

Empirical and Thematic Perspectives

Assessing Japan's Long-term Economic Performance – Implications for the United States and the Euro Area

- In this essay, we focus on the drivers of Japan's economic weakness since the bursting of its asset bubble two decades ago, with particular attention to the evolution of demographic and labor market variables. We also compare Japan's experience over this period to that of the United States and the euro area, searching for both similarities and differences. Drawing on this examination, we hazard some guesses as to where these three economies may be headed in the years ahead.
- We find that Japanese growth over the past two decades has, by any metric, been markedly slower than that of the United States and the euro area. Notably, however, the softer pace of Japanese growth has not reflected less favorable productivity performance. Indeed, if any of these economies has posted lagging productivity growth, it is the euro area, particularly over the past decade.
- Rather, Japan's tepid performance has been characterized by a sharp, 15 percent, decline in aggregate hours worked, while the United States and the euro area have posted increases. The contraction in Japanese hours has reflected both labor supply factors (two decades ago Japanese hours per worker were high relative to other advanced economies) and labor demand factors (Japan's corporate sector has aggressively deleveraged and has been conservative in its hiring practices as well).
- As a related point, annual hours per worker in the United States and the euro area are presently outliers relative to other advanced economies—the United States on the high end, and the euro area on the low end. We thus underscore the possibility that hours per worker in the United States may decline toward international norms going forward and that hours in the euro area may rise. Even so, attitudes toward work are deeply cultural, and such trends are accordingly difficult to predict.
- The economic effects of Japanese aging have been tempered to date by rising labor force participation, particularly among women. That said, female participation rates in Japan, and the euro area as well, have now increased to levels reached in the United States in the early 1990s, which have not subsequently been surpassed. As such, our view is that further gains in labor force participation in these three economies will need to come from the rising participation of older workers.
- Our working hypothesis is that these economies will successfully manage their demographic transitions. We should not underestimate the capacity of market economies to adapt to shifting environments. The aging population will no doubt pose challenges, but aging will also present profit-making opportunities for new products and production techniques. That said, the all-too-possible failure of political processes to address fiscal sustainability issues looms as a particular risk. Such a failure would intensify stresses in financial markets and weigh on business confidence and, hence, on the willingness to hire and invest.

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Assessing Japan's Long-term Economic Performance – Implications for the United States and the Euro Area

Introduction

In a previous essay, we examined whether the United States seems poised to follow Japan into a sustained period of soft economic growth.¹ After the bursting of the asset bubble two decades ago, Japanese real GDP growth declined sharply and has never recovered. Even so, business-cycle dynamics were surprisingly absent. Real GDP and other key variables showed little pattern of initial decline and subsequent recovery. Rather, the Japanese economy simply transitioned from rapid growth before the bubble burst to markedly slower growth thereafter. The evidence put forward in our previous essay highlighted some clear differences in the U.S. situation at present. Unlike Japan in the early 1990s, the U.S. economy has shown the signs of a prolonged and intense cyclical episode. Key components of U.S. economic activity fell sharply during the financial crisis, but they are now generally in the midst of slow (but distinct) recoveries.

A major open issue from our previous work—which we believe merits deeper examination—has to do with the drivers of the sustained slowing in Japan's economy. How much of this phenomenon has reflected the rapid aging of the country's population versus other factors, such as the protracted deleveraging of the corporate sector after the bursting of the bubble and the (very) delayed response of Japanese policymakers in dealing with the bad loan problems of the banks? Alternatively, given the country's aging demographics, has the soft performance over the past two decades really been surprising or even unusual?

In this essay, we dig deeper into the nature of Japan's economic weakness since the bursting of its asset bubble two decades ago. We also compare Japan's experience to that of the United States and the euro area, searching for both similarities and differences. Drawing on this examination, we hazard some guesses as to where these three economies may be headed in the years ahead.

Our key conclusions are four-fold. First, by any metric, Japanese growth over the past two decades has been softer than that of the United States and the euro area. Specifically, on a per capita basis, Japanese growth has come in at 0.6 percent annually, compared with 1.5 percent for the United States and 1.1 percent for the euro area. Second, the weaker pace of Japanese growth has not reflected softer productivity. Indeed, if any of these economies has posted lagging productivity growth, it is the euro area, particularly over the past decade. Third, a defining feature of Japan's performance has been a sharp, 15 percent, decrease in aggregate hours worked. We find that the drivers of this decline include deteriorating demographics, a reluctance of firms to hire (given concerns about their balance sheets), a statutory shortening of the workweek, and a normalization of labor supply—two decades ago Japanese hours per worker were much higher than in other countries with similar incomes. In contrast, aggregate hours for the United States and the euro area have increased more than 15 percent and 5 percent, respectively, over the past two decades. Finally, our work suggests that the effects of population aging are already well advanced in Japan and that the United States and the euro area will not escape such pressures going forward. Over the next twenty years, all three of these economies are projected to see sharp declines in the shares of their working age population, broadly similar to what Japan has recorded since 1991.

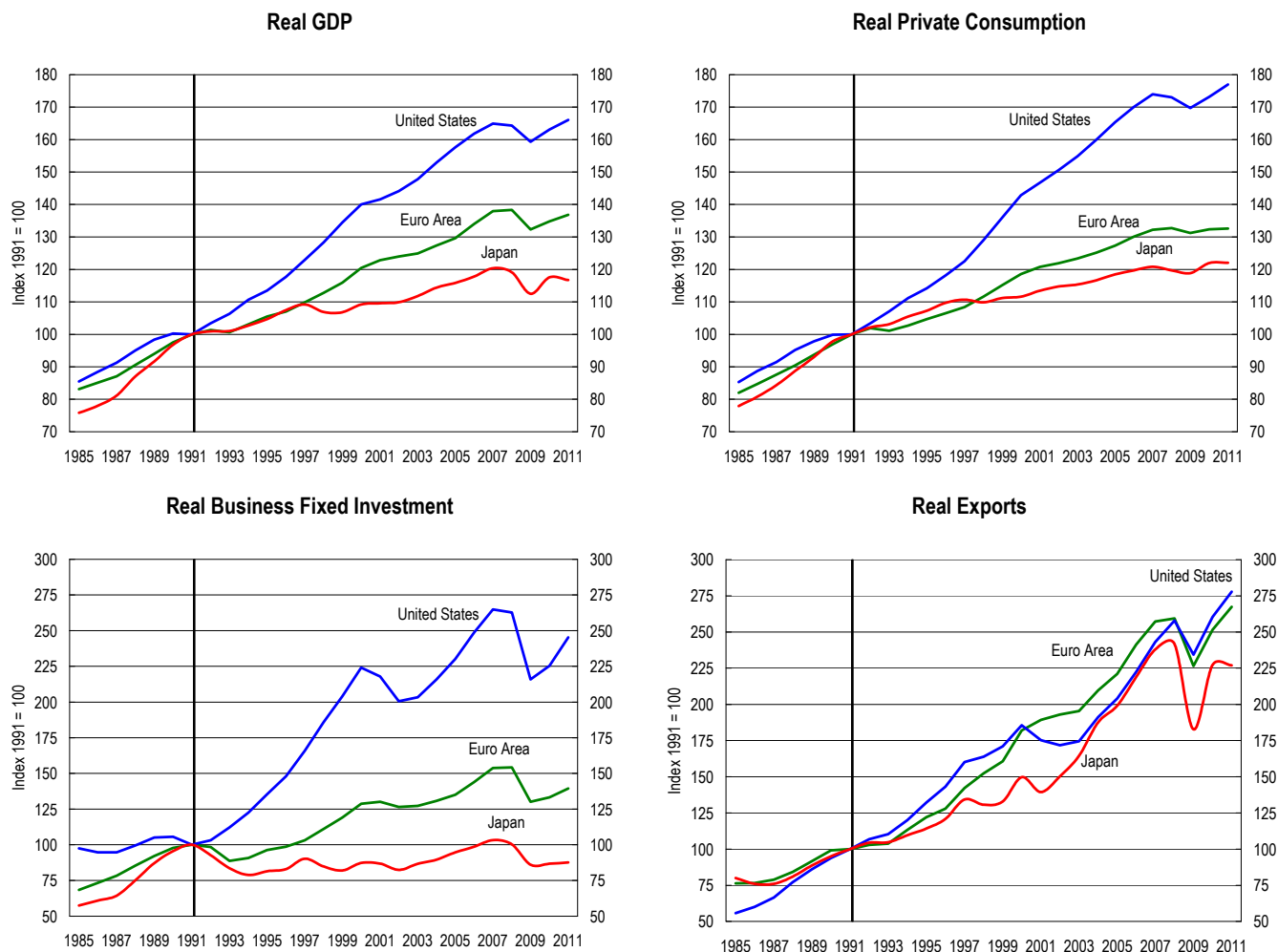
¹ ["Is the United States Following in Japan's Footsteps?" June 26, 2012.](#)

Conceptual Framework

As the framework for this examination, we employ several straight-forward arithmetic decompositions, which will focus mainly on developments on the supply-side of these economies. The key insight is that the evolution of real GDP per capita can be decomposed into moves in labor productivity, hours per worker, the employment rate, the labor force participation rate, and the share of the working age population. We look at the behavior of each of these variables one by one, and then bring them together into a common framework to draw some broader conclusions. We find that this approach provides a powerful lens for examining the performance of the Japanese economy over the past two decades and also allows us to trace out some implications for the United States and the euro area.

In conducting this work, we compare the evolution of the Japanese economy with that of the United States and the euro area, taking 1991 as our benchmark. This date corresponds to the initial bursting of Japan's asset bubble and, in our view, marks a distinct shift in the features of Japan's economic performance. This 1991 benchmark also conveniently provides us two decades of data to examine and use in formulating comparisons.

Figure 1.



Sources: BEA, Cabinet Office of Japan, Eurostat, Oxford Economics, Haver Analytics, and Citi Research.

Comparing Paths of Real GDP

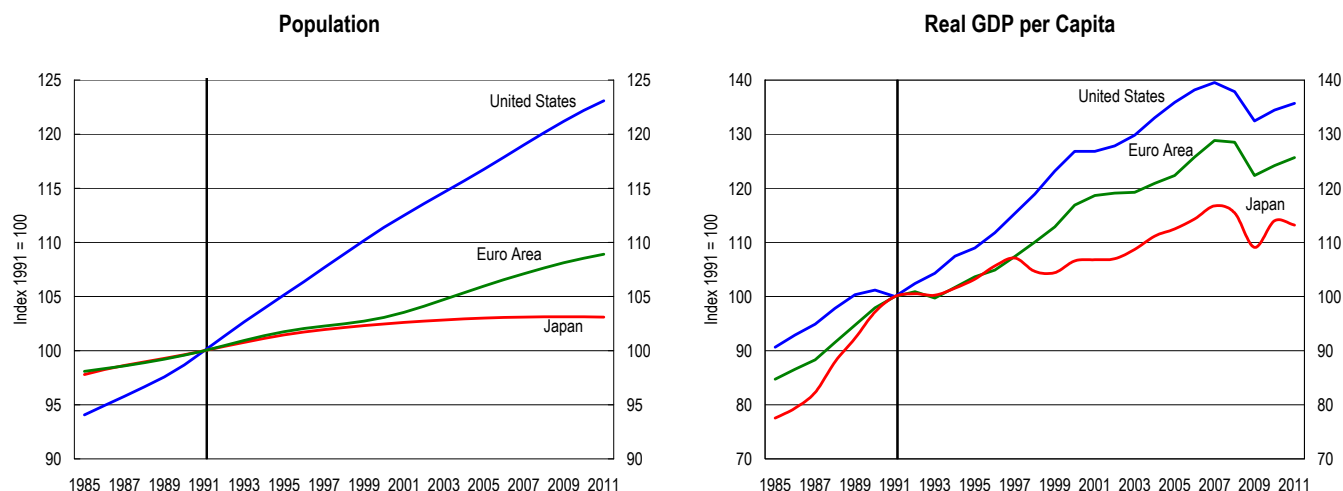
Figure 1 shows the evolution of real GDP over the last two decades for Japan, the euro area, and the United States. These data are broadly in line with conventional perceptions regarding the relative performance of these three economies. Specifically, since 1991, Japanese real GDP has posted an anemic expansion totaling just over 15 percent ($\frac{3}{4}$ percent a year on average); the euro area has grown a bit over 35 percent ($1\frac{1}{2}$ percent annually); while the U.S. economy has expanded a comparatively robust 65 percent ($2\frac{1}{2}$ percent a year).

The remaining panels of Figure 1 show some key demand-side components of real GDP. Over the past two decades, spending by U.S. households has significantly outpaced that by counterparts abroad, with annual consumption growth of nearly 3 percent, compared with just less than $1\frac{1}{2}$ percent for the euro area and 1 percent for Japan. Similarly, business fixed investment in the United States, although volatile over the past two decades, has substantially exceeded that of the euro area. And the Japanese corporate sector, which has been in the throes of sustained balance sheet deleveraging, has reduced the level of its investment since 1991. (We will discuss this issue in more detail below.)

Finally, export performance across these three economies has been more similar, with each economy recording export gains that have outpaced overall GDP. The buoyance of exports no doubt reflects ongoing trends toward trade liberalization and increased economic integration, but it also hints that exporters in these economies have done a reasonably good job of positioning themselves to benefit from the rapid growth of the emerging markets economies.

As highlighted in the left panel of Figure 2, the relatively favorable growth performance of the United States over the past two decades has in part been driven by more rapid population growth and supportive demographics more generally. The U.S. population has expanded by well over 20 percent since 1991, reflecting both higher fertility rates and openness to immigration. In contrast, the euro-area has seen total population growth of less than 10 percent, and Japan's population has posted an anemic 3 percent gain.

Figure 2.



Sources: United Nations, BEA, Cabinet Office of Japan, Eurostat, Oxford Economics, Haver Analytics, and Citi Research.

The implication of these differences in population growth is that, as shown in the right panel, the evolution of per capita real GDP has been more similar than that of overall GDP. Since 1991, per capita output is up 35 percent in the United States and about 25 percent in the euro area. Japan has still put in the weakest performance, but the gap relative to the two other economies is somewhat less pronounced, with per capita GDP up about 12 percent. The remainder of our essay examines these results in greater detail, focusing in particular on some indicators of supply-side performance.

Aggregate Hours Worked and Labor Productivity

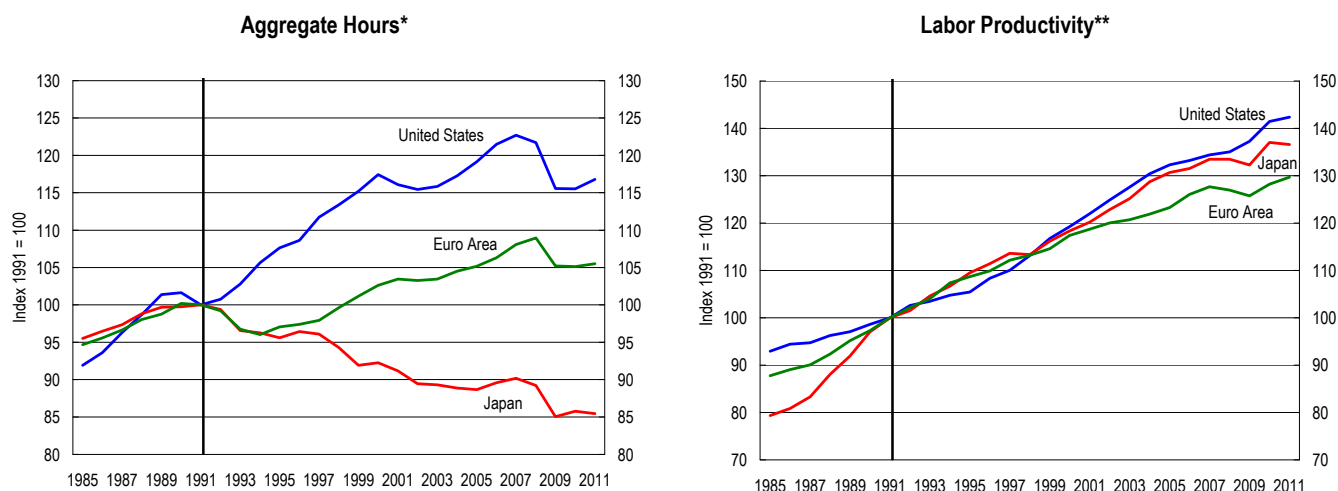
As the next step in this examination, we decompose the evolution of real GDP (Y) for these three economies into aggregate hours worked (H) and hourly labor productivity (Y/H). Specifically,

$$Y = H * Y/H$$

In words, the total output in the economy during any given period is equal to the total number of hours worked during that period multiplied by the productivity of labor during each hour worked.

The left panel of Figure 3, which presents data on aggregate hours worked, highlights a dramatic secular divergence across these economies. Aggregate hours in Japan have contracted by a staggering 15 percent since 1991. Over the same period, the total hours of U.S. workers have increased by more than 15 percent. This 30 percent relative shift in aggregate hours between the United States and Japan goes a long way to frame the observed differences in economic performance between these two economies. The experience of the euro area falls between these two extremes, with total hours edging up about 5 percent over the past twenty years. In the next section, we will consider in detail the sources of the decline in Japanese hours and, more generally, the differing performance of hours across these three economies.

Figure 3.



*Annual hours worked by all employees. **Real GDP per hour worked.

Sources: BLS, BEA, Cabinet Office of Japan, Eurostat, Ministry of Health, Labor, and Welfare, OECD, Oxford Economics, Haver Analytics, and Citi Research.

In contrast, the right panel highlights that trends in labor productivity have been fairly similar. The United States again comes out on top, with real output per hour moving up a little over 40 percent through this period, a solid pace of roughly 1¼ percent a year. But notably, Japan's performance by this metric has been almost as strong, posting a rise of just under 40 percent since the asset bubble burst two decades ago. Importantly, this suggests that Japan's weaker performance in terms of GDP and GDP per capita has not reflected weaker productivity, but rather, diminishing factor inputs. Hourly labor productivity in the euro area has been somewhat weaker than in the United States and Japan, but not significantly so. Indeed, productivity growth in the euro area seems to have broadly matched that in the United States and Japan through the 1990s but has fallen behind subsequently, in our view underscoring the need for productivity-enhancing structural reforms in a number of euro-area countries.

Our sense is that these results for productivity and hours merit deeper analysis. We begin this effort by specifying a simple production function: We assume that goods are produced using hours of labor (H) and units of capital (K) and that production is constant returns to scale, with the shares of capital and labor set at 1/3 and 2/3, respectively. These assumptions suggest the following relationship:

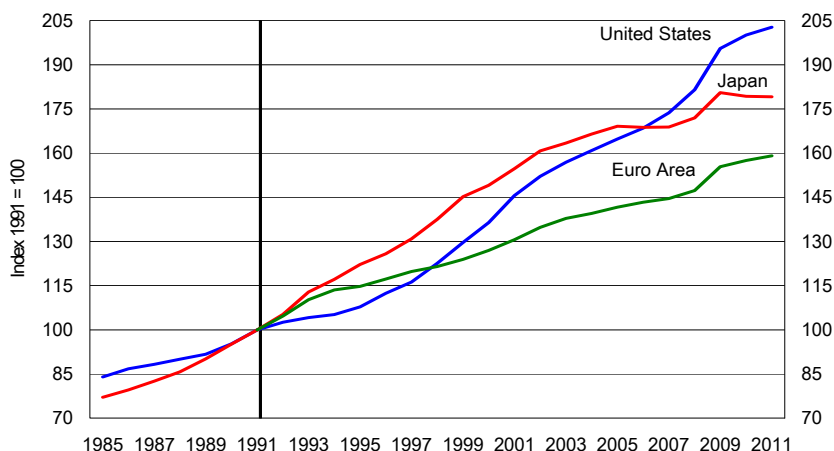
$$Y = A * K^{1/3} * H^{2/3}$$

Where "A" denotes multi-factor productivity, i.e., the effectiveness with which the economy is able to deploy units of labor and capital to make goods and services.² Dividing both sides by aggregate hours yields an expression for hourly labor productivity:

$$Y/H = A * (K/H)^{1/3}$$

Figure 4 shows the behavior of the key variable in this equation—the ratio of capital to hours (K/H). Over the past two decades, K/H has risen by slightly more than 100 percent in the United States, 80 percent in Japan, and 60 percent in the euro area.

Figure 4. Capital-Hours Ratio*



*Gross real capital stock divided by aggregate annual hours for whole economy.
Sources: OECD, Oxford Economics, Haver Analytics, and Citi Research.

² Hayashi and Prescott perform an empirical decomposition of Japan's performance in the 1990s that is broadly similar in spirit. (See "The 1990s in Japan: A Lost Decade," *Review of Economic Dynamics*, 2002, pages 206-235.)

However, as reported in Table 1, these outcomes reflect markedly differing underlying drivers. For the United States, the capital stock has risen at an annual pace of 4½ percent, significantly increasing the availability of capital for each unit of labor, even as hours worked have also been on a rising trajectory. In contrast, for Japan, the capital stock rose much more moderately, but the ratio of K/H—and, hence, productivity growth—has been supported by the decline in aggregate hours. In short, our analysis suggests that the rise in hours (holding all else equal) has subtracted about 0.3 percentage point a year from U.S. productivity growth since 1991, while contracting hours have added a similar amount to Japanese productivity growth. This table also highlights that over the past twenty years, the growth of multi-factor productivity in these three economies has been fairly similar—contributing a ½ percentage point a year (or just slightly more) to labor productivity growth.

Table 1. Labor Productivity (1991-2011)

	Average Growth			Contributions		
	Y/H (1)	K (2)	H (3)	K (4)	H (5)	A (6)
Japan	1.6	2.2	-0.8	0.7	0.3	0.6
Euro Area	1.3	2.6	0.3	0.9	-0.1	0.5
United States	1.8	4.4	0.8	1.5	-0.3	0.6

Note: Contributions calculated using standard Cobb-Douglas production function.

Source: Citi Research.

We see Japan's experience over the past two decades as suggesting a broader channel that may help to support economic activity in the face of an aging population. Specifically, declines in hours worked should tend to increase the capital-labor ratio, holding other things equal, and thus boost labor productivity. The basic idea is that the decline in labor input leaves more capital for the remaining workers, effectively allowing them to climb up their marginal product curves. And if corporates are better positioned financially than has been the case in Japan through much of the past two decades, the diminishing availability of labor will motivate firms to pursue labor-saving investments, which should further support labor productivity.

Explaining the Moves in Aggregate Hours

In the previous section, we documented a sizable drop in aggregate hours worked in the Japanese economy over the past two decades, compared with a significant increase for the United States and a lesser rise for the euro area. In this section, we examine the sources of this divergent performance. Was it the case that Japan's aging workers simply chose a different point on the labor-leisure frontier? Or, alternatively, did firms that were in the throes of sustained debt deleveraging scale back their operations and shed labor resources?

We begin this discussion with a decomposition of aggregate hours worked (H):

$$H = H/E * E/L * L/WAP * WAP/P * P$$

Where the variables are defined as follows:

- E is aggregate employment
- L is total labor force
- WAP is the working age population
- P is total population

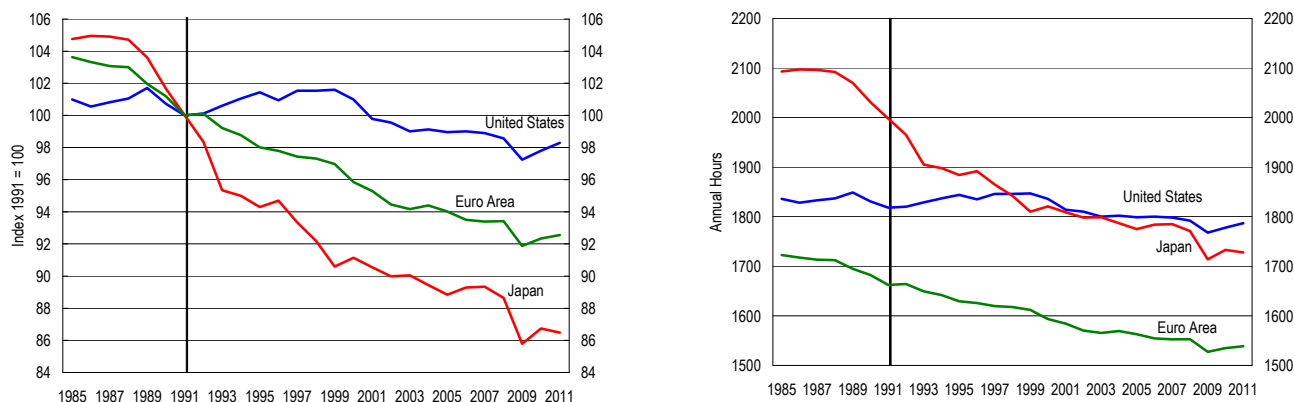
This in turn implies that:

- H/E is average hours per worker
- E/L is the employment rate (or $1 - \text{unemployment rate}$)
- L/WAP is the labor force participation rate
- WAP/P is the share of the working age population (or $1 - \text{dependency ratio}$)

This framework provides a powerful lens for explaining movements in aggregate hours and also allows us to make some useful comparisons of economic performance in Japan, the United States, and the euro area. The upshot is that a decline in aggregate hours worked—such as that which Japan has recorded over the past two decades—could be driven by any combination of declining hours per worker, lower employment rates, decreasing labor force participation, a lower share of the working-age population, or a contraction in the overall population. We will look at the behavior of each of these variables in turn and then—in the following section—pull them together into a common framework and draw some conclusions.

Hours per Worker (H/E). Figure 5 focuses on the first term in the decomposition above—the evolution of hours per worker. As shown in the left panel, hours per worker have been relatively stable in the United States, edging down just 2 percent over the past two decades. In contrast, hours per worker have declined noticeably in the euro area, by roughly 7 percent since 1991, and have fallen more than 13 percent in Japan. This sharp decline in Japan's hours per worker accounts for the lion's share of the net decline in the country's aggregate hours worked over the past two decades.

Figure 5. Hours per Employee*



*Average annual hours worked by all employees.

Note: Due to data limitations, our measure for euro area hours includes only Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, and Spain. These countries represent around 90 percent of the region's population.

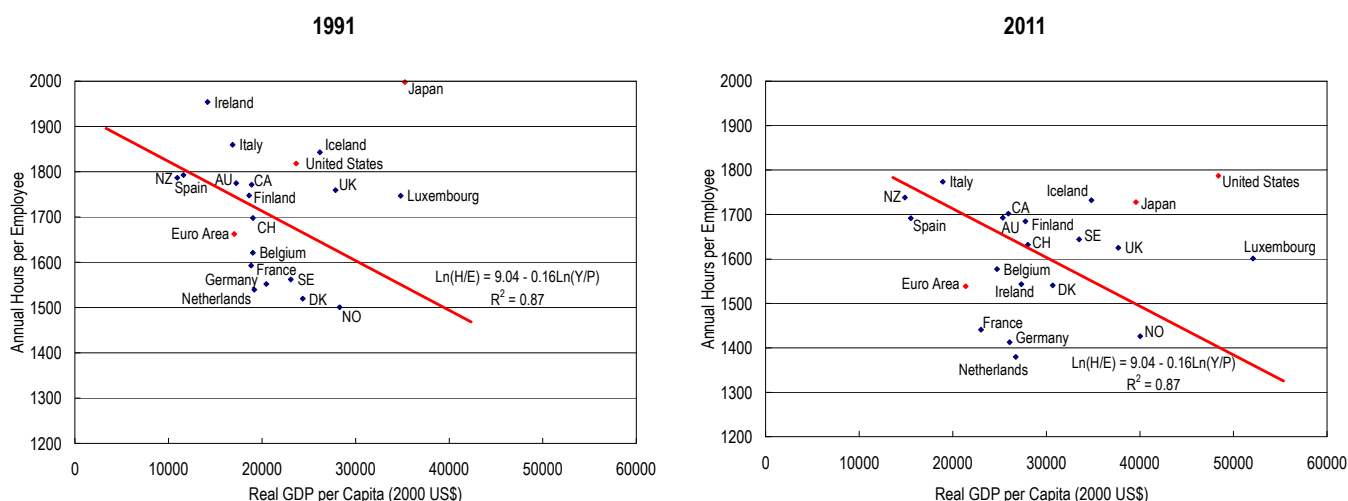
Sources: OECD, Haver Analytics, and Citi Research.

The right panel shows annual hours per employee. Notably, Japan began the period with a much higher level of hours per worker than the other two economies, with employee hours hovering in the late 1980s at around 2100. By 2011, hours per worker had fallen sharply, to about 1730, somewhat lower than in the United States but still well above the euro area. As discussed in a paper by Kawaguchi, et al., this decline in hours followed a shift in Japan's labor laws that gradually reduced the legal workweek from 48 hours in 1987 (six days of eight-hours each) to 40 hours by 1997. Hours exceeding the legal maximum required a premium in compensation of at least 25 percent. During the 1980s, Japan was the subject of international criticism because of its large current account surplus, and the government was hopeful that a statutorily required cut in hours would help remedy this imbalance. The Kawaguchi, et al., paper concludes, however, that the direct effects of the mandated change in the workweek explain only a fraction of the observed decline in Japanese hours per worker during the 1990s.³

In Figure 6, we tackle this issue from a complementary perspective. The two scatterplots show the relationship between real GDP per capita and annual hours per employee for a group of twenty-one advanced economies in 1991 and again in 2011. The red line displays the estimated relationship between these two variables, based on a panel regression that includes data for the same countries running from 1970 to 2011.⁴ The key result is that a 10 percent increase in real GDP per capita is associated with a 1.6 percent decline in hours per employee. We find this result to be very statistically significant.

This framework highlights that Japan was an outlier among the major industrial countries in 1991, with very high hours per worker given its level of GDP per capita. Over the past two decades, Japan has moved toward the pack but still remains well above the regression line. As a first impression, this decline in Japanese hours per worker (and the legal changes that helped bring it about) very much has the flavor

Figure 6. Real GDP per Capita vs. Hours per Employee



Note: New Zealand data point in right panel is for 2010.

Sources: OECD, World Bank World Development Indicators, Haver Analytics, and Citi Research.

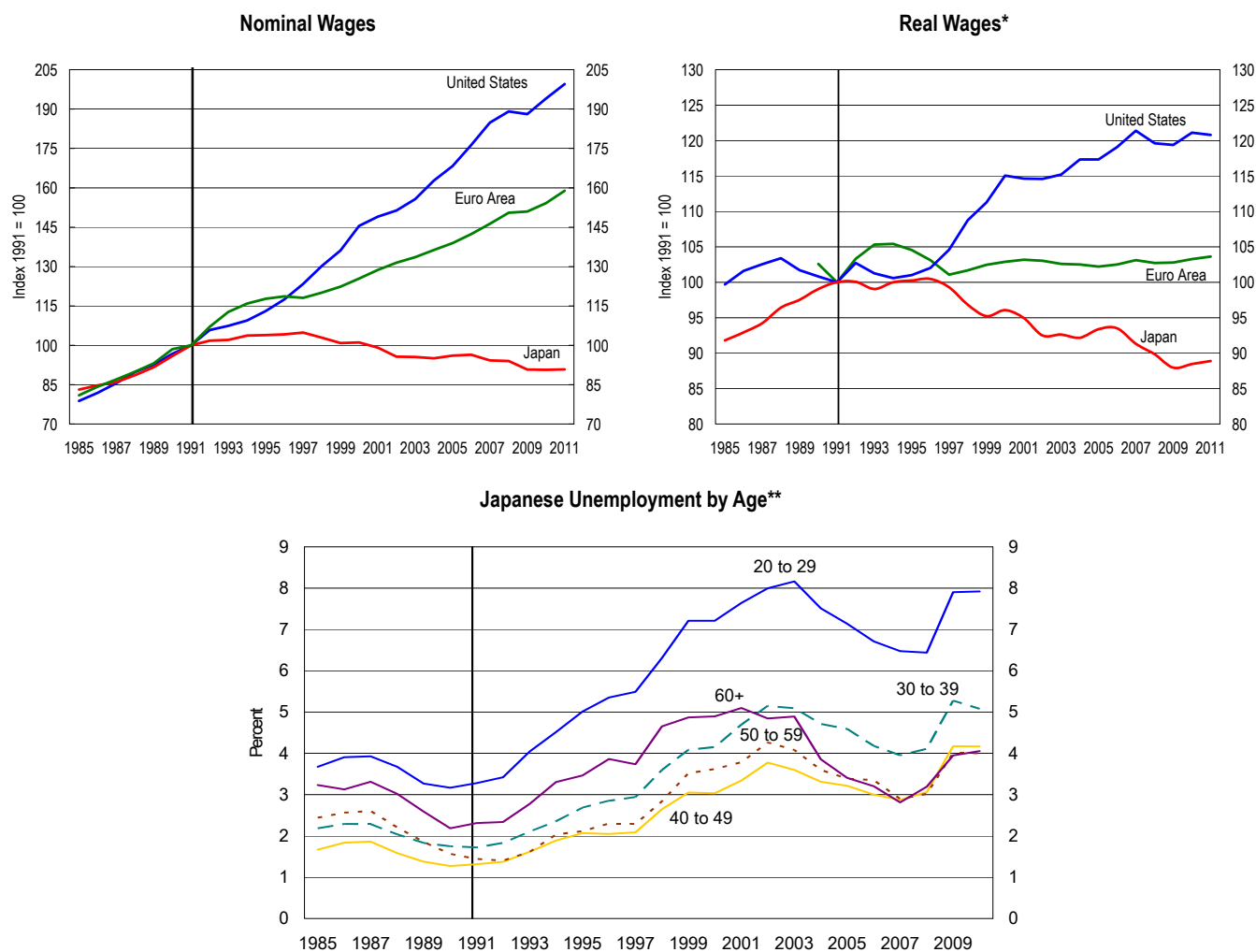
³ D. Kawaguchi, H. Naito, and I. Yokoyama, "Labor Market Responses to Legal Work Hour Reduction: Evidence from Japan," December 27, 2008.

⁴ The regression also includes fixed effects for individual countries and each year.

of a reduction in labor supply in response to the country's higher level of real GDP, essentially the choice of a different point on the labor-leisure curve.

Even so, we are not inclined to interpret the decline in Japanese hours per worker as being driven solely by an inward shift of the labor supply curve—i.e., that in the face of the country's rising prosperity workers simply chose to work less. Other factors appear to have been in play as well. First, as displayed in Figure 7, Japanese wages have been on a steady downward trajectory, in both nominal and real terms since the mid-1990s. In marked contrast, an inward shift of labor supply would be expected to drive wages up. Similarly, the bottom panel highlights that Japanese unemployment has generally been on a rising trajectory over the past twenty years for all cohorts of workers, but unemployment rates for young workers (ages 20 to 29) has suffered the worst of this increase. Both of these developments bear the imprint of weakness in labor demand.

Figure 7.



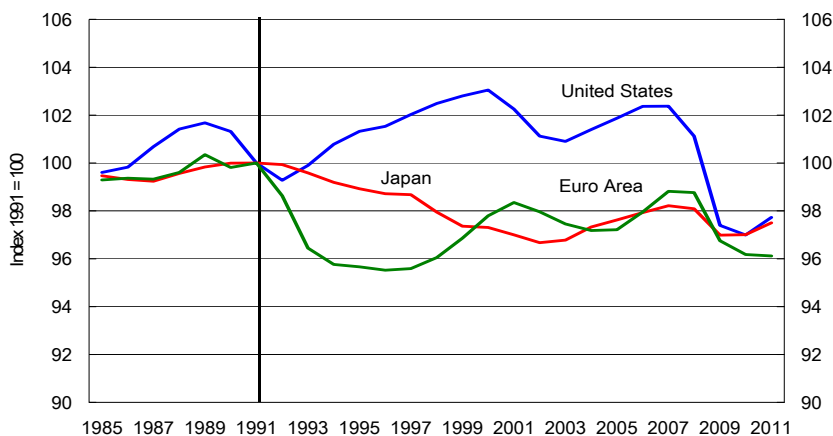
*Nominal wages divided by headline consumer price index. **Unemployed in a given age bracket as a share of that cohort's labor force participation.
Sources: BLS, ECB, Ministry of Internal Affairs and Communications, OECD, Haver Analytics, and Citi Research.

As such, the reduction in Japan's hours per worker over the past two decades strikes us as reflecting a complex set of factors, certainly including statutory change and reduced labor supply in the face of rising prosperity; but the decline in hours also reflects factors that have weakened the demand for labor, such as the deleveraging and paring back that has occurred in the corporate sector, as firms have moved to strengthen their balance sheets.

Finally, returning to Figure 6, it is striking that over the 1991 to 2011 period, the United States and the euro area have also become outliers relative to other countries—the United States on the high side in terms of hours per worker and the euro area on the low side. Accordingly, we highlight the possibility that over the coming decade, hours per worker in the United States may decline toward international norms and hours in the euro area may rise, thus tending to restrain growth in the United States and fuel growth in the euro area.

Employment Rate (E/L). Figure 8 shows the employment rate, which is defined as the share of the labor force that currently holds a job. As with the other variables, we display this ratio as an index, set equal to 100 in 1991. All three economies have seen a cyclical drop in the employment rate in the years since the global financial crisis erupted, with a particularly large decline in the United States. But even so, the net moves in this variable over the past two decades have been fairly muted, with all three of these economies recording similar net declines of roughly 3 percent since 1991. Going forward, we are hopeful that the eventual onset of cyclical recoveries in these economies will push the employment rate back up.

Figure 8. Employment Rate



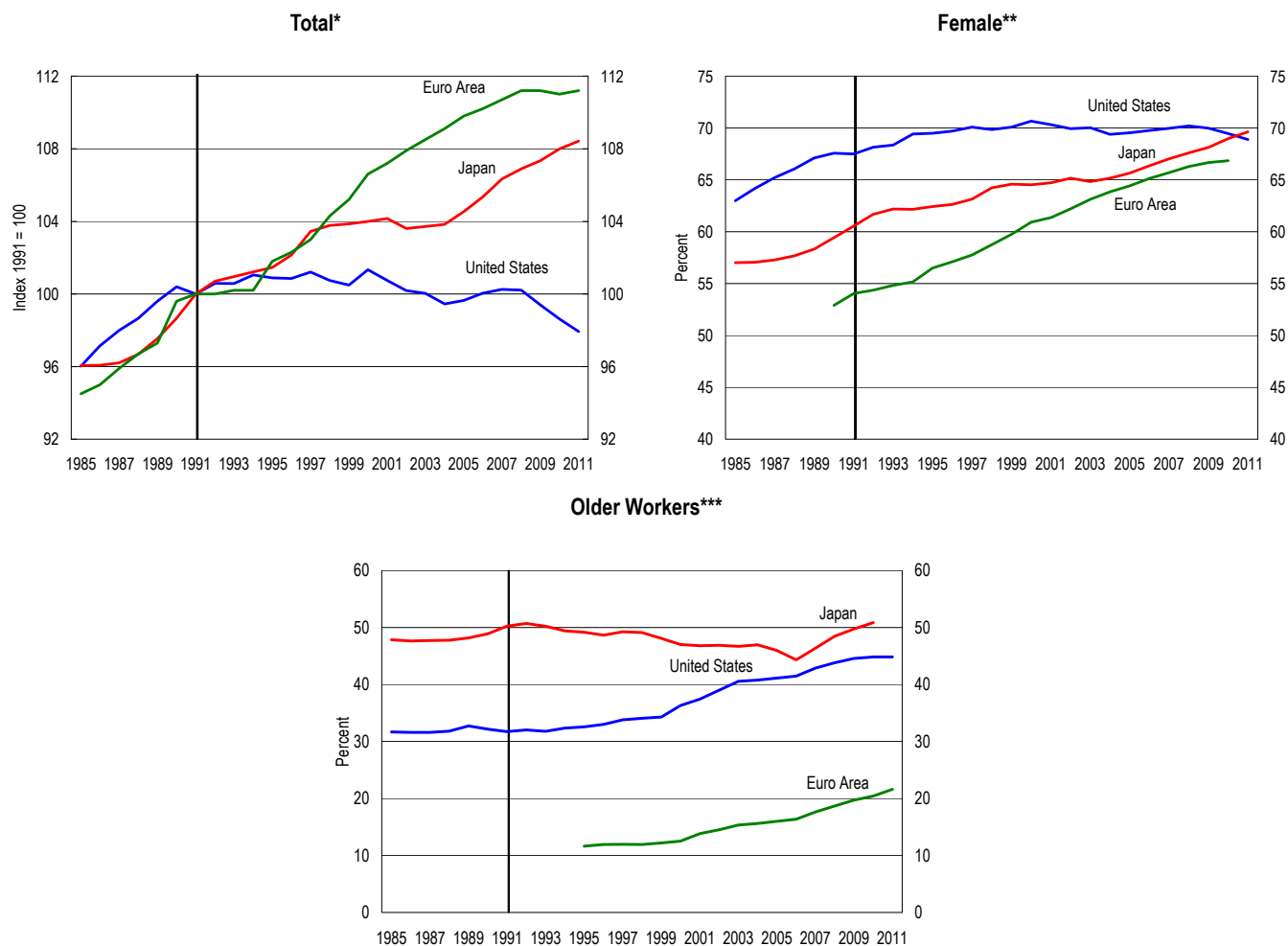
Sources: BLS, Eurostat, Ministry of Health, Labor, and Welfare, Oxford Economics, Haver Analytics, and Citi Research.

Labor Force Participation Rate (L/WAP). The next figure focuses on the rate of labor force participation, which we define as the size of the labor force relative to the working age population (ages 15 through 64).⁵ Over the past twenty years, the United States has posted a slight decline in total labor force participation. In contrast, the euro area and Japan have recorded gains of near 10 percent; in both of these economies, rising labor force participation rates have been an important offset to the decline in hours per worker noted above.

⁵ While there is some variation in the definitions of labor force participation used by statistical agencies around the world, we use this definition because it is consistent with the spirit of our decomposition. For the United States, the BLS takes as the denominator the entire population age 16 and over, excluding people who are inmates of institutions.

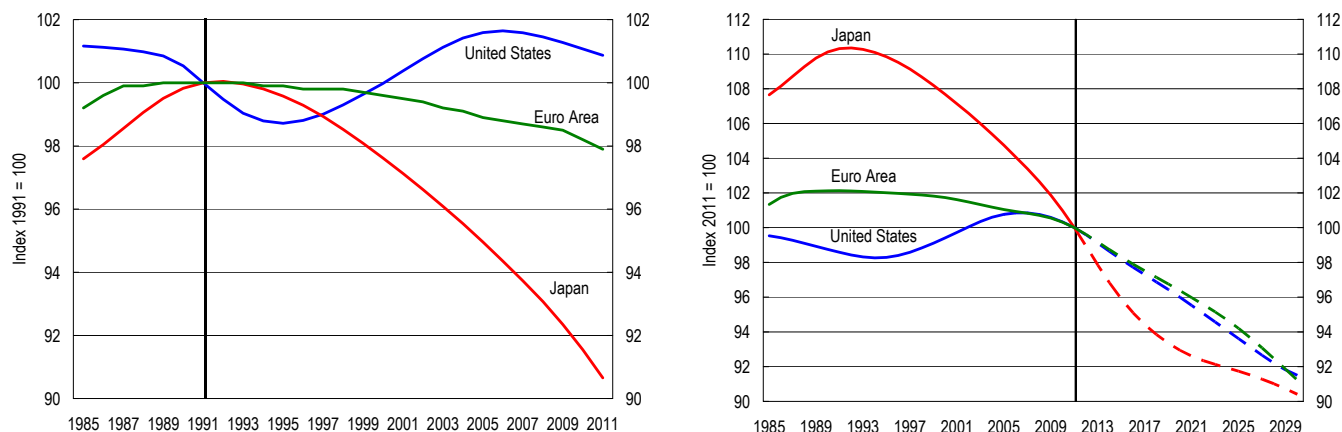
As shown in the right panel, these divergences in labor force participation rates have largely reflected differing trajectories of female labor force participation, which was roughly flat in the United States through the past two decades (after rising significantly in the 1970s and 1980s), but which increased significantly in the other two economies. Notably, female labor force participation rates for Japan and the euro area have now reached the 65 to 70 percent range, where U.S. female participation rates have topped out since the early 1990s. This raises questions regarding the extent to which growth in these economies is likely to benefit from further increases in female participation. Instead, our view is that additional gains in labor force participation rates in all three economies will need to come from the rising participation of older workers, especially given the fact that shifting demographics imply that older people will account for a larger share of the population. As highlighted in the bottom panel, the good news is that we see significant scope for higher participation rates among older workers, particularly in the euro area where such rates are still relatively low.

Figure 9. Labor Force Participation Rates



*Labor force as a share of working age population; **Female labor force as a share of female working age population; ***Labor force participation of 60-70 year olds.
Sources: BEA, Cabinet Office of Japan, Eurostat, World Bank World Development Indicators, Oxford Economics, Haver Analytics, and Citi Research.

Figure 10. Share of Working Age Population*



*Ratio of population ages 15-64 to total population.
Sources: United Nations, Haver Analytics, and Citi Research.

Share of Working Age Population (WAP/P). Over the past two decades, the share of the working age population has moved very little on balance for the United States and has declined only about 2 percent in the euro area (Figure 10). In contrast, Japan has seen a sharp decline of nearly 10 percent in the share of its working age population.

These data highlight that the effects of population aging are already well advanced in Japan, but the other two economies will hardly be exempt from these stresses going forward. The right panel shows U.N. projections for the share of the working age population, setting the 2011 observations equal to 100. The striking result is that Japan still has a long way to go with its demographic transition—the share of its working age population is slated to fall almost as much over the next two decades as it has since 1991. Of equal importance, over the next twenty years, the United States and the euro area are both expected to see declines in the share of their working age populations that are roughly comparable to those projected for Japan.

Decomposing the Evolution of Real GDP

In this section, we pull together the various strands of our analysis into a common framework and put forward some specific, numerical results. As a first step, we combine several of the equations presented above to get a relationship for real GDP:

$$Y = Y/H * H/E * E/L * L/WAP * WAP/P * P$$

And dividing both sides by population implies the following expression for real GDP per capita:

$$Y/P = Y/H * H/E * E/L * L/WAP * WAP/P$$

Using these two equations, Table 2 decomposes real GDP growth for the United States, the euro area, and Japan into its underlying supply-side components. We report this decomposition for four periods: 1991 to 2000, 2000 to 2007, 2007 to 2011, and the entire 1991 to 2011 time span.

Table 2. Average Growth Rates (Annual)

	Y (1)	P (2)	Y/P (3)	Y/H (4)	H/E (5)	E/L (6)	L/WAP (7)	WAP/P (8)
1991-2000								
<i>Japan</i>	1.0	0.3	0.7	1.9	-1.0	-0.3	0.4	-0.3
<i>Euro Area</i>	2.1	0.3	1.7	1.8	-0.5	-0.2	0.7	0.0
<i>United States</i>	3.8	1.1	2.7	2.0	0.1	0.3	0.1	0.1
2000-2007								
<i>Japan</i>	1.4	0.1	1.3	1.7	-0.3	0.1	0.3	-0.6
<i>Euro Area</i>	2.0	0.6	1.4	1.2	-0.4	0.1	0.5	-0.1
<i>United States</i>	2.4	1.0	1.4	1.7	-0.3	-0.1	-0.2	0.2
2007-2011								
<i>Japan</i>	-0.8	0.0	-0.8	0.6	-0.8	-0.2	0.5	-0.8
<i>Euro Area</i>	-0.2	0.4	-0.6	0.4	-0.2	-0.7	0.1	-0.2
<i>United States</i>	0.2	0.9	-0.7	1.4	-0.2	-1.2	-0.6	-0.2
Total: 1991-2011								
<i>Japan</i>	0.8	0.2	0.6	1.6	-0.7	-0.1	0.4	-0.5
<i>Euro Area</i>	1.6	0.4	1.1	1.3	-0.4	-0.2	0.5	-0.1
<i>United States</i>	2.6	1.0	1.5	1.8	-0.1	-0.1	-0.1	0.1

Note: Variables defined in text.

Source: Citi Research.

For the 1990s, the performance of the United States stands out, with real GDP growth of 3.8 percent, compared with 2.1 percent for the euro area and just 1 percent for Japan. A sizable portion of this differential reflected more rapid population growth in the United States. But even adjusting for population, the U.S. performance was superior, with per capita GDP growth of 2.6 percent, against 1.7 percent for the euro area, and 0.7 percent for Japan. Labor productivity growth for the three economies was quite solid, at around 2 percent. Japan saw a moderate increase in labor force participation, but this only partially offset contractions in other variables, including the sharp drop in hours per worker documented above, which subtracted 1 percentage point a year from growth. For the euro area, labor force participation contributed a sizable 0.7 percentage point a year, and this offset a decline in hours per worker and the employment rate. The United States posted a moderate increase in the employment rate and small gains in the other variables as well.

From 2000 through 2007, the United States continued to record the most rapid overall GDP growth, but differences in per capita GDP growth disappeared, with all three economies seeing per capita expansions in the 1¼ to 1½ percent range. Relative to the other economies, the United States benefited from still-strong productivity growth and a small rise in the share of the working age population. The euro area's productivity growth was relatively weak, stepping down to 1.2 percent, but this decline was largely offset by a further sizable increase in labor force participation. Japan recorded strong labor productivity growth, matching the United States, as well as an increase in labor force participation, and these developments were sufficient to offset the ongoing decline in the share of the working age population.

Since the global financial crisis erupted, all three of these economies have seen distinctly negative per capita GDP growth. Productivity in the United States has held up much better than in the other two economies, moving forward at a 1.4 percent pace, but U.S. growth has been dragged down by a sharp decline in the employment rate (which has subtracted 1.2 percentage points a year) and a drop in labor force participation (which has cut annual growth by another 0.6 percentage

point). Japan has seen a continued fall in both hours per worker and the share of the working age population but—even during this period of marked stress—labor force participation has posted a further rise. For the euro area, growth was held back by a declining employment rate and, unlike the earlier periods, the region did not see a significant rise in labor force participation.

For the twenty-year period as a whole, the U.S. economy expanded at a 2.6 percent rate overall and 1.5 percent on a per capita basis. Labor productivity grew at a solid 1.8 percent clip, but hours per worker, the employment rate, and labor force participation all contracted slightly. Japan's economy on average expanded only 0.8 percent overall and 0.6 percent per capita. As we have noted, Japanese labor productivity was solid, growing at 1.6 percent a year, supported by the sharp decline in hours and, hence, a climb up the marginal product of labor curve. Japan's performance was also bolstered by rising labor force participation, which contributed 0.4 percentage point a year to growth on average. However, these effects were offset by sharp drops in hours per worker (which subtracted 0.7 percentage point a year from growth) and the share of the working age population (which subtracted 0.5 percentage point). Finally, the euro area had the weakest productivity growth, at 1.3 percent, and like Japan saw a meaningful decline in hours per worker. However, also like Japan, the euro area saw a sizable $\frac{1}{2}$ percentage point a year contribution from labor force participation.

Some Concluding Thoughts

The discussion in this essay has unearthed a range of useful results. By any metric, Japanese growth over the past two decades has been softer than that of the United States and the euro area. But importantly, the weaker pace of Japanese growth has not been driven by a softer productivity performance. Indeed, if any of these economies has posted lagging productivity growth, it is the euro area, particularly over the past decade or so. This observation is consistent with our broader view that a number of countries in the euro area are suffering from competitiveness deficiencies that are likely to require concentrated (and probably painful) structural reforms to resolve.

A key feature of Japanese economic weakness over the past two decades has been a marked drop in aggregate hours worked. In part, this has reflected a normalization of labor supply—two decades ago Japanese hours were high relative to other countries with similar incomes. But our work suggests that this has also reflected weakness in labor demand. As Japanese firms have aggressively deleveraged and cleaned up their balance sheets, they have also been conservative in their hiring (and compensation) practices. A portion of Japan's decline in hours no doubt also reflects demographic stresses, as Japan has seen a sharp drop in the share of its working age population. But to date this effect has been tempered by rising labor force participation, particularly among women. That said, female participation rates in Japan, and the euro area as well, have now increased to levels reached in the United States in the early 1990s, which have not subsequently been surpassed.

So what does all of this mean for the trajectory of growth in these three economies over the next decade or two? We actually see a mix of factors and considerations:

- Over this long horizon, the process of aging will continue at a ferocious pace in Japan and begin in earnest in the United States and the euro area. As such, we see the declining share of the working age population as likely to subtract something on the order of 0.4 to 0.5 percentage point from growth in each of these economies over the next couple of decades.

- Part of this effect may be offset by rising labor force participation of older workers, but our read of the data is that this process is only beginning to get traction. As an economic policy measure, moves to encourage the participation of older workers (including higher retirement ages) would seem well advised. A related point is that over the past two decades, Japan and the euro area have seen a marked rise in labor force participation among women. As we noted above, the U.S. experience suggests that the scope for further increases in female participation in the euro area and Japan may be limited.
- Another important consideration is that, controlling for per capita income, the high level of U.S. hours per worker is a conspicuous outlier in international comparisons. As such, we should entertain the possibility that U.S. hours per worker may move down in coming decades as the population ages. Such a development could create significant headwinds for U.S. growth and perhaps for global growth as well.
- The opposite possibility should be considered for the euro area, where hours per worker are low relative to international comparators. Clearly, structural reforms to raise productivity growth are necessary in some euro-area countries, and an increase in hours worked could also be part of the solution to the stresses currently afflicting these countries. An increase in hours would help fuel economic growth and reduce the impact on households of downward pressures on hourly wages.
- Implicit in our work is the fact that these three economies are still very much suffering from the effects of the global financial crisis and the ongoing stresses in Europe. While there is ample scope to debate how long-lived such effects may be, we are hopeful that at some point—perhaps still several years down the road—a cyclical recovery of some sort will take hold. This should bring with it a rebound in the employment rate and probably also in hours per worker and labor productivity. Once a recovery does take hold, it should have the capacity to support above trend growth for some time.

Pulling the various threads together, we see an array of possible long-run paths for these three economies. Even so, the scenarios that we judge most likely seem to imply long-term per capita GDP growth in the range of $\frac{1}{2}$ to $1\frac{1}{2}$ percent over the next couple of decades. Given the pace of labor productivity growth during the past twenty years, as well as its general resilience through a range of shocks, we would expect labor productivity growth to continue at something near a $1\frac{1}{2}$ percent pace. The key question then is how severe the drag from deteriorating demographics and the associated economic adjustments will be. But our best guess, based on the experience of these economies since 1991, is that the drag from demographics is unlikely to amount to more than 1 percentage point a year on net, although the exact composition of the drag is likely to vary meaningfully across countries and over time.

We see important downside risks relative to this benchmark if political processes fail to address the uncertainties and overhangs associated with fiscal indebtedness. Such a failure would intensify stresses in financial markets and weigh on business confidence and, hence, on the willingness to hire and invest. The upside risks flow mainly from the capacity of market economies to innovate and adapt to shifting economic environments. The aging population and evolving demographics more generally are likely to pose challenges, but they will also present profit-making opportunities for new products and processes. As such, we would expect that over

time, firms will re-orient the structure of their production toward labor-saving and capital-intensive approaches.

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