49.2	15.7
Automotive Maintenance	82	34	48.3	4.7
Recreational Durables	107	3	45.8	1.1
Eggs	64	42	44.2	0.2
Hotel Charges	60	39	41.3	1.2
Public Transportation	37	43	33.3	3.2
Fuel, Light & Water Charges	44	29	30.4	6.0
Eating Out	22	38	25.0	6.8
Package Tours	26	29	22.9	0.2
Memorandum items:				
Energy-related (Fuel, water, light)	3	2	2.1	0.5
Food	620	458	16.0	33.2
Fresh food	322	274	82.8	5.1
Rice	5	1	2.5	0.2
Durable goods 1/	255	24	8.3	8.9

1/ Primarily recreational durables, but also including medical appliances and automobiles.

³⁷ Measured by the root mean squared forecast error of the regression of trimmed inflation on the 36-month moving average of CPI inflation.

References

- Bank of Japan, 2006, “Background Note to: The Bank’s Thinking on Price Stability,” March 10, available on the BoJ web site: www.boj.or.jp.
- Bryan, Michael F. Bryan and Stephen G. Cecchetti, 1994, “Measuring core inflation,” in *Monetary Policy*, ed. N. Gregory Mankiw, (University of Chicago Press).
- , 1999, “The Monthly Measurement of Core Inflation in Japan,” *Bank of Japan: Institute for Monetary and Economic Studies (IMES) Discussion Paper Series*, No. 99-E-4 (February).
- Conway, Paul, Véronique Janod, and Giuseppe Nicoletti, 2005, “Product Market Regulation in OECD Countries: 1998 to 2003,” *OECD Economics Department Working Paper*, ECO/WKP(2005)6, April.
- Diewert, W. Erwin, 1976, “Exact and Superlative Index Numbers,” *Journal of Econometrics* Vol. 46 (May) 115-45.
- Fukui, Toshihiko, 2006, “New Framework for the Conduct of Monetary Policy: Toward Achieving Sustainable Economic Growth with Price Stability,” Speech to the Japan Chamber of Commerce and Industry, Tokyo (March 16).
- Mahadeva, Lavan and Gabriel Sterne, 2002, “The role of short-run inflation targets and forecasts in disinflation,” *Centre for Central Banking Studies*, No. 167 (Bank of England).
- Moulton, Brent, 1997, “Bias in the Consumer Price Index: What is the Evidence,” *Journal of Economic Perspectives*, Vol. 10, No. 4 (August) 159–177.
- Nishimura, Kiyohiko, 2006, “The New Policy Framework of the Bank of Japan: Central Banking in an Uncertain World,” Speech at Uppsala University, June 27.
- Roger, Scott, 1998, “Core Inflation: Concepts, Uses and Measurement,” *Reserve Bank of New Zealand Discussion Paper*, No. G98/9, July.
- Roger, Scott and Mark Stone, 2005, “On Target? The International Experience with Achieving Inflation Targets,” *IMF Working Paper*, No. 05/163, August.
- Shiratsuka, Shigenori, 1997, “Inflation Measures for Monetary Policy: Measuring Underlying Inflation Trend and Its Implication for Monetary Policy Implementation,” *Institute for Monetary and Economic Studies Discussion Paper Series*, No. 97-E-7, August.
- , 1999, “Measurement Errors in the Japanese Consumer Price Index,” *Monetary and Economic Studies*, Vol., 17, No. 3 (Institute for Monetary and Economic Studies, Bank of Japan) December.

WEO, 1999, "Safeguarding Macroeconomic Stability at Low Inflation," *World Economic Outlook*, Chapter 4, October.

Whelan, Karl, 2000, "A Guide to the Use of Chain Aggregated NIPA Data," *Finance and Economics Discussion Series*, No. 2000-35 (June, Federal Reserve Board of Governors).

Wynne, Mark, 1999, "Core Inflation: A Review of Some Conceptual Issues," *Federal Reserve Bank of Dallas Working Paper Series*, No. 9903 (June).

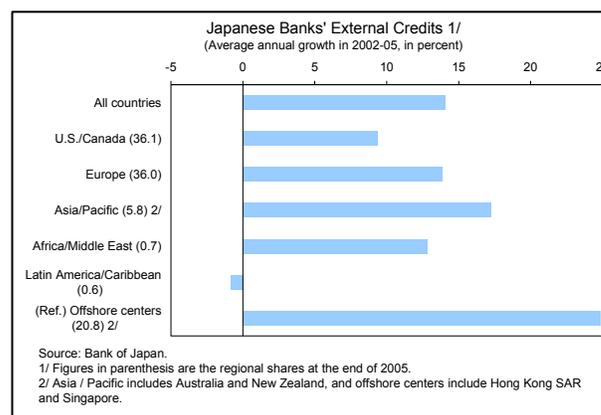
IV. THE REEMERGENCE OF JAPANESE BANKS IN ASIA³⁸

9. **In an effort to diversify their lending and raise profits, Japanese banks are expanding overseas, particularly in other countries in Asia.**³⁹ As they move toward less defensive financial positions—including by reducing government bond investment and expanding uncollateralized SME lending—banks are also reestablishing operations in Asia that were scaled back in the wake of the collapse of the bubble as well as 1997–98 Asian crisis. These operations mainly comprise providing lending, derivatives, and cash management services to Japanese companies as they shift production and distribution into Asia, but they also increasingly include transactions with non-Japanese clients. Japanese banks’ strategies in Asia differ from those in Europe and the United States, where they focus more on investment banking services such as M&A and securities lending.

10. **This chapter describes the reengagement of Japanese banks with the rest of Asia,** including the rapid increase in credit extension and the products and strategies employed. It then considers the potential implications of this reengagement for financial and macroeconomic stability in both Japan and in the other Asian countries.

A. Recent Developments in Japanese Banks’ Overseas Operations

11. **Japanese banks’ external credit outstanding has been growing apace, but especially rapidly vis-à-vis Asia.** While the current share of credit extended to Asia is only about one-sixth of that vis-à-vis North America or Europe, it has been growing steadily since end-2002. Asia has also accounted for a rising share of Japanese banks’ overseas branches, particularly in countries where Japanese manufacturers have established operations.⁴⁰

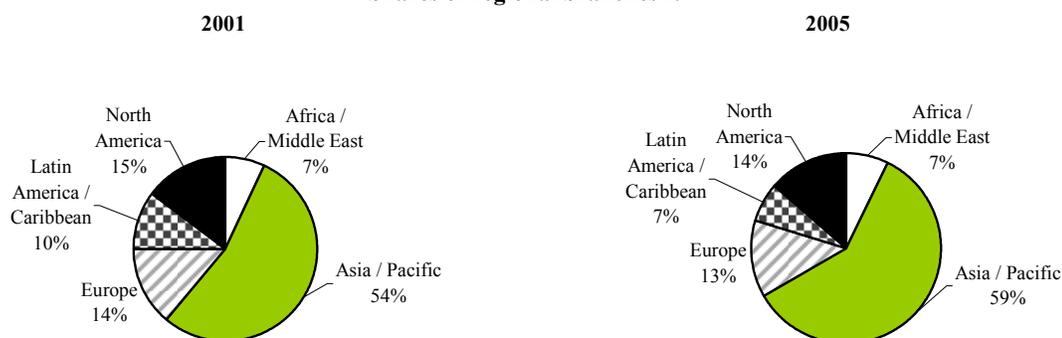


³⁸ Prepared by Shinobu Nakagawa (ICM)

³⁹ Because this chapter focuses on cross-border activities, references to “Asia” exclude Japan. “Asia” also excludes the financial centers of Hong Kong SAR and Singapore (which are classified as “offshore centers”), and includes Australia and New Zealand.

⁴⁰ Credit to offshore centers is rising even faster than credit to Asia, particularly vis-à-vis the Cayman Islands and Bermuda. In these jurisdictions, credits are mostly extended to special purpose vehicles that issue (for example) subordinated debt for Japanese banks. Offshore centers also serve as conduits for credit to U.S. and global hedge funds (mostly market-neutral and global-macro funds of funds), as Japanese banks diversify their asset portfolios.

Shares of regional branches 1/



Branch network in 2005 1/

Branches		Sub-branches and Representative offices	
Total	103	Total	74
Africa / Middle East	1	Africa / Middle East	12
Asia / Pacific	69	Asia / Pacific	36
Australia	2	Australia	1
Bangladesh	0	Bangladesh	1
China	19	China	16
Hong Kong SAR	6	Hong Kong SAR	2
India	5	India	1
Indonesia	1	Indonesia	3
Malaysia	4	Malaysia	6
Myanmar	0	Myanmar	2
New Zealand	1	New Zealand	0
Pakistan	1	Pakistan	0
Philippines	2	Philippines	1
Singapore	5	Singapore	0
South Korea	5	South Korea	0
Taiwan	5	Taiwan	0
Thailand	9	Thailand	0
Vietnam	4	Vietnam	3
Europe	14	Europe	9
Latin America / Caribbean	7	Latin America / Caribbean	5
North America	12	North America	12

Source: Individual Banks' Annual Reports.

1/ The sum of MUFG, Mizuho FG, and SMFG, not including their subsidiaries and affiliated companies.

12. **Within Asia, China and South Korea have been the two largest destinations for Japanese banks credit.**⁴¹ As Japanese companies (and their parts suppliers) in industries such as autos and home electronics have ventured further into these Asian countries, their domestic banks (both major and regional) have followed to provide financial services, such as lending and cash management, in a fashion similar to the approaches of German and other industrial-country banks. In China, the rise in credit partly reflects lending to large Japanese manufacturers that are working to upgrade facilities so that they can produce and distribute

⁴¹ As noted above, Hong Kong SAR and Singapore are classified in offshore centers, and thus excluded from the table.

final consumption goods. While the shares of both China and South Korea have grown since 2000, along with the shares of India, Taiwan Province of China (POC) and (while small) Vietnam, the share of ASEAN-4 countries has fallen.

**Table 1. Top 10 Asian Jurisdictions for Japanese Banks' External Credits
(In percent)**

	Shares in Asia				
	2000	2002	2004	2005	
1	China	18.5 South Korea	24.8 China	27.6 China	25.7
2	South Korea	18.5 China	19.1 South Korea	26.9 South Korea	25.1
3	Indonesia	18.4 Indonesia	14.3 Thailand	9.6 Malaysia	9.3
4	Thailand	17.7 Thailand	13.8 Indonesia	9.5 India	9.1
5	Malaysia	10.1 Malaysia	12.4 Malaysia	8.7 Thailand	8.9
6	Philippines	5.4 Philippines	5.8 Taiwan	7.2 Indonesia	8.7
7	Taiwan	5.4 Taiwan	4.7 Philippines	4.9 Taiwan	7.1
8	India	3.8 India	3.1 India	3.6 Philippines	4.3
9	Pakistan	0.8 Pakistan	0.7 Vietnam	0.8 Vietnam	0.9
10	Vietnam	0.6 Vietnam	0.4 Kazakhstan	0.5 Kazakhstan	0.5

Source: Bank of Japan.

13. **Japanese banks have also become more active in the domestic banking markets of selected countries.** Activities include providing banking services to non-Japanese corporate clients, although they remain limited to well-known names in the region and public projects, due to insufficient financial disclosure by local SMEs. Japanese banks are also increasing their involvement in syndicated loan participation and arrangements, as well as asset securitization and liquidation, particularly in South Korea and major Southeast Asian countries.⁴² Retail operations such as housing loans and consumer credit are much more limited. However, there may be increased scope to expand such operations in China in the near future, as provision of such services in local currency is to be allowed starting December 2006.

B. Japanese Bank Business Activities in Asia

Funding operations

14. **The funding structure of Japanese banks' overseas activities is fairly simple.** Assets—mainly loans and securities investment—are principally financed by local currency deposits and inter-office accounts (borrowing from headquarters or other branches). This balance sheet structure is basically the same for most Asian branches.⁴³ In China, however,

⁴² Japanese banks' branches, subsidiaries, and affiliated companies in Hong Kong SAR and Singapore play a leading role in their fee-based businesses in the region.

⁴³ The share of inter-office accounts in total liabilities has declined by roughly one half in the last decade, as local branches in Asia have accumulated deposits from their corporate clients in the region.

loans exceed currency deposits, and thus the banks rely more on inter-bank funding (call money) from large Chinese banks.

Table 2. Principal Assets and Liabilities of Overseas Branches of Japanese Banks

(as of December 2005, in billions of U.S. dollars)

Assets		Liabilities	
Loans and bills discounted	164.8	Deposits	178.9
Cash and due from banks	58.5	Acceptances and guarantees	46.0
Investment securities	49.6	Inter-office accounts	31.3
Trading assets	21.1	Trading liabilities	23.9
Financial derivatives	18.7	Financial derivatives	18.7
Foreign exchanges	8.2	Negotiable certificates of deposit	22.6
Foreign bills bought	4.0	Borrowed money	10.5
Due from foreign banks	3.2	Payables under securities lending	7.2
Call loans	8.1	Call money	4.6
Receivables under securities borrowing	1.7	Due to foreign banks	0.3

Source: Bank of Japan.

15. **Looking ahead, however, banks may diversify their funding sources.** As credit exposures continue to grow, local branches may need to develop a variety of funding alternatives from local financial markets, such as call money and bonds with various maturities, which in turn could support development of local capital markets.

Products and services offered by Japanese banks

16. **The main products and services offered in local Asian markets comprise:**

- **Syndicated loans** have become a major instrument for supplying credit to regional projects and large-scale facility investments by both Japanese and non-Japanese clients. Japanese major banks are active as both arrangers and participants. Loan syndication often includes Japanese regional and local Asian banks, and in some cases, U.S. and European counterparts.
- Through their group trust banks, Japanese banks are also selling Japan-related **trust products**, such as J-REITs and trust beneficiary rights including high-yield Japanese credits. These products meet the needs of Asian investors, who have strong appetites for higher returns and also want to diversify their geographical exposure beyond the United States and Europe.
- Inroads into **retail banking operations**, such as housing loans and consumer credit, have been slower, however, reflecting stiff competition from entrenched local banks. Japanese banks are looking to establish alliances and capital relationships with local large financial institutions in some markets in order to increase their activities in the retail sector.

C. Implications for Financial and Macroeconomic Stability in Asia

17. **The increased presence of Japanese banks in Asia boosts their profitability and improves their risk diversification,** and thus bolsters the stability of the Japanese banking

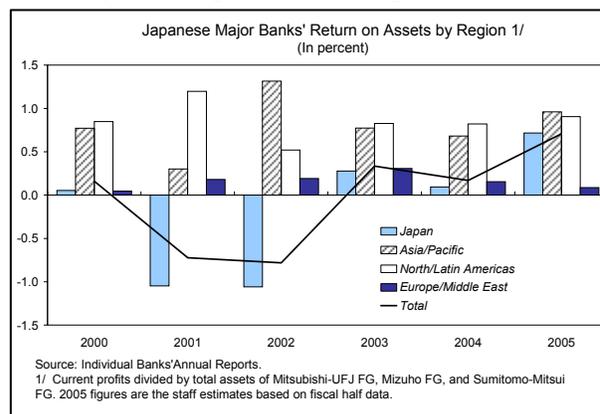
and financial system. It also provides another source of credit for Asian economies, and thus potentially supports their stable long-run growth.

Bank profitability

18. Asia has been a source of high and relatively stable profits for Japanese banks.

Asia, along with North America/Latin America, has been a source of high ROA (return on assets). This is notable, given that North American operations are less asset-intensive, relying more on fee-based activities. The strong profitability of Asian operations may reflect the fact that even ordinary lending can earn sizeable returns in some Asian countries: for example, lending margins in China average 350–400 basis points. Moreover, it does not seem to have resulted in a deterioration in credit quality:

according to bank annual reports, asset quality (as measured by nonperforming loans) on credit to the private sector has been significantly better in Asia than in the United States.



19. **While the shift into Asia has supported core profits, they remain low.** High recent net incomes mainly reflect huge reductions in domestic loan-loss provisioning costs, made possible by Japan's economic recovery. Going forward, high-yielding activities in Asia, along with an expanded range of activities at home, could bolster Japanese banks' profitability and thereby promote the health and stability of the banking system.

Bank credit risk management/diversification

20. **The expansion into Asia is also increasing Japanese banks' geographical diversification.** In order to avoid building excessive credit risk concentration in particular markets, diversification needs to be well balanced between Japan, other Asian countries, and other regions. Such diversification is also consistent with Japanese supervisory policies and the Basel II principle. That said, credit exposures to Asian markets remains very small compared to other regions, such as the United States and Europe, and a few countries account for a large share of the exposure to Asia.

21. **Growth in Japanese banks' credit extended to Asia is also providing diversification across Japanese and non-Japanese clients.** In particular, the lending shares accounted by Japanese and non-Japanese clients are currently roughly equal in most Asian countries, thanks to efforts to build long-term relationships with local conglomerates and

governments.⁴⁴ In China, by contrast, Japanese companies account for 80-90 percent of credit exposure. Indeed, Japanese banks regard themselves as almost at full capacity to provide financial services to such corporate clients in China.

22. **Of course, the expansion also raises potential challenges in managing credit risk exposure.** Accordingly, Japanese mega banks are actively managing credit risk on a portfolio basis. Their Tokyo headquarters collate all information on domestic and global credit exposures and evaluate total credit risk on a quantitative basis and with respect to economic capital. Relatedly, they are managing credit risk through their financial operations—for example, by aggressively arranging and participating in syndicated loans both domestically and in Asia. More gradually, they are also starting to use credit derivatives to transfer Asian credit risks to global investors (although most of the risk transfer involves Japanese risks).

Potential implications for Japanese and Asian regional macro economies

23. **Although exposure to Asia remains modest, the better diversification of Japanese banks would in principle make the banking system more robust.** With Asia still accounting for a small share of credit, the diversification benefit would be marginal at present. Nevertheless, given that the regional and Japanese economic cycles are imperfectly correlated, the share of the balance sheet exposed to a deterioration in the Japanese economy is somewhat smaller than in the past. Accordingly, as long as regional economies are expanding, the risk of a sharp erosion of capital that would cause banks to rein in credit at home and abroad would be moderately reduced. Similarly, because Japanese companies are also becoming more internationally diversified, their exposure to a downturn in Japan—and thus their creditor banks' exposures—is reduced. Indeed, as they grow further, Asian banking operations could come to provide an earnings and capital buffer that would help to sustain credit growth and support the monetary transmission channel in the event of a domestic downturn, which would promote Japanese financial and economic stability.

24. **By the same token, Japanese banks' lending to local companies in Asia diversifies those companies' funding sources.** Compared with domestic banks in the region, Japanese banks are less exposed to local economic conditions and thus would be less likely to experience a significant worsening in credit quality because of a downturn in any one country. Accordingly, they could in principle play a buffer role if the local credit cycle turned down, reducing the risk of excessive reductions in credit that could adversely affect production and employment. This role may be especially important for Asia, given the lack of well-developed and liquid corporate bond markets. That said, whether Japanese banks would continue to lend in a downturn is a question, although as noted before, they did tend to maintain their exposures during the Asian crisis, compared with other mature-market banks. In addition, while the evidence on how foreign banks affect access to credit is mixed, survey

⁴⁴ Japanese banks did not reduce credit exposures to the local Asian corporate and public sectors drastically during the Asian financial crisis in late 1990s, compared to their U.S. and European counterparts. This may have created goodwill with local clients, helping to promote their financial activities in the region.

evidence suggests that credit constraints are less binding for firms in countries that have greater foreign bank participation.⁴⁵

25. **At the same time, the risk of spillovers can not be ruled out, although the risk does not seem large at present.** In principle, a sharp and prolonged downturn in Japan could lead Japanese banks to rein in credit to the region in order to clean up their balance sheets, similar to what happened after the 1980s bubble burst. However, this risk is less than in the past, because major banks' balance sheets are strong and they manage risks better. Similarly, a tightening of yen liquidity could in principle tighten terms on lending to regional clients, but the banks have been providing credit to Japanese and non-Japanese clients in the region mainly in terms of U.S. dollars and local currencies funded outside Japan through local deposits and inter-bank money. Lending in Japanese yen, by contrast, has been relatively limited. Thus, higher interest rates in Japan would have at most an indirect effect.

D. Summary and Conclusions

26. **The reemergence of Japanese banks' activities in Asia brings potential benefits to both Japan and other countries.** From Japan's perspective, these activities are a potentially important source of both enhanced profits and better diversification. Both are beneficial for the Japanese banking system, especially in light of still-low core profits. At present, however, credit exposures to Asia remain relatively modest, but over time, growth in these activities could become a significant source of profits, while helping to diversify credit exposures. From the perspective of other countries, the renewed presence of Japanese banks helps to diversify corporate funding sources, which is particularly useful in light of the limited development of local corporate bond markets.

⁴⁵ Clarke, George, Robert Cull, and Maria Soledad Martinez-Peria, "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries?", World Bank Policy Research Working Paper 2716, November 2001.