# International comparisons of labor productivity and per capita income

*A new cross-national study reveals differences in economic performance and living standards that are both quantitatively and qualitatively large across countries and regions*

Bart van Ark and Robert H. McGuckin

Interest in international comparisons of economic performance and living standards has grown with increased world trade and improved labor and capital mobility. Differences among countries in average labor productivity, a measure of economic performance, and income per capita, a measure of living standards, are determined by differences in the number of annual working hours per person and the share of the population that works. Thus, any study of international variations in these measures must be accomplished using a range of labor market indicators—working hours, unemployment, and labor force participation rates.

This article describes recent work at The Conference Board in combining estimates from a variety of statistical sources to reconcile labor productivity and per capita income for a wide range of countries and regions.[1] This approach helps in understanding how living standards and economic performance are related. Because these factors are affected by policy, identifying their relative importance in attaining economic goals provides benchmarks for assessing the costs of particular policies and potential areas for reform.

## A comparisons framework

Even when two countries have similar productivity levels, less use of labor—fewer hours of work, more unemployment, and lower labor participation rates—can cause one to have lower per capita income than the other.[2] This relationship can be conveniently expressed with the aid of the following decompositions that link differences in per capita income and productivity. First, the difference in per capita income, $O/P$, between two countries ($X$ and $Y$) is expressed as the difference in labor productivity times the difference in labor input per person, $H/P$:

$$O/P^{x\text{-}y} = (O/H)^{x\text{-}y} * (H/P)^{x\text{-}y} \quad (1)$$

Second, the differences in working hours per person are decomposed into differences in: hours worked per person employed ($H/E$); numbers of persons employed relative to the total labor force, that is, employed persons plus registered unemployed persons, ($E/L$); the ratio of the labor force to all persons aged 15 to 64, that is, the "working age" population ($L/P15–64$); and the share of the working age population in the total population ($P15–64/P$). Algebraically, this can be expressed as:

$$H/P^{x\text{-}y} = (H/E)^{x\text{-}y} * (E/L)^{x\text{-}y} * (L/P15–64)^{x\text{-}y} * (P15–64/P)^{x\text{-}y} \quad (2)$$

This simple decomposition highlights major sources of labor supply and determines the fraction of the population employed. For example,

Bart van Ark and Robert H. McGuckin are with the Conference Board, New York. Van Ark is also an associate professor of economics at the University of Groningen, the Netherlands. The authors are solely responsible for the estimates provided in this article.

equation 2 attributes lower labor force participation in country *X,* relative to country *Y*, to fewer working hours per employee, higher official unemployment, lower labor force participation (that is, underemployment), or a too-young or too-aged population.

## Data sources and comparability

Until recently, comparisons of productivity and per capita income were restricted to a small number of countries. But efforts during past decades to construct an internationally consistent system of national accounts have greatly expanded both the number of countries that can be compared and the quality of the comparisons. Estimates of output and per capita income are now regularly published by international organizations, such as Eurostat, the International Monetary Fund, the Organization for Economic Cooperation and Development (OECD), the United Nations, and the World Bank. Secondary sources with estimates for a larger range of variables, including productivity, labor input, expenditure, investment, and their components, which are frequently used in academic and policy studies, also have been developed.[3]

Much of the work on international comparisons is based on comparisons of growth rates across countries, which minimize measurement errors from methodological differences in the way aggregate economic measures are created. This is because many of these errors are relatively constant over time, and therefore drop out when the growth rate is calculated.[4]

In implementing the decomposition presented above, it is necessary to develop comparable measures of output and labor inputs in terms of levels. Level comparisons can be more sensitive to differences in estimation procedures. Moreover, the need to convert output values from many countries into a common currency means that purchasing power parities (PPPs) are required. Below, we briefly outline some of the major problems that are encountered in developing the key magnitudes required for our reconciliation—output, PPPs, and labor input measures. As indicated earlier, we seek a set of internationally comparable indicators, which are not necessarily the "best" measure for an individual country.

*Gross domestic product.* The gross domestic product (GDP) of an economy, defined as the total gross value of production minus intermediate inputs in current prices, is calculated using relatively consistent methodologies across most countries. Although countries are at different stages in implementing the new 1993 guidelines for the United Nations System of National Accounts (SNA), most countries at least adhere to the 1968 version of SNA.

Despite common methodologies, comparisons of real GDP have become more complicated during recent years. As the share of services in output has increased, distinguishing between price and quantity components of the value of output has become increasingly difficult. This is partly because of the lack of primary statistics for services, such as censuses and price surveys. In addition, it is conceptually more difficult to define the quantity of a particular service delivered than the quantity of a tangible good.[5]

This problem of increasing proportions of poorly measured services is common to all countries. It is of particular concern in international comparisons because individual countries tend to follow their own procedures in estimating services output. Moreover, because the shares of services vary across national economies, the impact of the problem is not uniform.

A second problem is that the weighting systems used to aggregate individual goods and services into GDP measures at constant prices are not fully harmonized. Several advanced countries—including, most recently, the United States—are now producing annually chained series for GDP. Because this procedure relies on very recent component weights, it is preferred for statistical as well as theoretical reasons. On the other hand, there are still a substantial number of countries that use 5- or even 10-year-old base-year weights in developing their national accounts. These differences affect the comparability of the time series of real GDP, as longer base periods lead to an overstatement of growth rates when (as is usual) observations for the first year of the period are used as GDP component weights.

A third problem, one that becomes particularly important when low-income countries are included in the analysis, is undercoverage of output measures due to neglect of large parts of the informal economy. Even in advanced countries, adjustments for the underground economy can differ substantially, and the effect on GDP estimates can be as much as 15 to 20 percent.[6]

To obtain maximum comparability across countries, we obtained our measures of GDP directly from the OECD *National Accounts*,[7] and updated them to 1997 on the basis of growth rates from the June 1998 issue of the OECD biannual publication, *Economic Outlook*. For non-OECD countries, which, for the most part, are countries on the Asian and South American continents, data are based on a consistent set of estimates through 1992 by A. Maddison.[8] These have been updated to 1996 with national account statistics from individual countries, complemented with information obtained from the Asian Development Bank, A. Hofman, and the World Bank.[9]

*Purchasing power parities.* Even with consistent methodologies for measurement of GDP, comparisons of output in different countries cannot be undertaken without making adjustments for differences in relative price level. Hence the use of purchasing power-adjusted exchange rates is a fundamental

component of the level comparisons pursued in this article. Purchasing power parities (PPPs) are the amount of a country's currency that is required to purchase a standard set of goods and services worth one unit of the currency of another (base) country. When converting output measured in one currency into the currency of another country, PPPs take account of the price differences between the countries.

The use of purchasing power parities has a long history going back to work done at the Organization of European Economic Cooperation during the 1950s.[10] Since 1975, the construction of PPPs has been a regular aspect of the statistical programs of international agencies such as Eurostat, the OECD, the United Nations, and the World Bank. An important feature of the recent PPP estimates is that they allow one to make multilateral comparisons between groups of countries. Hence the results are transitive, so that, for example, a comparison of the U.S./Germany PPP with the Germany/France PPP gives the same result as the U.S./France PPP.

For OECD countries, purchasing power parities are now estimated on a regular basis. In this study, we used OECD estimates of 1993 PPPs developed according to the EKS method.[11] Hence, 1997 GDP is expressed at the price level of 1993, and then converted into U.S. dollars using the 1993 EKS PPPs. For most non-OECD countries, the latest benchmark estimates of PPPs relate only to 1980 or 1985, but R. Summers and A. Heston and A. Maddison compiled a complete set of PPPs for 1990, derived from the earlier benchmarks.[12] Maddison's estimates of GDP in dollars are based on PPPs calculated according to the Geary-Khamis method.[13] We applied Maddison's 1990 PPPs for non-OECD countries to our 1996 estimates expressed in 1990 prices.

One of the problems in using purchasing power parities is that the results for a particular year, say 1997, differ depending on whether the comparison is made based on, for example, 1990 or 1993 PPPs. This is because the weights used for the cross-country level comparisons are not consistent with those of the national time series, which are used in the updating. However, it appears that these differences are relatively small between the 1990 and 1993 benchmark PPPs, in contrast to comparisons of earlier benchmark-year PPPs.[14] Thus, the results we derive are relatively insensitive to our choice of PPP. Nevertheless, for the sake of consistency, we also show, in table 2, the 1996 estimates for OECD countries when they have been derived on the same basis as those for the non-OECD countries—that is, by using Geary-Khamis PPPs for 1990.

*Employment.* Estimates of employment in this article are for the average number of persons with one or more paid jobs during the year.[15] Unfortunately, labor accounts are not as well harmonized as are national accounts, although a small number of countries provide employment estimates within the national accounts framework. For OECD countries, the employment estimates are mostly derived from the OECD labor force statistics.[16] These data are based on labor force or population surveys, so that they match the figures on total population and on the population aged 15 to 64, which are obtained from the same source. For Asian and South American countries, the primary data source for labor input estimates was Maddison, who largely used labor survey and population census results.[17] Maddison's latest estimates were for 1992, and these were updated to 1996 with time series from the Asian Development Bank and the World Bank.[18]

*Unemployment.* The official unemployment estimates—that is, the shares of the labor force not employed—are based on OECD estimates of standardized unemployment.[19] These estimates are developed by the OECD to ensure comparability over time and across countries. For the Asian and South American countries, we calculated unemployment on the basis of the difference between the employment and labor force estimates.

*Working hours.* The international comparability of working hours is one of the most troublesome aspects in any data set on productivity, as very different data collection and processing procedures still are applied across countries. For a small number of countries, including Canada, the United Kingdom, and the United States, estimates of hours actually worked (as opposed to hours paid) can be directly obtained on the basis of labor force survey information. Most other countries, however, make use of some variant of the "component method" to arrive at hours actually worked.[20] This method begins with a measure of paid hours or "usual" hours, which is supplemented with estimates of "unusual" working hours (such as overtime) and various types of hours not worked, including vacation and holidays, absences due to sickness, and part-time work. Estimates based on the component method generally are obtained by combining information on paid employee hours from establishment surveys (such as the U.S. Current Employment Statistics program) and information on working hours of self-employed and unpaid family workers from labor force surveys (such as the U.S. Current Population Survey).

The major differences that exist in methods for compiling hours figures make it difficult to obtain comparable international estimates of working hours. While it is not possible to fully assess which country estimates are "best," the data produced by Maddison are largely based on the component method and have been adjusted where possible to improve comparability. This is a big advantage for the present study.[21] We updated Maddison's estimates for 1992 with the trends from series in the OECD publication, *Employment Outlook,*[22] or from national sources, although in quite a number of cases we had to assume that working hours were constant between 1992 and 1997.

This said, Maddison's estimate of annual working hours in

the United States requires some further discussion, as his figures are considerably lower than those derived using alternative data sources. For 1997, U.S. hours per person employed, updated from Maddison's estimate for 1992, are 1,628 per year. Another estimate of annual working hours is developed by the OECD using data on total hours worked derived from the Current Population Survey, which are divided by the average numbers of persons at work. This estimate was as high as 1,966 hours per year in 1997.[23]

The estimate of U.S. hours used has an important impact on the international comparisons of productivity. When the updated Maddison estimates for annual hours are used, 4 of the 23 OECD countries for which data are shown in table 1 have higher labor productivity than the United States in 1997—Belgium (107 percent of the U.S. level), Norway (106 percent), France (103 percent), and the Netherlands (101 percent). When the OECD estimate of 1,966 hours for U.S. workers is used, these four countries have a much bigger productivity lead—Belgium (130 percent of the U.S. level), Norway (128 percent), France (124 percent), and the Netherlands (122 percent). In addition, five other countries are above the U.S. level on the basis of the latter measure, namely Austria (103 percent), Germany (106 percent), Ireland (109 percent), Italy (108 percent), and the United Kingdom (101 percent). The implausibility of these comparative productivity figures in combination with a U.S. estimate of annual working hours, which is as much as 400 to 500 hours per person higher than in Europe, leads us to reject the U.S. estimate of 1,966 hours per person in 1997.[24]

While it is not possible to completely assess which U.S.

**Table 1. Decomposition of gross domestic product (GDP) per hour relative to the OECD average into effects of working hours, labor force participation and GDP per capita, 25 countries and areas, 1997**

| Country or area | GDP per hour worked as a percent of the OECD average | Effect of working hours[1] | GDP per person employed as a percent of the OECD average[2] | Effect of unemployment[3] | Effect of labor force as a percent of the working age population (aged 15 to 64)[4] | Effect of working age population (aged 15 to 64) as a percent of total population[5] | Total effect of labor force participation[6] | GDP per person employed as a percent of the United States[7] |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Australia | 96 | 0 | 96 | –1 | 2 | 0 | 1 | 97 |
| Austria | 102 | –4 | 98 | 3 | –2 | 1 | 2 | 100 |
| Belgium | 128 | –5 | 123 | –3 | –19 | –1 | –22 | 101 |
| Canada | 97 | 2 | 98 | –2 | 2 | 2 | 2 | 100 |
| Denmark | 92 | 0 | 92 | 1 | 9 | 1 | 11 | 103 |
| Finland | 93 | 0 | 94 | –7 | 2 | 0 | –5 | 88 |
| France | 123 | –9 | 113 | –6 | –9 | –2 | –17 | 97 |
| Germany[8] | 105 | –5 | 100 | –3 | –4 | 2 | –4 | 96 |
| Greece | 75 | –4 | 71 | –2 | –11 | 1 | –12 | 58 |
| Ireland | 108 | 5 | 113 | –4 | –12 | –3 | –18 | 95 |
| Italy[9] | 106 | –11 | 96 | –5 | –1 | 2 | –5 | 91 |
| Japan | 82 | 10 | 92 | 4 | 6 | 4 | 14 | 106 |
| The Netherlands | 121 | –26 | 95 | 2 | –4 | 2 | 0 | 96 |
| New Zealand | 69 | 8 | 77 | 1 | 3 | –1 | 2 | 79 |
| Norway | 126 | –17 | 109 | 4 | 12 | –4 | 12 | 122 |
| Portugal | 56 | 2 | 58 | 0 | 1 | 1 | 2 | 60 |
| Spain | 84 | 13 | 97 | –14 | –13 | 2 | –26 | 71 |
| Sweden | 93 | –3 | 89 | –3 | 6 | –4 | –1 | 88 |
| Switzerland | 94 | 0 | 94 | 3 | 12 | 1 | 17 | 111 |
| Turkey | 36 | 2 | 38 | 0 | –8 | –1 | –9 | 29 |
| United Kingdom | 100 | –9 | 91 | 0 | 3 | –2 | 0 | 92 |
| United States | 120 | –1 | 118 | 3 | 9 | –2 | 10 | 128 |
| Weighted average: | | | | | | | | |
| All OECD[10] | 100 | 0 | 100 | 0 | 0 | 0 | 0 | 100 |
| European Union (EU–14)[11] | 103 | –5 | 98 | –4 | –4 | 0 | –8 | 90 |
| North West Europe[12] | 108 | –7 | 100 | –2 | –2 | 0 | –4 | 96 |

[1] Calculated on the basis of actual hours worked per person per year.
[2] Sum of columns 1 and 2.
[3] Calculated on the basis of standardized unemployment rates from OECD.
[4] Calculated on the basis of labor force as a percent of the population aged 15 to 64. This column also includes rounding differences.
[5] Calculated on the basis of population aged 15 to 64 as a percent of total population
[6] Sum of columns 4, 5, and 6, plus rounding differences.
[7] Sum of columns 3 and 7.
[8] Includes the former East Germany.
[9] Employment and labor force estimates for Italy were increased by 20 percent to account for "underground" employment. See A. Maddison, *Dynamic Forces in Capitalist Development* (London, Oxford University Press, 1991), p. 252.
[10] Consists of the countries itemized above. Excludes Iceland and Luxembourg and countries that have recently become OECD members (Czech Republic, Hungary, Korea, Mexico, and Poland).
[11] Excludes Luxembourg.
[12] Unweighted average for Austria, Belgium, Denmark, Germany (including the former East Germany), Finland, France, The Netherlands, Norway, Sweden, Switzerland, and the United Kingdom.

NOTE: Due to rounding, sums of individual items may not equal totals.

SOURCES: See text.

hours measure is most accurate, the Maddison estimates provide a relatively consistent international standard. However, a final judgment cannot be made before more detailed work on international comparability of hours is carried out.

## Results for the OECD

Chart 1 shows comparisons of labor productivity (top bar) and per capita income (bottom bar) for the United States, the European Union, and Japan, relative to the GDP weighted average for the OECD in 1997. The bars in the center of each diagram show productivity after adjusting for the contribution of each labor-input component.

The chart panels show striking differences across the three core regions within the OECD. The United States is clearly ahead of the European Union and Japan in terms of both GDP per capita and labor productivity, but the ranking between the latter two differs. Whereas the European Union comes second after the United States in productivity, it ranks third on the per capita income measure. Indeed, the relative labor productivity of the European Union is 2.7 percentage points higher than the OECD average, whereas the per capita income is 10 per-

**Table 2. Decomposition of gross domestic product (GDP) per hour relative to the United States into effects of working hours, unemployment, labor force participation and GDP per capita, 28 countries and areas, 1996**

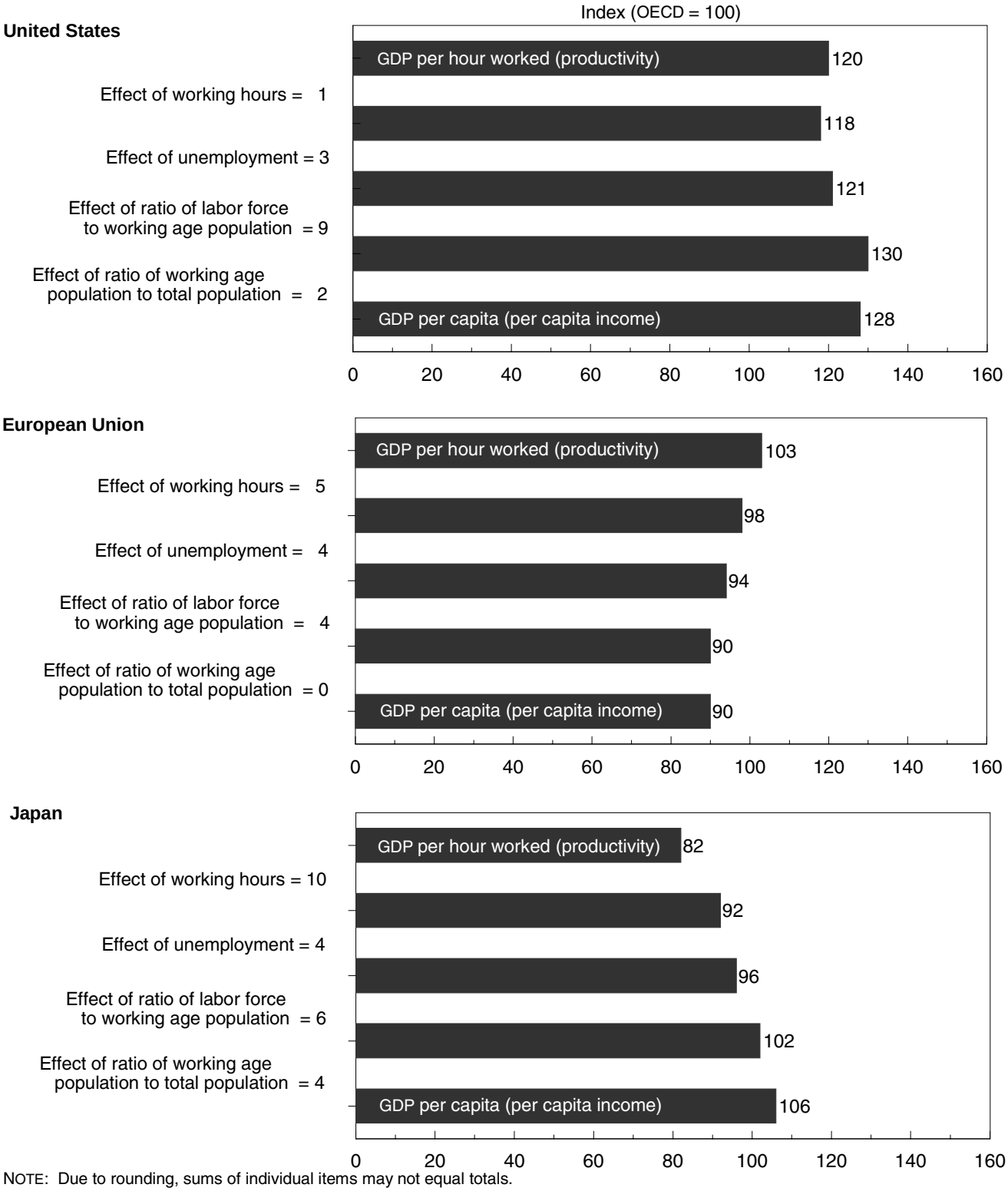
| Country or area | GDP per hour worked as a percent of the United States | Effect of working hours[1] | GDP per person employed as a percent of the United States[2] | Effect of unemployment[3] | Effect of labor force as a percent of the working age population (aged 15 to 64)[4] | Effect of working age population (aged 15 to 64) as a percent of total population[5] | Total effect of labor force participation[6] | GDP per person employed as a percent of the United States[7] |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Argentina | 41 | 7 | 48 | –4 | –10 | –3 | –13 | 35 |
| Brazil | 26 | 4 | 30 | –5 | –7 | –1 | –8 | 22 |
| Chile | 41 | 10 | 50 | –5 | –12 | –1 | –12 | 38 |
| Colombia | 29 | 7 | 36 | –8 | –11 | –1 | –12 | 24 |
| Mexico | 23 | 6 | 29 | –1 | –5 | –2 | –8 | 22 |
| Venezuela | 44 | 8 | 52 | –2 | –12 | –4 | –16 | 36 |
| Bangladesh | 4 | 1 | 6 | 0 | –2 | 0 | –2 | 3 |
| China | 8 | 3 | 11 | 1 | 0 | 0 | 1 | 12 |
| Hong Kong | 66 | 26 | 93 | 3 | –10 | 6 | –1 | 92 |
| India | 7 | 3 | 9 | 0 | –1 | –1 | –2 | 7 |
| Indonesia | 13 | 5 | 18 | 0 | –2 | –1 | –3 | 15 |
| Japan | 72 | 9 | 82 | 2 | –1 | 5 | 6 | 87 |
| Malaysia | 31 | 11 | 42 | 1 | –5 | –4 | –8 | 33 |
| Pakistan | 10 | 4 | 14 | 0 | –5 | –2 | –6 | 7 |
| Philippines | 9 | 3 | 13 | 0 | –1 | –1 | –2 | 10 |
| Singapore | 54 | 23 | 77 | 2 | 8 | 6 | 16 | 93 |
| South Korea | 37 | 20 | 57 | 3 | –8 | 4 | –2 | 56 |
| Sri Lanka | 18 | 6 | 24 | –2 | –8 | 0 | –10 | 14 |
| Taiwan | 47 | 22 | 70 | 2 | –13 | 3 | –8 | 61 |
| Thailand | 19 | 7 | 26 | 0 | 0 | 1 | 1 | 26 |
| United States | 100 | 0 | 100 | 0 | 0 | 0 | 0 | 100 |
| GDP-weighted average: | | | | | | | | |
| Latin America | 29 | 5 | 34 | –4 | –3 | –2 | –9 | 25 |
| Asia | 12 | 4 | 17 | 0 | –1 | 0 | –1 | 15 |
| Asia excluding Japan | 10 | 4 | 13 | 0 | –1 | 0 | –1 | 12 |
| Newly Industrializing Economies[8] | 43 | 22 | 65 | 2 | –9 | 4 | –3 | 62 |
| Southeast Asia[9] | 15 | 5 | 20 | 0 | –2 | –1 | –3 | 17 |
| South Asia[10] | 7 | 3 | 10 | 0 | –2 | –1 | –3 | 7 |
| OECD[11] | 84 | 1 | 85 | –2 | –5 | 1 | –6 | 79 |

[1] Calculated on the basis of actual hours worked per person per year.
[2] Sum of columns 1 and 2.
[3] Calculated on the basis of the ratio of employment to the labor force.
[4] Calculated on the basis of employment force as a percent of the population aged 15 to 64.
[5] Calculated on the basis of population aged 15 to 64 as a percent of total population.
[6] Sum of columns 4, 5, and 6.
[7] Sum of columns 3 and 7.
[8] Includes Hong Kong, Singapore, South Korea, and Taiwan.
[9] Includes Indonesia, Malaysia, Philippines, and Thailand.
[10] Includes Bangladesh, India, Pakistan, and Sri Lanka.
[11] Excludes Iceland and Luxembourg and countries that have recently become OECD member (Czech Republic, Hungary, Korea, Mexico, and Poland). Rounding differences, and so forth, are included with the estimates of the labor force/active population effect in column 5.

NOTE: Due to rounding, sums of individual items may not equal totals.

SOURCES: Sources for GDP, hours, employment, and labor productivity are as described in the text, except that data for China are from A. Maddison, *Chinese Economic Performance in the Long Run* (Paris, OECD Development Center,1998). Data on working hours were obtained from sources described in the text, except that those for Hong Kong, Singapore, Korea, and Taiwan are based on N.F.R. Crafts, "Economic Growth in East Asia and Western Europe Since 1950: Implications for Living Standards," *National Institute Economic Review* (National Institute of Economic and Social Research), October, 1997, pp.75–84.

**Chart 1.** **Decomposition of gross domestic product (GDP) per hour relative to the OECD average into effects of working hours, unemployment, labor force participation, and GDP per capita, United States, European Union, and Japan, 1997**




NOTE: Due to rounding, sums of individual items may not equal totals.

centage points behind it. The difference of 12.7 percentage points is attributable to shorter average working hours (5.2 points), higher unemployment (3.6 points), and lower labor force participation (6.3 points) in the European Union.

In Japan, the opposite situation occurs, with labor productivity as much as 18.6 percentage points behind the OECD average, but with per capita GDP 5.7 percentage points above corresponding OECD measure. In this case, the difference for Japan is accounted for by substantially higher average hours per person employed (10.1 points), less unemployment (3.9 points), higher labor force participation (6.2 points), and a lower dependency rate of people in the nonworking-age population than is the case for the OECD as a whole (3.9 points). The United States also benefits from a relatively high labor force participation rate, but some of this advantage is offset by a relatively high dependency rate.

In conclusion, whereas the European Union clearly has a labor problem that depresses the relative level of per capita income, Japan's problems appear to be more related to relatively low productivity, which is compensated for only by extraordinary high labor force participation and long working hours of the employed population.

## Results for Asia and South America

Panels 1 and 2 of chart 2 show the results of comparisons for Asia (excluding Japan) and South America, based on data for 1996. Rather than being compared to the OECD average, as in the foregoing analysis, levels for Asian and South American countries are compared to that of the United States. Per capita income and labor productivity in both regions are far behind the U.S. level, but some important differences can be observed. First, labor productivity and per capita income are lower in Asia than in South America. Secondly, the productivity gap relative to the United States is larger than the per capita income gap for Asia, whereas South American productivity is closer to the U.S. level than is the region's per capita income. As in Asia, annual average hours worked in South America are higher than those in the United States, but lower labor force participation more than offsets the positive contribution of the higher working hours to per capita income.

In Asia, higher average working hours, compared to the United States, are not offset by lower labor force participation. This is particularly true for the four East Asian Newly Industrializing Countries (NICs)—South Korea, Taiwan, Hong Kong, and Singapore (chart 2, panel 3). For this group of countries, labor productivity is 42.9 percent of the U.S. average, with per capita income 61.9 percent of the U.S. figure. The narrower gap (38 percentage points) for per capita income is almost totally explained by higher average working hours (21.7 percentage points) in these countries. For example, South Korean workers put in nearly 2,500 hours per year, nearly a third more than U.S. workers. Nevertheless, labor force participation in the East Asian NICs is still somewhat lower than in the United States, which somewhat moderates the effects of relative per capita income level of the East Asian region in 1996.

## Conclusions

Productivity is only one of the factors determining living standards. Living standards also depend on "how many mouths need to be fed" from what is produced. In this respect, important differences are observed between countries. For example, the level of productivity in France is above that of the United States. But, this productivity advantage is eroded by the effects of fewer working hours and lower labor force participation rates, particularly among the working age population.

As a final note, one needs to be cautious in applying such information directly for policy purposes. If, for example, the United States has lower productivity due to greater use of low-skilled labor than has France, efforts by France to increase labor force participation might reduce that country's productivity while increasing per capita income. Moreover, relatively high wage costs in European countries may have induced rapid substitution of capital for labor in these countries relative to the United States, explaining their high productivity levels.[25] In short, policy analysts must look at a wider range of issues than those highlighted here. Nevertheless, the importance of these benchmark analyses should not be minimized. They provide useful ways to focus policy work by indicating areas for potential improvements, and assessing the relative costs of existing labor market policies. □

## Notes

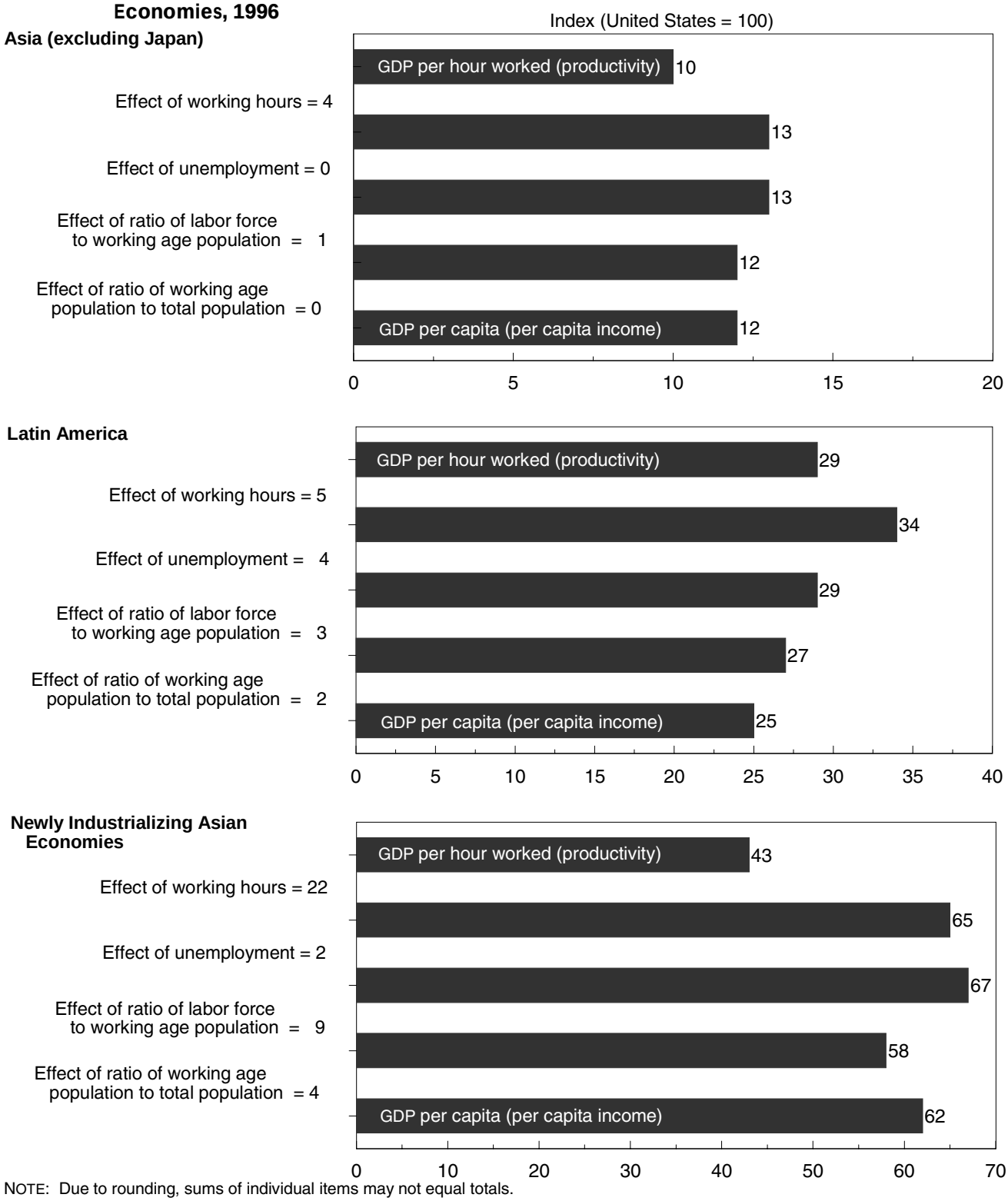
[1] See The Conference Board series, *Perspectives on a Global Economy*: "Understanding Differences in Economic Performance," Report 1187–97–RR (New York, Summer 1997); "Technology, Productivity, and Growth: U.S. and German Issues," Report 1206–97–RR (Brussels, Winter 1997); "Asia After the Crisis: Challenges for a Return to Rapid Growth," Report 1219–98–RR (New York, Summer 1998); and "The Euro's Impact on European Labor Markets," Report 1236–99–RR (New York, Winter 1998).

[2] Per capita GDP is not a complete measure of well being, but it is an important indicator of it, and highly correlated with other indicators.

[3] Specifically, these sources include R. Summers and A. Heston, "The Penn World Table (March 5): An Expanded Set of International Comparisons, 1950–1988," *Quarterly Journal of Economics*, May 1991, pp. 327–68; and R. Summers and A. Heston, *Penn World Tables 5.5*, diskette, June 1993. For estimates over a longer timespan, see A. Maddison, *Monitoring the World Economy 1820–1992* (Paris, OECD Development Centre, 1995).

[4] Maddison suggests that over the past 40 to 50 years, differences between growth measures of OECD countries due to noncomparability of the measure "…of less than 0.2% a year should probably not be regarded as

**Chart 2.** **Decomposition of gross domestic product (GDP) per hour relative to the United States into effects of working hours, unemployment, labor force participation, and GDP per capita, Asia (excluding Japan), Latin America, and the Newly Industrializing Asian Economies, 1996**




NOTE: Due to rounding, sums of individual items may not equal totals.

significant." See A. Maddison, "Macroeconomic Accounts for European Countries," in B. van Ark and N.F.R. Crafts, eds., *Quantitative Aspects of Post-War European Economic Growth* (Cambridge, CEPR/Cambridge University Press, 1996), pp. 27–83, at p. 30.

[5] See Z. Griliches, ed., *Output Measurement in the Service Sectors* (Chicago, National Bureau of Economic Research/University of Chicago Press, 1992) for a range of papers on output, price, and productivity measurement of services. For a recent overview of the size of the problem, see Edwin R. Dean, "The accuracy of BLS productivity measures," *Monthly Labor Review*, February 1999, pp. 24–34.

[6] See Maddison, "Macroeconomic Accounts for European Countries."

[7] *National Accounts, Main Aggregates, Volume 1* (Paris, Organization for Economic Cooperation and Development, 1998).

[8] See Maddison, *Monitoring the World Economy*.

[9] Asian Development Bank, *Key Indicators of Developing Asian and Pacific Countries* (Manilla, Asian Development Bank, 1997); A. Hofman, *The Economic Development of Latin America in the Twentieth Century* (Cheltenham, U.K., Edward Elgar Publishers, forthcoming); and World Bank, *World Development Indicators 1998*, CD-ROM version (Washington, The World Bank, 1998).

[10] See, for example, M. Gilbert and I.B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies* (Paris, Organization of European Economic Cooperation, 1954); and M. Gilbert and Associates, *Comparative National Products and Price Levels* (Paris, Organization for Economic Cooperation and Development, 1958).

[11] See Organization for Economic Cooperation and Development, *Purchasing Power Parities and Real Expenditures, EKS Results, Volume I* (Paris, Organization for Economic Cooperation and Development, 1995). EKS is named after O. Eltetö, P. Köves, and B. Szulc, who are the inventors of this method. EKS PPPs are basically geometric averages of binary PPPs. This means that they represent averages that do not account for differences in country size. For recent reviews of PPP programs, see, for example, I. Castles, "Review of the OECD-Eurostat PPP Programme The Evaluation of the International Comparison Program" (downloadable from **http://www.oecd.org**, 1997); and J. Ryten, "The Evaluation of the International Comparison Programme" (downloadable from **http://www.un.org/Depts/unsd**, 1998).

[12] See Summers and Heston, *Penn World Tables 5.5*; and Maddison, *Monitoring the World Economy*.

[13] The Geary-Khamis method, named after R. Geary and S.H. Khamis, simultaneously develops so-called international prices and purchasing power parities. Unlike the EKS system, these multilateral PPPs give weights to countries according to their size measured in terms of gross national product. (See, for example, Organization for Economic Cooperation and Development, *Purchasing Power Parities and Real Expenditures*.) For example, in application of this method, the GDP of the United States counts approximately 5 times as much in the determination of international prices as that of India and about 7.5 times as much as that of Brazil.

[14] See Maddison, *Monitoring the World Economy*, appendix C.

[15] Below we also introduce average annual working hours.

[16] Organization for Economic Cooperation and Development, *Labour Force Statistics 1977–1997* (Paris, Organization for Economic Cooperation and Development, 1998).

[17] Maddison, *Monitoring the World Economy*.

[18] See Asian Development Bank, *Key Indicators*; and World Bank, *World Development Indicators*.

[19] Organization for Economic Cooperation and Development, *Economic Outlook* (Paris, Organization for Economic Cooperation and Development, June 1998).

[20] Including most Northwest European countries. See Organization for Economic Cooperation and Development, *Employment Outlook*, p. 185. Estimates for European countries using the component method are provided in "Le temps de travail dans l'Union europeenne: estimation de la duree effective annuelle (1983–1993)," *Statistiques en bref*, no. 4 (Luxembourg, Eurostat, 1995).

[21] See A. Maddison, "Monitoring the Labour Market: A Proposal for a Comprehensive Approach in Official Statistics," *Review of Income and Wealth*, June 1980, pp. 175–217. Maddison proposed a comprehensive system of labour market accounts for a number of OECD countries to permit the compilation of consistent estimates of hours worked.

[22] Organization for Economic Cooperation and Development, *Employment Outlook*.

[23] Organization for Economic Cooperation and Development, *Employment Outlook*, table E.

[24] The high estimate of U.S. hours may partly reflect upward response biases in the measurement of actual hours at work in labor force surveys. On the other hand, hours estimates based on establishment surveys are more vulnerable to understatement of hours of self-employed workers and family workers.

[25] See, for example, The Conference Board, "The Euro's Impact on European Labor Markets."