How Immigration Contributes to Economic Growth in the U.S.

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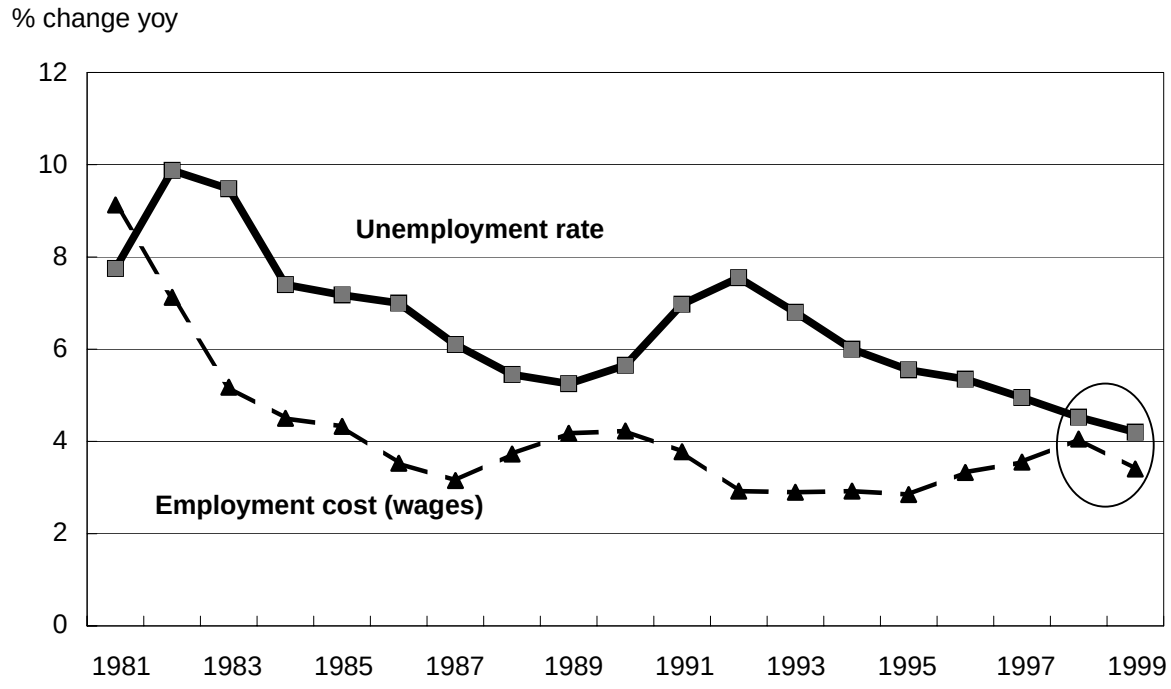
1. 1990s Immigration to the U.S. Sets Record

Since March 1991, the U.S. economy has enjoyed the longest expansion of the postwar period, reaching 111 months as of June. Despite low unemployment and the tight labor market, wage growth actually declined in 1999, helping to keep inflation in check (Figure 1). The strong wealth effect from the rising stock market has in turn added fuel to the economy.

Figure 1 Wage Growth and Inflation in the U.S.



Source: Bureau of Labor Statistics

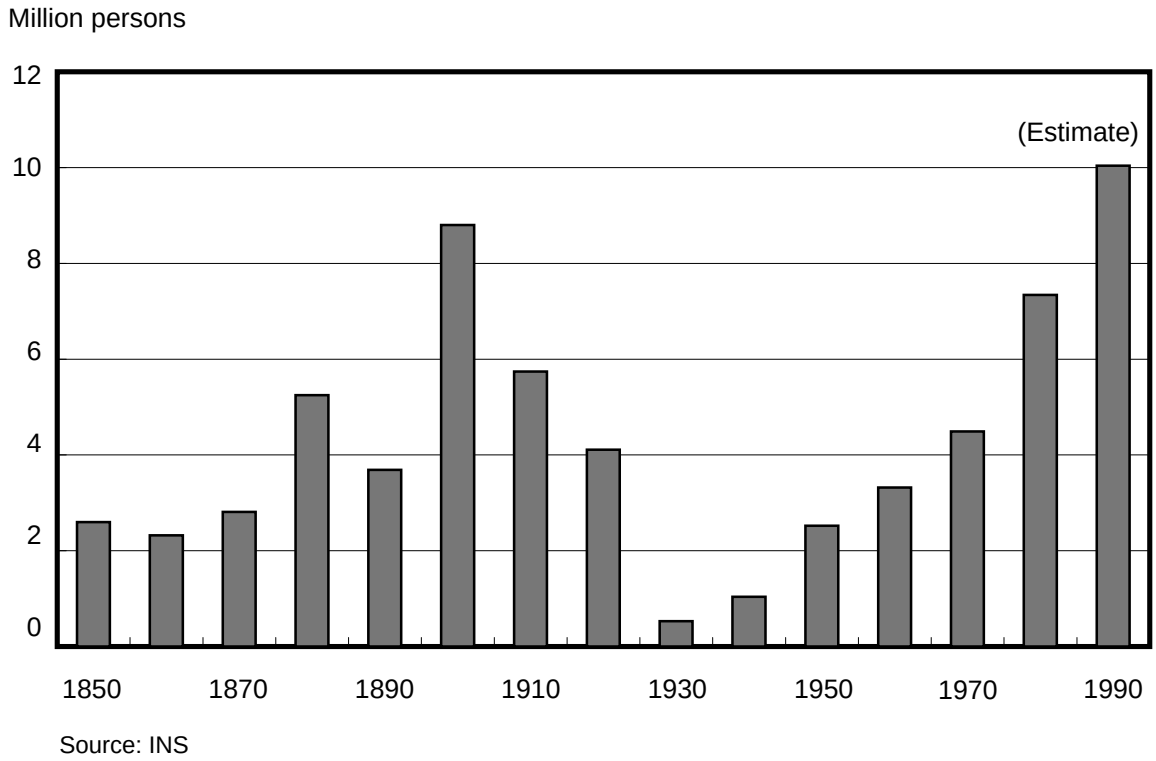
One explanation for the combination of sustained economic growth and stable inflation comes from the “new economy” argument, which emphasizes productivity growth due to the information technology (IT) revolution. In the new economy, the growing stock of information technology makes inventory

management more efficient and drives down transaction costs, thereby leading to productivity growth. Labor productivity growth, which averaged 1.5% per year from 1974 to 1994, rose at a 6.9% annualized sequential rate in the fourth quarter of 1999. According to central bank sources in both the U.S. and Japan, from two-thirds to four-fifths of that productivity growth can be attributed to IT applications.

It is true that advances in IT can contribute to economic growth by increasing productivity while preventing inflationary pressure, and as Fed Chairman Alan Greenspan states, by creating new demand through higher expectations for long-term returns. But in addition to the IT revolution, there is another factor behind productivity growth and restrained inflation — the rising immigration into the U.S. during the 1990s.

In fiscal 1998, while immigration into the U.S. fell 17.3% to 660,477 persons, the decline is due to an increase in pending applications. Immigration applications in March 2000 rose 24% year-on-year, bringing the number of pending applications to 1,003,931. Including the pending cases, total immigration in the 1990s is estimated at 10,039,459 persons. This exceeds the inflow of 8,795,386 persons in the first decade of the twentieth century mainly from Italy and Germany, and may be the first time that 10 million immigrants enter the U.S. in a single decade (Figure 2).

Figure 2 Number of Legal Immigrants (by decade)



Source: INS

By country of origin, while many immigrants are IT technical specialists from India, the overwhelming proportion of immigrants are Hispanics from Latin America. This is due to the 115,000 annual limit on H1-B visas granted to technical specialists (however, a pending bill would suspend the limit for three years from fiscal 2001), and to the estimated 275,000 mostly Hispanic immigrants who enter illegally every year. According to estimates by the Immigration and Nationalization Service in October 1996, there are approximately 5 million illegal immigrants in the U.S., and eight of the top ten countries of origin are Latin American; Mexico alone accounts for 2.7 million.

Figure 3 Immigration to the U.S. by Country of Origin

Rank	Country	Total (%)
1	Mexico	19.9
2	China	5.6
3	India	5.5
4	Philippines	5.2
5	Dominican Republic	3.1
6	Vietnam	2.7
7	Cuba	2.6
8	Jamaica	2.3
9	El Salvador	2.2
10	Korea	2.2

Source: INS

This inflow of IT specialists and Latin American workers is believed to diversely affect growth not only of the new economy but the overall U.S. economy. Below we analyze the economic impact of immigration.

2. The Economic Impact of Immigration

(1) Supply of Labor

1. Short-term effect from business cycles

The direct effect of immigration, of course, is to increase the labor supply. Based on INS surveys and our immigration estimates for the 1990s, the number of foreign nationals living in the U.S. is estimated to reach 29.81 million by 2000. This represents 10.8% of the total population, up from 7.9% in 1990. Since Hispanics account for three-fourths of this increase, their effect in terms of raw manpower is larger than that of immigrant IT technicians mostly from Asia. In fact, the Hispanic labor force's 3.6%

annual growth rate means that it contributed about one-third of the growth rate of the overall labor force (1.1%).

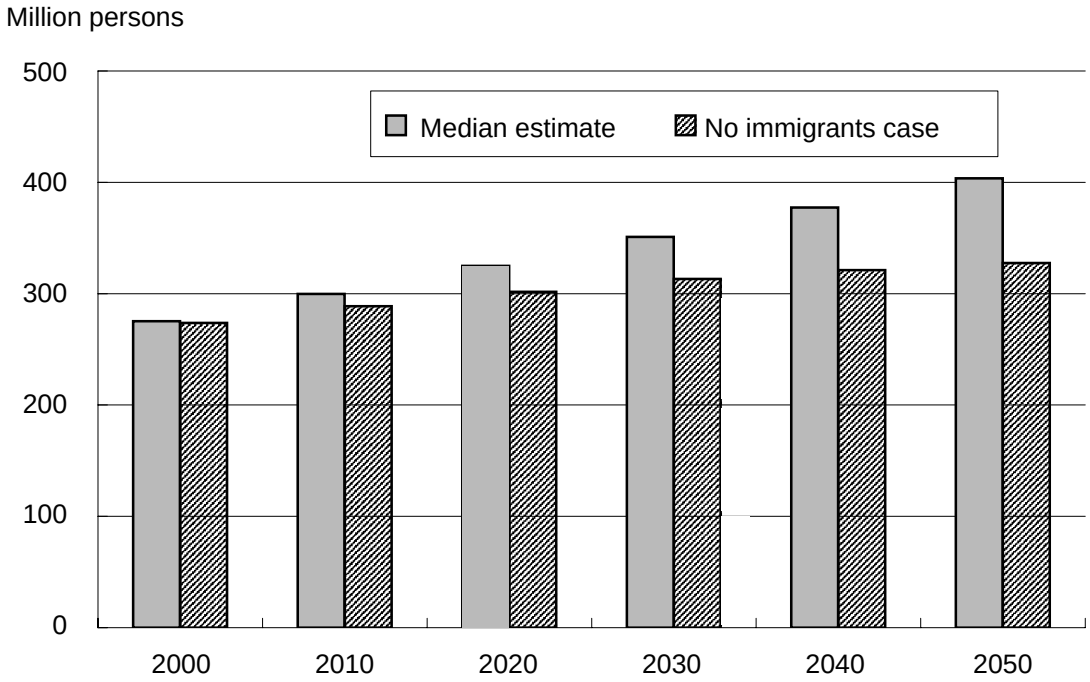
In the short term, this inflow of immigrants has helped balance the labor market and suppress inflation during the economic expansion.

2. Long-term effect on economic growth

The total fertility rate among Hispanic women of 3.0 is significantly higher than the 1.8 rate for White women. For this reason, the immigrant population tends to grow faster than the general population after settling down, thereby contributing further to labor force growth. Projections for the U.S. show that if immigration were halted, the population would be 76 million smaller than the median projection in 2050 (Figure 4). This difference amounts to 18.9% of the population, and indicates that the impact of immigration on the U.S. labor force will increase in the future.

In addition, a virtuous cycle is anticipated between population changes and economic growth that will offset the declining birth rate and aging of the domestic population. As mentioned above, the inflow of immigrants along with their higher birth rates cause the labor force to grow. This increases the economy's potential growth rate and raises economic growth expectations. As a result, the birth rate rises among Whites, further increasing the labor force. Generally, this trend occurs over a time span of 20 years or longer. Immigration thus affects economic growth not only in the short term but over the long term as well.

Figure 4 Population Projection for the U.S.



Source: U.S. Census Bureau

(2) Alleviation of Wage Growth Pressure

We next examine the effect of immigration in reducing upward wage pressure. While skilled immigrants receive large compensations for their advanced IT technical skills, their high productivity and demand inducement effect on other industries help to suppress growth in unit labor costs (wage growth rate in excess of productivity).

On the other hand, of the majority of immigrants who are Hispanic, over 60% are employed in labor intensive, unskilled jobs such as in domestic services and the fast food industry. Since Hispanics on average earn approximately 65% the wage of Whites, the inflow of low-wage labor helps to suppress wage growth in low-productivity areas as well, thereby helping to reduce inflation.

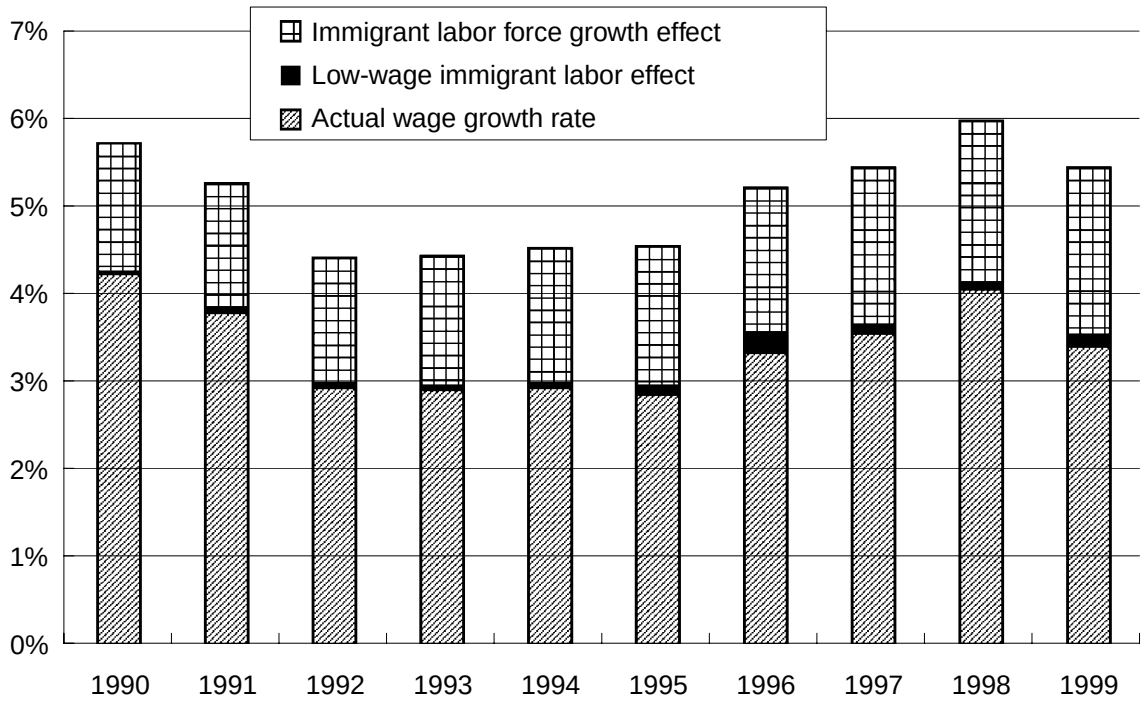
Below we attempt to measure how much Hispanic immigrants reduce wage growth. We first calculated a Phillips curve using the unemployment rate and employment cost (wage) growth for the overall labor force during the 1990s. Next we estimated the unemployment rate assuming that no Hispanic immigration had occurred:

$$\frac{\text{Total no. of unemployed persons} - \text{No. of Hispanics employed}}{\text{Total labor force} - \text{Hispanic labor force}}$$

Inserting this unemployment rate into the Phillips curve, we obtained the wage growth rate in the case that the labor supply was not augmented by immigration. Furthermore, the increase in low-wage Hispanic labor from 8.3% of the labor force in 1990 to 10.3% in 1999 also tends to reduce the overall wage level.

The qualitative and quantitative effects of immigration on suppressing wage growth are shown in Figure 6. During the 1990s, immigration reduced wage growth by 1.7% per year; 1.62% of this was due to the increase in labor supply, and 0.08% came from the increase in the ratio of Hispanics in the labor force.

Figure 6 Suppression of Wage Growth due to Immigration



The wage suppression effect was particularly large in the late 1990s, reaching 2% in 1999. Thus had no immigration occurred, the 3.4% wage growth rate for that year would have risen to 5.4% and significantly added to inflationary pressures.

Unemployment has continued to decline, falling to 3.9% in April 2000. Yet amid the tightening labor market, inflationary pressures appear to be held in check by the increasing participation of low-wage

immigrant labor. This inference conforms with the decline in Hispanic unemployment from 9.3% in 1995 to 6.4% in 1999.

Thus while Whites and other highly skilled labor groups have moved into productive and high paying IT related jobs, low-wage immigrant labor groups have continued to flow into less productive jobs outside of IT, allowing the economy as a whole to achieve growth without inflation.

(3) Productivity Growth

1. Effect of immigration on productivity growth

The potential growth rate — a measure of the economy's capacity to grow — is generally expressed as the sum of labor force growth rate and productivity growth rate. In the late 1990s, the potential growth rate of the U.S. economy was 3.5% (1.2% labor force growth + 2.3% productivity growth). Since immigration contributes directly to labor force growth, and also plays a role in productivity growth, it contributes in both quantitative and qualitative aspects.

Immigrants who are technical experts in IT related areas tend to choose specific destinations such as Silicon Valley, where their concentrated presence produces synergistic effects as they build out a knowledge base. These concentrations contribute to productivity growth not only in the IT industries they belong to but in other industries (knowledge spillover), thereby further stimulating economic growth.

Generally, when an economic expansion causes the labor market to tighten, labor supply constraints lead to higher marginal labor costs and diminishing returns. But the steady inflow of low-cost Hispanic and other immigrant labor has helped keep down the marginal cost of labor input despite rising production, while higher capacity rates mean that fixed costs are lower. As a result, there is an increase in returns to production (economies of scale) and productivity.

In other words, immigration contributes to productivity growth through the external effects associated with synergies from skilled immigrants, and through economies of scale made possible by low-cost immigrant labor.

2. Endogenous growth model analysis

The mechanism by which external effects and economies of scale prevent diminishing productivity and thereby sustaining long-term economic growth is generally analyzed in the framework of an endogenous growth model. We expanded the endogenous growth model of Romer (1986) by incorporating a new endogenous variable for changes in labor quality due to external effects and economies of

scale, and analyzed its effect on productivity growth.

The endogenous variable related to labor quality is obtained by aggregating corporate performance in research and production activities. We assumed that this performance is shared by all companies as a result of external effects.

Having defined the variables, we estimated production coefficients based on actual data for production, capital stock, and labor force, then obtained the endogenous variables related to labor quality, and examined their contribution to productivity growth (see endnote for calculation method). Production coefficients are obtained from endogenous variables related to capital stock, labor force, and labor quality, and the state of technology. To reflect advances in IT, we also performed calculations by separating out IT from other capital stock.

3. Productivity growth due to immigration

The estimation results are shown in Figure 7. The contribution of labor quality to productivity growth moves in a cycle: productivity rises in the early phase of the economic recovery due to the small change in employment, but as the economy expands, marginal costs increase and productivity declines (see arrows). This pattern generally agrees with the normal assumption of diminishing returns to scale.

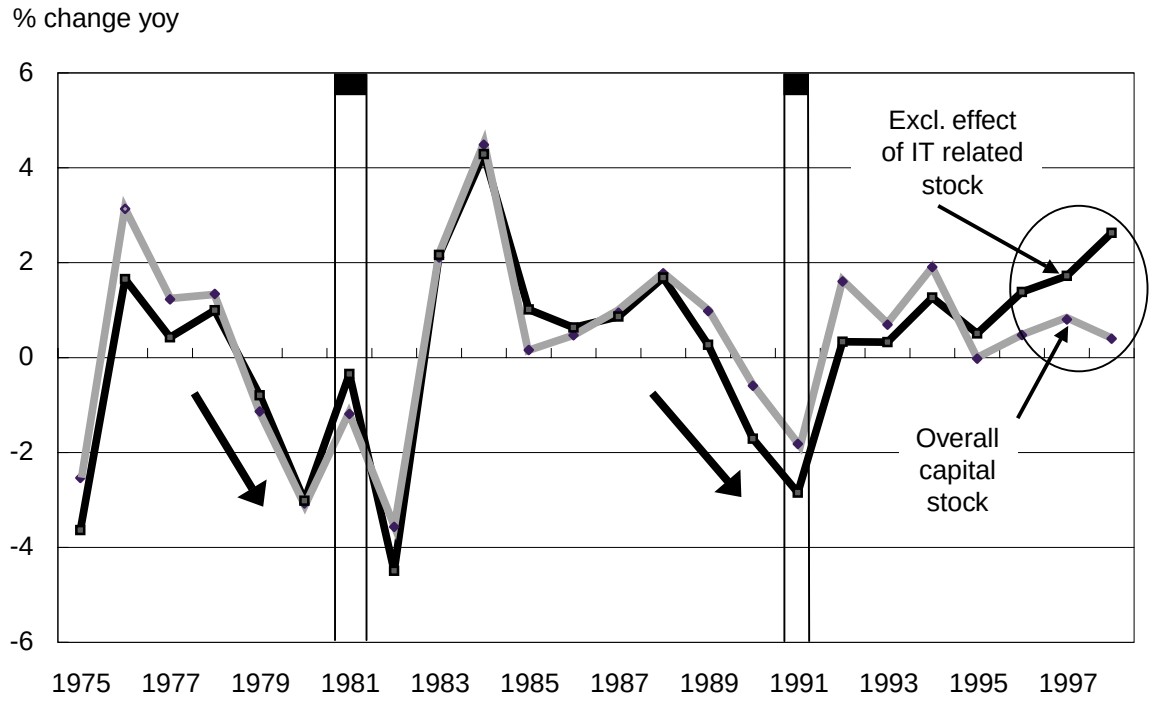
However, productivity growth has been sustained throughout the duration of the long expansion (see circled part of graph). This unusual situation suggests the possibility of increasing returns to scale due to external effects of accumulated earnings and economies of scale from low-cost immigrant labor.

In addition, since 1996, the contribution of labor quality to productivity growth is actually higher when the effect of IT related stock is excluded.

Rather than the effect of the growth in IT related stock, this result reflects external effects from the immigration of IT technicians and the concentration of knowledge and economies of scale from increased immigration. Productivity grew 2.8% in 1998, of which 2.6% is attributed to changes in labor quality. The reason for this large contribution is that the immigration and concentration of IT technicians were stimulated by the development of the new economy.

In other words, productivity growth attributable to the new economy is not limited to increases in IT related investment, but also to the accumulation of human capital such as IT technicians.

Figure 7 Quality of Labor and Productivity Growth



Note: Vertical lines indicate recessions.
Source: Department of Commerce; Department of Labor

3. Future Immigration Trends and Implications for Japan

(1) U.S. Immigration Trend Will Remain Unchanged

As we have shown, the wave of immigration into the U.S. has not only expanded the labor supply, but produced wide ranging and long-term economic effects by helping to suppress wage growth and boost productivity. The real GDP growth of 5.4% in the first quarter of 2000 remained above the potential growth rate.

If productivity growth has a demand inducement effect as FRB Chairman Greenspan has stated, mounting inflationary pressure and a recession may be in store for the future. Should this occur, immigrant employment will decrease primarily in low-wage jobs, and immigration could actually worsen the unemployment rate, contrary to the present case.

However, in the long-term, immigration trends will continue their present course while contributing to economic growth. With IT technicians in short supply worldwide, Japan and European countries are also trying to attract foreign technicians. But since the concentration of IT in the U.S. produces syner-

gies that contribute to economic growth, the U.S. is likely to attract more skilled technicians from around the world.

In addition, with the end of the Cold War ushering in greater labor mobility worldwide, the relatively high wage levels in the U.S. are likely to keep attracting more immigrants of all skill levels. This will not only increase the potential growth rate, but ease labor supply constraints and create a sustained condition of increasing returns. The growth rate gap between the U.S. and other countries during the 1990s is thus expected to be maintained.

(2) Implications for Japan

The economic effects of immigration trends in the U.S. have implications for Japan, where the falling birth rate and rapid aging have caused a troublesome decline in the labor force. There is intense competition for IT technicians in the global labor market. Attracting the best requires a competitive labor market and clear guidelines for human resources management and evaluation systems. With respect to the domestic labor force, the predicted decline in new graduates entering the labor force means that the existing labor force structure must be changed.

The problem is in securing labor in less productive (labor intensive) areas. Increased labor demand in less productive areas such as, for example, the promising long-term care market, tends to create inflationary pressures.

To alleviate tight labor market conditions in growth industries, Japan should consider encouraging immigration from neighboring countries in Asia just as the U.S. has relied on immigration from Latin America. Considering the long-term effects on economic growth from immigration, a broad revision of immigration laws including permanent visa status appears necessary.

Note

Assume the following Cobb-Douglas function:

$$Y=AK_i^{\alpha}K_o^{\beta}(QL)^{1-\alpha-\beta}$$

where Y is production, A is the state of technology, K_i is the IT capital stock, K_o is all other capital stock, Q is an endogenous variable for the quality of labor, and L is the labor force. We can rewrite the equation to obtain production per person as follows:

$$\frac{Y}{L}=A\left(\frac{K_i}{L}\right)\left(\frac{K_o}{L}\right)Q^{1-\alpha-\beta}$$

Here, technological progress is $A_t=e^{gt}$ (where g is the neutral rate of technological progress). Taking the log of this equation, we have:

$$\ln y = gt + \alpha \ln k_i + \beta \ln_o = (1-\alpha-\beta) \ln Q$$

This equation is then estimated (small letters denote per person). Furthermore, when the equation is fully differentiated, we obtain the productivity growth rate and contributions of each factor.

$$\frac{\dot{y}}{y} = g + \alpha \frac{\dot{k}_i}{k_i} + \beta \frac{\dot{k}_o}{k_o} + (1-\alpha-\beta) \frac{\dot{Q}}{Q}$$

The values shown in Figure 7 are taken from the $\frac{\dot{Q}}{Q}$ component.