



### *Global Productivity Trends*

# The 2010 Productivity Brief: Productivity, Employment, and Growth in the World's Economies

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The recession left its mark on global productivity, which fell in 2009. With recovery expected in 2010, advanced economies will see renewed productivity gains but continue to shed workers. Meanwhile, the productivity gap – the productivity growth differential between the United States and Europe – increased dramatically in 2009.

Global productivity growth, measured as the increase in output per person employed, turned negative in 2009—the first significant contraction of that benchmark since the early 1980s. However, productivity is expected to recover sharply in 2010 with most economies having already passed through the recession trough of the cycle. While advanced economies will mostly see jobless productivity growth as labor markets recover slowly, most emerging and developing economies will experience a combination of productivity *and* employment growth. This not only reflects their growing contributions to world output growth, but also a strengthening of their global competitiveness based not only on their low relative cost, but also on increasingly higher productivity.

Short-term cyclical effects aside, it is the long-term trend in productivity growth that determines the shift in productivity strengths and the relative growth potential across regions and countries. Long-term productivity growth depends on the efficiency with which all inputs in the production process of goods and services (including labor, workforce skills, machinery, and technology inputs) are used. This is measured as total factor productivity (TFP) growth. For advanced economies as a whole, TFP trends have been declining since 2005, which indicates a slowdown in the pace at which innovation and technological change are translating into efficiency gains. In contrast, emerging and developing countries have experienced a positive and long-term increase in TFP growth, reflecting a strengthening of the efficiency with which those economies use labor and capital in productive economic activity.

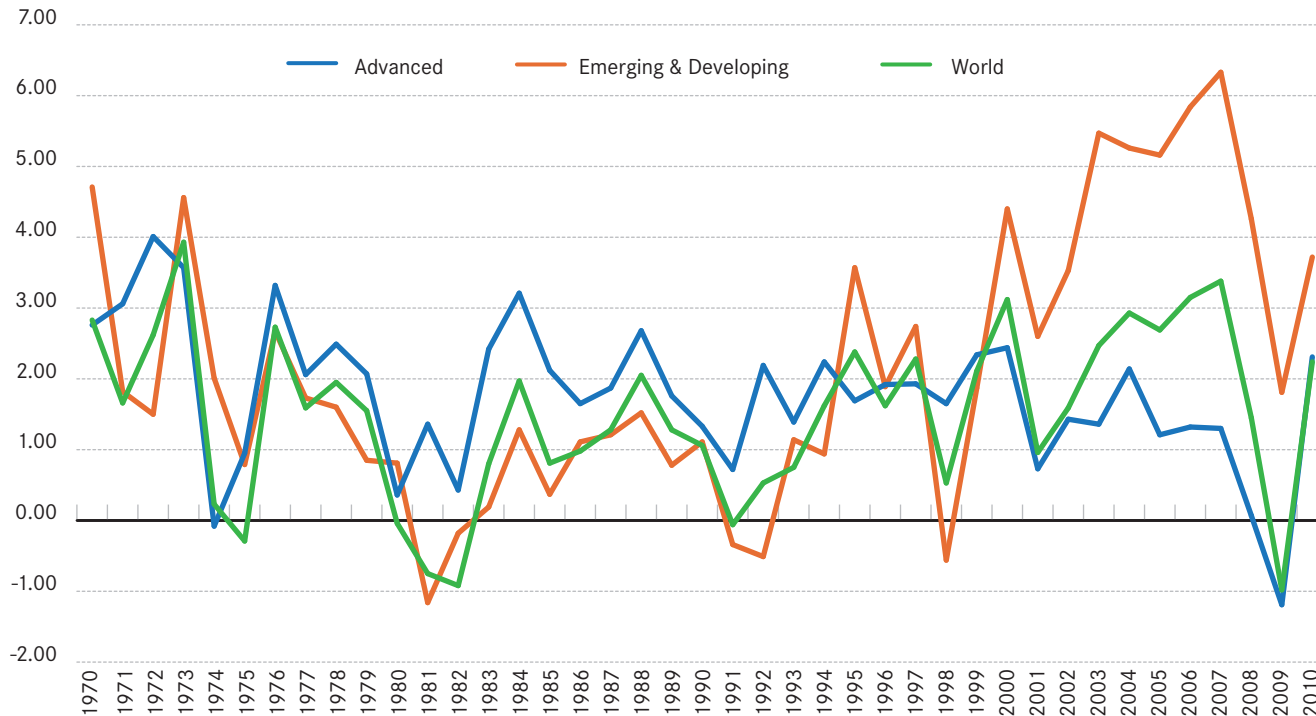


## Global Trends

- World productivity growth turned negative in 2009 (-1 percent), which reflects the strong impact the global recession has had on the average production volume per worker. This continues a two-year development. In 2007, world productivity growth was 3.4 percent, dipping to 1.4 percent in 2008.
- The 2009 decline took place despite massive layoffs and a reduction in working hours, especially in advanced economies, and a meager increase in world employment of only 0.5 percent.
- There has not been a significant negative global productivity growth rate since the early 1980s (-0.8 percent in 1981 and -0.9 percent 1982) but those declines were due primarily to negative productivity growth rates in developing countries rather than advanced economies.
- Following its dismal performance in 2009, productivity is expected to improve sharply to 2.2 percent in 2010. This increase will be the result of the combination of a projected recovery in world GDP of 3.4 percent and a modest 1.2 percent increase in world employment. The recovery in productivity will set the stage for efficiency gains that should pay off in terms of higher wages and lower consumer prices if the global economy continues to expand beyond 2010.
- While short-term productivity movements are highly volatile during peaks and troughs, the long-term trend in labor productivity worldwide had gradually increased until 2008, mainly as the result of an acceleration in the average trend for emerging and developing economies. A further improvement in the long-term productivity trend will depend on a revival of global demand, stimulated by technological change and innovation.
- The average long-term trend of labor productivity in advanced economies has stalled since 2000. The gradual improvement in the world trend for productivity is due to emerging and developing economies that have rapidly taken over leadership in productivity growth. However, levels of productivity in emerging and developing countries are still much lower than in the advanced economies, leaving substantial scope for catching up and a strengthening of competitiveness relative to advanced economies.

Chart 1a

### Labor Productivity Growth (GDP per person employed)



## Regions and Countries

- Despite a deep recession, labor productivity growth in the United States strengthened in “per hour” terms in 2009 to 2.5 percent, up from 1.4 percent in 2008. This rate is the highest among the major advanced economies and points to a very timely reaction to the crisis by firms in the United States.
- Productivity growth rates in other advanced economies were much weaker: 0.3 percent in Japan, -1.0 percent in the Euro Area, and as much as -1.9 percent in the United Kingdom. The productivity differential between the United States and the Euro Area is now 3.5 percentage points, and between the United States and the United Kingdom, it stands at 4.4 percentage points. For comparison, the productivity differential between the United States and the Euro Area was only 1 percentage point between 1995 and 2005 and 0.2 percentage points between the United States and the United Kingdom.
- The productivity differentials among advanced regions partly reflect differences in output declines during 2009, which were much higher in Japan (-5.6 percent), the Euro Area (-4.1 percent), and the United Kingdom (-4.8 percent) than in the United States (-2.5 percent).

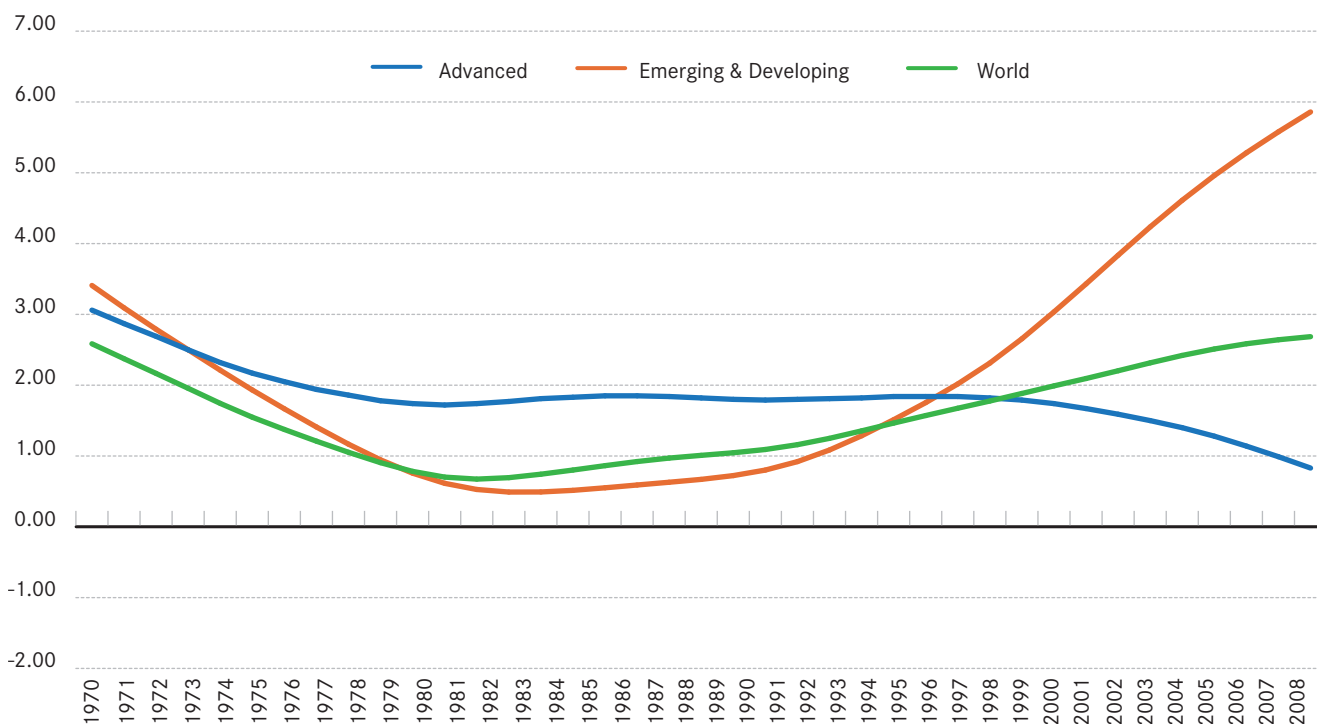
Labor hoarding in Europe, which saw total working hours decline at -3.1 percent in the Euro Area and -2.8 percent in the United Kingdom, was a major factor. The working hours decline was higher in the United States (-5.1 percent) and Japan (-5.9 percent).

- While productivity growth in 2009 was negative in most European countries, there were significant variations between such major countries as Italy (-3.2 percent) and Spain (+3.8 percent). While both economies suffered strong output declines (-4.9 percent in Italy and -3.7 percent in Spain), Spain shed hours five times as rapidly (-7.5 percent) as Italy (-1.7 percent). Another positive performer in terms of productivity in Europe was Ireland, whose experience was close to Spain’s – a large output decline accompanied by an even larger decline in hours.
- The productivity decline in new EU member states in 2009 (-0.5 percent, on average) was considerably less than in old EU member states (-1.1 percent, on average).<sup>1</sup> But new member states also showed large differences among

<sup>1</sup> Old EU member states refer to countries that were a member of the European before 2004. New EU member states refer to countries that have become members since 2004. See Tables 5 through 7 for a listing of old and new member states.

Chart 1b

### Labor Productivity Growth Trend (GDP per person employed)



Note: The trend in chart 1b was obtained from the annual estimates in chart 1a using a Hodrick-Prescott filter with a  $\lambda=100$ .

The trend runs only to 2008, as the observations for 2009 and 2010 are regarded as too volatile to determine the long-run trend at this point in time.

Source: The Conference Board Total Economy Database, January 2010

themselves. At -6.1 percent, Lithuania experienced the sharpest productivity decline. In contrast, Poland, the largest country among the new member states, experienced a productivity increase of 1.8 percent that was the result of 0.9 output growth (the only positive GDP growth rate in all of Europe) and a relatively modest -0.9 loss in working hours.

- Productivity growth in the seven largest emerging economies (Brazil, China, India, Indonesia, Mexico, Russia, and Turkey) was 3.6 percent, on average, which was down by 1.7 percentage points from the 5.3 percent rate in 2008. Differences among countries were large, ranging from -3.8 percent in Russia and -3.2 percent in Turkey to 3.9 percent in India and as much as 8.2 percent in China.
- The continued strength of China's productivity growth rate in 2009 is mainly the result of government policies focused on stimulating output growth (estimated at 7.7 percent for 2009, using a logarithmic growth rate) and saving jobs (which are likely to have fallen by no more than 0.5 percent in 2009).<sup>2</sup>
- Economies that were less affected by the global crisis, such as India and Indonesia, have even continued to create jobs in net terms in 2009. These positive trends reveal the underlying current of growth potential in emerging economies.

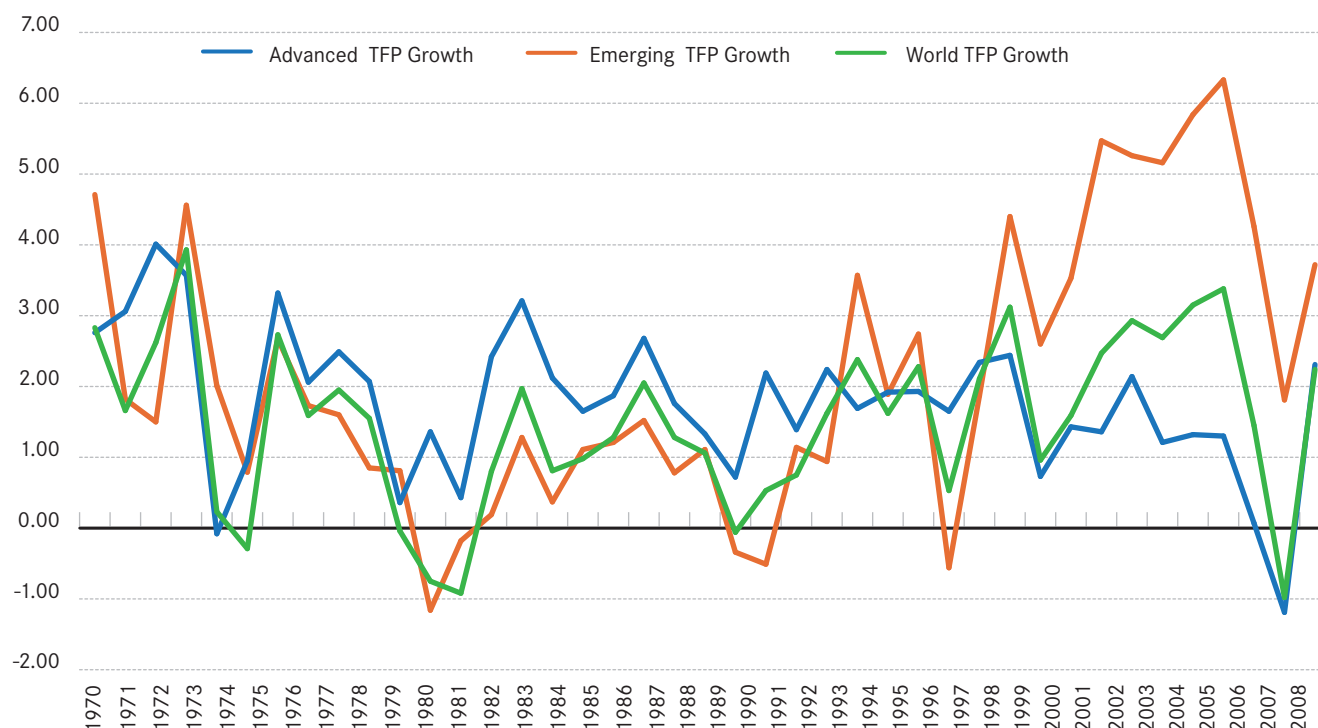
## Looking Ahead

- Productivity growth will return to positive territory (2.2 percent globally) in 2010. The pro-cyclical nature of productivity growth reflects the sharper improvement in output growth (from -0.4 percent in 2009 to 3.4 percent in 2010) relative to the modest rise in employment growth (from 0.5 percent in 2009 to 1.2 percent in 2010).
- Improvements in productivity in 2010 will be sharpest in advanced economies, notably in Europe (from -1.0 percent in 2009 to +2.0 percent in 2010) and Japan (from 0.3 percent in 2009 to 2.7 percent in 2010). The return to positive output growth will occur despite a continued loss of jobs. The United States will see a moderate improvement in productivity - from 2.5 percent in per-hour terms in 2009 to 3 percent in 2010 - but the recovery will be of a "jobless" nature as employment growth is projected to fall at -0.7 percent,
- In 2010, emerging economies will see productivity growth rates accelerate back to 3.7 percent, close to the level of 2008. The sharpest improvements are expected in "other developing Asia" (i.e., developing countries in Asia outside of China and India), Central and Eastern Europe, and Russia and other countries in the Commonwealth of Independent States (CIS).

<sup>2</sup> China's GDP growth rate in 2009 changed from 8.0 percent, when calculated in percentage terms, to 7.7 percent when using log differences.

Chart 2a

### Total Factor Productivity Growth



- As emerging and developing economies gain a larger share of the global economy, they will also make a larger contribution (2.0 percentage points) to global productivity growth in 2010. (Advanced economies will contribute only 1.2 percentage points.) However, the overall impact on global productivity growth will be partly offset by a shift of economic activity from higher productivity workers in advanced economies to lower productivity workers in emerging and developing economies, which will take -0.9 percentage points off global productivity growth in 2010.

## The Long-Term Picture

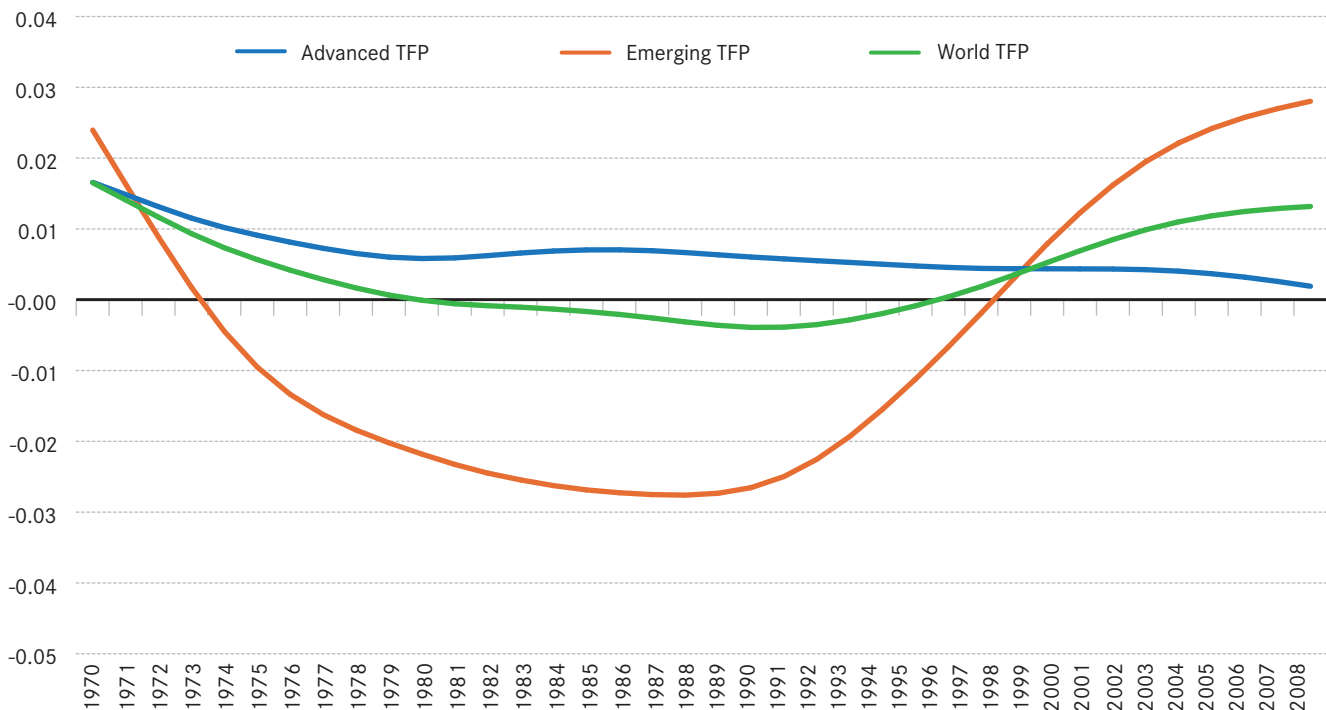
- While the short-term improvements in productivity help countries position themselves to exploit new growth potential, the actual trigger for sustainable growth is the long-term productivity trend, which is also the main source for improvements in living standards.
- To accelerate the long-term productivity trend, growth needs to come from not only investments in inputs, which

equip workers with higher skills and better tools to produce, but also from an increase in the efficiency with which these inputs are used.

- Total Factor Productivity (TFP) growth, which represents the growth in output over the combined contribution of inputs (such as labor, workforce skills, machinery, and technology inputs), has weakened in advanced countries, dropping from 0.4 percent in the period between 1995 and 2005 to 0.2 percent for 2005–2008.
- TFP growth in emerging and developing economies, on the other hand, has strongly improved – from 1.0 percent for 1995–2005 to 2.4 percent for 2005–2008. Despite a temporary weakening of TFP growth in emerging economies in 2008 to 1 percent, which was mainly due to the start of the recession and the cooling of the Chinese and Indian economies, the rise in the long-term TFP trend puts the emphasis for future growth even more strongly on the emerging economies. This raises their competitive strength, as it helps these countries to match higher costs, such as rising wages, by their ability to lower costs and prices through efficiency gains.

Chart 2b

### Total Factor Productivity Trends



Note: The trend in chart 2b was obtained from the annual estimates in chart 2a using a Hodrick-Prescott filter with a  $\lambda=100$ .

The trend runs only to 2008, as the observations for 2009 and 2010 are regarded as too volatile to determine the long-run trend at this point in time.

Source: The Conference Board Total Economy Database, January 2010

# Summary Tables from the Total Economy Database

## TABLES BY REGION AND MAJOR COUNTRIES

Tables 1 through 4 provide a summary picture of the growth rates in labor productivity, output, and employment for the major regions and countries in the world.

**Table 1** shows the growth rates of Gross Domestic Product, Employment, and GDP per person employed in 2008, 2009, and 2010. The estimates show the collapse in output and employment growth in advanced countries in 2009 to -3.5 percent for GDP and -2.3 percent for employment, leading to a decline in labor productivity of 1.2 percent. The **United States** was one of the few countries in the advanced world showing a positive labor productivity growth rate. At 1.0 percent, the growth rate of GDP per person employed represents the very strong reaction in the U.S. labor market relative to the decline in GDP. The modest recovery in the **United States** in 2010 will see no employment growth with it.

Among the emerging economies, **China** showed the strongest output and productivity performance in 2009 at 7.7 percent and 8.2 percent respectively. This was largely the result of a boom in bank loans which stimulated output growth, in particular

investment-intensive activities of state-owned enterprises (SOEs). Meanwhile employment growth stalled as a result of layoffs by private companies, especially export-oriented firms. Hence, while overall productivity increased, there may have been important underlying structural changes. For example, SOEs and infrastructure construction occupy a larger footprint in the economy. In contrast to China and many other developing economies in Asia, **Central and Eastern Europe** and especially **Russia** and **other countries in the Commonwealth of Independent States** showed large declines in productivity, as output fell much faster than employment.

In 2010, world labor productivity growth is expected to improve to 2.2 percent, as a result of a recovery in the advanced economies from -1.2 percent in 2009 to 2.3 percent in 2010, and in emerging and developing economies from 1.8 percent to 3.7 percent.

Table 1

**Growth in GDP, Employment, and GDP per Person Employed by Major Region, 2008-2010**

	2008			2009 (estimate)			2010 (projection)		
	GDP	Employment	GDP per person employed	GDP	Employment	GDP per person employed	GDP	Employment	GDP per person employed
United States	0.4	-0.4	0.9	-2.5	-3.6	1.0	2.3	-0.7	3.0
EU-15 (old)	0.5	0.7	-0.3	-4.2	-1.9	-2.3	0.9	-1.1	2.0
Japan	-0.7	-0.1	-0.6	-5.6	-3.0	-2.5	1.5	-1.2	2.7
Other Advanced*	1.4	1.6	-0.2	-2.4	-0.1	-2.3	2.3	1.1	1.2
<b>Advanced Countries</b>	<b>0.4</b>	<b>0.4</b>	<b>0.1</b>	<b>-3.5</b>	<b>-2.3</b>	<b>-1.2</b>	<b>1.7</b>	<b>-0.6</b>	<b>2.3</b>
China	9.2	0.6	8.6	7.7	-0.5	8.2	8.2	0.5	7.7
India	6.5	2.4	4.0	5.8	2.0	3.9	6.8	2.0	4.8
Other developing Asia	5.0	2.9	2.1	2.9	3.0	0.0	6.3	3.0	3.3
Latin America	4.3	2.0	2.3	-0.5	-0.2	-0.4	2.5	0.2	2.2
Middle East	4.5	3.4	1.1	2.9	3.4	-0.5	3.6	3.4	0.2
Africa	5.6	2.8	2.8	2.9	2.8	0.1	4.0	2.8	1.2
Central & Eastern Europe	2.9	1.9	1.0	-3.6	-1.8	-1.8	2.0	-0.2	2.1
Russia and other CIS**	5.2	0.8	4.4	-3.7	0.4	-4.1	2.0	0.4	1.6
<b>Emerging Market and Developing Countries</b>	<b>6.1</b>	<b>1.8</b>	<b>4.3</b>	<b>2.9</b>	<b>1.1</b>	<b>1.8</b>	<b>5.2</b>	<b>1.5</b>	<b>3.7</b>
<b>World</b>	<b>3.0</b>	<b>1.6</b>	<b>1.4</b>	<b>-0.4</b>	<b>0.5</b>	<b>-1.0</b>	<b>3.4</b>	<b>1.2</b>	<b>2.2</b>
<b>Addenda:</b>									
EU-12 (new)	3.8	1.9	2.0	-3.2	-2.5	-0.8	1.1	-0.8	1.9
EU-27	0.9	0.9	-0.1	-4.1	-2.0	-2.0	0.9	-1.1	2.0
Euro Area	0.6	0.7	-0.2	-4.1	-1.9	-2.2	0.8	-1.2	2.0
OECD	0.7	1.0	-0.4	-3.8	-1.8	-2.0	1.5	-0.6	2.0

Note: This table is based on estimates for 111 countries (see table 9).

Note: Growth rates are based on the difference in the log of the levels of each variable. For example, China's GDP growth rate in 2009 changed from 8.0 percent, when calculated in percentage terms, to 7.7 percent when using log differences.

\*Other advanced includes Canada; Switzerland; Norway; Israel; Iceland; Cyprus; Korea; Australia; Taiwan, Province of China; Hong Kong; Singapore; and New Zealand.

\*\*CIS: Commonwealth of Independent States

Source: The Conference Board Total Economy Database (January 2010), OECD, IMF, World Bank

Table 2 shows the contribution of major regions and countries to world productivity growth, using the share of each region and country in global output as weights for their contribution. Advanced economies accounted for -0.6 percentage points of the global slowdown in labor productivity in 2009. Emerging and developing economies still add 1.1 percent to global labor productivity. Underlying these numbers is an accelerated shift in economic activity from advanced to emerging and developing

economies. While the latter countries show faster growth in labor productivity, their relative levels of productivity are much lower than in advanced countries. Hence, there is negative “allocation effect” on global productivity, which was especially large in 2009, at -1.5 percent. The latter has in fact been the dominant factor explaining the global productivity slowdown of -1 percent in 2009.

Table 2

### Contribution to Growth in GDP, Employment, and GDP per Person Employed by Major Region, 2008-2010

	2008			2009 (estimate)			2010 (projection)		
	GDP	Employment	GDP per person employed	GDP	Employment	GDP per person employed	GDP	Employment	GDP per person employed
United States	0.1	0.0	0.2	-0.5	-0.2	0.2	0.4	0.0	0.6
EU-15 (old)	0.1	0.0	-0.1	-0.8	-0.1	-0.4	0.2	-0.1	0.4
Japan	0.0	0.0	0.0	-0.3	-0.1	-0.2	0.1	0.0	0.2
Other Advanced*	0.1	0.0	0.0	-0.2	0.0	-0.2	0.2	0.0	0.1
<b>Advanced Countries</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>	<b>-1.8</b>	<b>-0.4</b>	<b>-0.6</b>	<b>0.9</b>	<b>-0.1</b>	<b>1.2</b>
China	1.3	0.2	1.2	1.1	-0.1	1.2	1.3	0.1	1.2
India	0.3	0.4	0.2	0.3	0.3	0.2	0.3	0.3	0.2
Other developing Asia	0.2	0.4	0.1	0.1	0.4	0.0	0.3	0.4	0.2
Latin America	0.3	0.2	0.2	0.0	0.0	0.0	0.2	0.0	0.2
Middle East	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0
Africa	0.2	0.3	0.1	0.1	0.3	0.0	0.1	0.3	0.0
Central & Eastern Europe	0.1	0.1	0.0	-0.2	0.0	-0.1	0.1	0.0	0.1
Russia and other CIS**	0.2	0.0	0.2	-0.2	0.0	-0.2	0.1	0.0	0.1
<b>Emerging Market and Developing Countries</b>	<b>2.8</b>	<b>1.5</b>	<b>2.0</b>	<b>1.4</b>	<b>0.9</b>	<b>1.1</b>	<b>2.5</b>	<b>1.3</b>	<b>2.0</b>
Reallocation effect***			-0.6			-1.5			-0.9
<b>World</b>	<b>3.0</b>	<b>1.6</b>	<b>1.4</b>	<b>-0.4</b>	<b>0.5</b>	<b>-1.0</b>	<b>3.4</b>	<b>1.2</b>	<b>2.2</b>

Note: This table is based on estimates for 111 countries (see table 9).

Note: Growth rates are based on the difference in the log of the levels of each variable.

\*Other Advanced includes Canada; Switzerland; Norway; Israel; Iceland; Cyprus; Korea; Australia; Taiwan, Province of China; Hong Kong; Singapore; and New Zealand.

\*\*CIS: Commonwealth of Independent States

\*\*\*Reallocation effect reflects the impact on the world productivity growth because of the larger share of the countries with low labor productivity levels.

Source: The Conference Board Total Economy Database (January 2010), OECD, IMF, World Bank

Table 3 summarizes the productivity, output and total hours growth rates for major advanced economies, including the United States, the Euro Area, Japan and the United Kingdom from 1995–2010. The table clearly shows the slowing of labor productivity growth since 2005. Throughout the longer period, the Euro Area appeared the main laggard in productivity per-

formance, which – at least for recent years – was partly related to a more favorable labor market performance. The European Union saw a significant acceleration in productivity growth in 2007 due to a cyclical peak, but it slowed again in 2008. Japan has shown the weakest output and employment performance, even though productivity grew slightly faster than in Europe.

Table 3  
**Growth of Labor Productivity, Real GDP, and Total Hours Worked by Region for Advanced Countries, 1995-2010**

	<i>United States</i>	<i>Japan</i>	<i>Euro Area</i>	<i>United Kingdom</i>
<i>Labor Productivity Growth (GDP per hour, annual average, percent)</i>				
1995-2005	2.4	2.1	1.4	2.2
2005-2009	1.5	0.8	0.5	0.9
2007	1.4	1.8	1.1	2.3
2008	1.4	0.1	0.1	1.0
2009 (estimate)	2.5	0.3	-1.0	-1.9
2010 (projection)	3.0	2.7	2.0	1.7
<i>Real GDP Growth (annual average, percent)</i>				
1995-2005	3.3	1.1	2.2	2.9
2005-2009	0.7	-0.5	0.6	0.4
2007	2.1	2.4	2.7	3.0
2008	0.4	-0.7	0.6	0.5
2009 (estimate)	-2.5	-5.6	-4.1	-4.8
2010 (projection)	2.3	1.5	0.8	1.1
<i>Growth in Total Hours Worked (annual average, percent)</i>				
1995-2005	0.9	-1.0	0.8	0.7
2005-2009	-0.9	-1.3	0.1	-0.5
2007	0.7	0.5	1.6	0.7
2008	-0.9	-0.8	0.4	-0.5
2009 (estimate)	-5.1	-5.9	-3.1	-2.8
2010 (projection)	-0.7	-1.2	-1.1	-0.6

Note: Growth rates are based on the difference in the log of the levels of each variable.

Source: The Conference Board Total Economy Database, January 2010

Table 4 provides a summary of the growth rates for seven of the leading emerging economies. While Brazil and Mexico have been among the weakest productivity performers historically, their performance diverged as Brazil's output, employment, and productivity performance strengthened in recent years. In addition to China, Indonesia and India strengthened their performance in recent years and, as they were relatively shielded from the

global crisis because of moderate exposure to exports and the global financial world, their performance remained reasonably strong during the recession. In contrast, Russia and Turkey, which were both strongly exposed to the global crisis, suffered most in terms of output, employment, and productivity losses.

Table 4  
**Growth of Labor Productivity, Real GDP, and Persons Employed for Major Emerging Economies, 1995-2010**

	<i>Major Emerging Economies</i>	<i>Brazil</i>	<i>Russia</i>	<i>India</i>	<i>China</i>	<i>Mexico</i>	<i>Indonesia</i>	<i>Turkey</i>
<i>Labor Productivity Growth (GDP per persons, annual average, percent)</i>								
1995-2005	4.1	0.3	3.7	4.2	6.7	1.4	1.5	3.6
2005-2009	5.9	2.6	3.7	5.2	9.6	0.5	2.1	1.0
2007	7.6	3.5	7.0	6.2	11.5	1.6	3.6	3.1
2008	5.3	4.0	4.7	4.0	8.6	-0.9	1.0	-1.2
2009 (estimate)	3.6	1.5	-3.8	3.9	8.2	-0.3	-0.3	-3.2
2010 (projection)	5.1	4.3	1.8	4.8	7.7	2.1	2.4	3.1
<i>Real GDP Growth (annual average, percent)</i>								
1995-2005	5.5	2.4	3.8	6.3	7.8	3.6	3.1	4.2
2005-2009	7.1	3.8	4.2	7.6	10.0	2.0	5.5	1.9
2007	9.1	5.5	7.8	8.6	12.2	3.2	6.1	4.6
2008	6.8	5.7	5.4	6.5	9.2	1.4	5.9	0.9
2009 (estimate)	4.1	0.0	-3.8	5.8	7.7	-1.5	4.7	-4.5
2010 (projection)	6.2	2.8	1.8	6.8	8.2	2.7	7.4	3.9
<i>Growth in Persons Employed (annual average, percent)</i>								
1995-2005	1.4	2.0	0.1	2.0	1.1	2.2	1.6	0.7
2005-2009	1.3	1.2	0.5	2.3	0.4	1.5	3.4	0.9
2007	1.5	2.0	0.8	2.4	0.8	1.7	2.5	1.5
2008	1.6	1.7	0.8	2.4	0.6	2.2	5.0	2.1
2009 (estimate)	0.5	-1.5	0.0	2.0	-0.5	-1.2	5.0	-1.3
2010 (projection)	1.1	-1.5	0.0	2.0	0.5	0.5	5.0	0.7

Note: Growth rates are based on the difference in the log of the levels of each variable. For example, China's GDP growth rate in 2009 changed from 8.0 percent, when calculated in percentage terms, to 7.7 percent when using log differences.

Source: The Conference Board Total Economy Database, January 2010

## COUNTRY RESULTS

Tables 5 through 7 provide growth rates for labor productivity, output, and total working hours for advanced economies, most of whom are members of the Organisation for Economic Co-operation and Development (OECD). The results are organized by major region, separating the European Union 15 (EU-15 old), including countries who were members of the EU before 2004, from the European Union-12 (EU-12 new), which includes the more recent entrants.

Strikingly, the old EU-15 suffered more severely from the crisis in output and productivity terms than the new EU-12, although some new member states (notably the **Baltic States**) have performed very badly in terms of labor input. **Poland** has strengthened its relative productivity performance during 2009, as it was fairly well protected from the crisis and structural changes strengthened the modern sector of the economy, which has significantly boosted its competitiveness relative to other Eastern European countries. Looking at productivity growth, **Germany** performed far worse than **France** due to a deeper contraction in output in Germany. The productivity performance of the United Kingdom has been somewhat more negative than in the rest of Europe during the recession, although the loss in working hours has been the same as for the EU-15. Despite their deep output contractions, **Spain** and **Ireland** still saw reasonably good productivity performance because their labor markets reacted very strongly to the recession. However, this may indicate large structural changes in those economies since some sectors (for

example, construction) were more strongly affected by the crisis than other sectors. **Australia** was among the few advanced countries that exhibited positive productivity growth at 2.6 percent in 2009. It saw positive output growth (0.6 percent) coupled with only a modest decline in working hours of -2 percent, reflecting the limited impact of the recession on Australia's economic structure.

Looking at 2010, of the 39 advanced economies listed in Tables 5 through 7, 36 countries will see a return to positive productivity growth rates. However, 28 of the countries will still see their total amount of working hours decline in absolute terms. In particular, 23 out of the 27 EU countries (as well as the United States) will experience a trade-off between productivity and employment growth. These trade-offs typically happen around peaks and troughs in the business cycle, but will need to be fully exploited to set the stage for structural changes in the economy and renewed competitive advantages.

Table 5

### Labor Productivity Growth (GDP Per Hour, Annual Average, Percent), 1995-2010

	1995- 2005	2005- 2009	2007	2008	2009 (estimate)	2010 (projection)
<b>United States</b>	<b>2.4</b>	<b>1.5</b>	<b>1.4</b>	<b>1.4</b>	<b>2.5</b>	<b>3.0</b>
<b>European Union (EU-15, old)(a)</b>	<b>1.5</b>	<b>0.5</b>	<b>1.2</b>	<b>0.2</b>	<b>-1.1</b>	<b>2.0</b>
Austria	1.5	0.8	2.2	0.2	-1.6	0.9
Belgium	1.4	0.0	1.5	-1.3	-1.6	1.8
Denmark	1.1	-1.1	-1.9	-2.7	-0.6	3.1
Finland	2.4	0.6	2.1	-0.5	-2.6	3.1
France	1.8	0.8	-0.2	0.4	0.3	1.8
Germany	1.6	0.2	0.7	-0.3	-2.2	2.8
Greece	3.5	1.5	4.5	1.8	0.0	0.6
Ireland	4.0	0.9	2.5	-1.5	1.2	3.0
Italy	0.5	-0.8	0.1	-0.5	-3.2	1.5
Luxembourg	2.1	-1.2	1.4	-4.3	-4.3	2.5
Netherlands	1.7	0.0	1.6	0.8	-3.7	2.3
Portugal	1.2	0.8	3.6	-1.5	-0.3	0.6
Spain	0.5	2.0	1.6	1.5	3.8	1.8
Sweden	2.6	-0.2	-0.6	-1.9	-1.0	2.7
United Kingdom	2.2	0.9	2.3	1.0	-1.9	1.7
<b>European Union (EU-12, new)(b)</b>	<b>4.2</b>	<b>2.6</b>	<b>3.8</b>	<b>2.3</b>	<b>-0.5</b>	<b>1.9</b>
Bulgaria	2.5	1.6	2.7	3.0	-2.3	-0.1
Cyprus	1.5	1.1	2.1	1.3	-0.5	0.1
Czech Republic	3.1	1.9	4.0	0.6	-1.6	2.6
Estonia	7.2	1.8	6.3	-2.3	-1.4	2.5
Hungary	2.8	1.2	1.3	1.9	-2.0	0.1
Latvia	6.4	2.8	7.9	-2.7	-2.0	0.0
Lithuania	5.3	1.9	5.5	1.6	-6.1	-3.1
Malta	1.5	0.3	-0.4	-0.8	-1.6	0.1
Poland	5.0	2.7	2.7	1.4	1.8	3.6
Romania	3.7	3.7	5.3	6.1	-2.7	-0.1
Slovakia	4.8	3.5	7.2	3.7	-2.4	2.6
Slovenia	4.1	1.6	3.6	0.7	-3.1	3.7
<b>European Union (EU-27, enlarged)(c)</b>	<b>2.0</b>	<b>0.7</b>	<b>1.4</b>	<b>0.3</b>	<b>-1.1</b>	<b>1.9</b>
<b>Japan</b>	<b>2.1</b>	<b>0.8</b>	<b>1.8</b>	<b>0.1</b>	<b>0.3</b>	<b>2.7</b>
<b>Other</b>						
Australia	2.2	1.2	0.8	0.1	2.6	0.5
Canada	1.5	0.1	0.4	-0.7	-0.2	1.1
Iceland	3.4	-2.3	0.3	0.4	-8.9	4.2
Mexico	1.1	0.5	1.9	-2.0	-0.3	2.1
New Zealand	1.0	0.4	2.9	-2.5	0.5	2.5
Norway	2.3	-1.0	-1.3	-1.2	-0.5	0.1
South Korea	4.4	2.8	5.5	4.2	-2.6	2.6
Switzerland	1.3	0.2	1.6	-0.9	-2.1	0.9
Taiwan	4.1	0.8	4.0	-0.5	-4.0	1.3
Turkey	4.3	1.0	3.1	-1.2	-3.2	3.1

Note: Growth rates are based on the difference in the log of the levels of each variable.

(a) referring to membership of the European Union before 2004

(b) referring to new membership of the European Union since 2004

(c) referring to all current members of the European Union

Source: The Conference Board Total Economy Database, January 2010

Table 6

**Real GDP Growth (Annual Average, Percent), 1995-2010**

	1995- 2005	2005- 2009	2007	2008	2009 (estimate)	2010 (projection)
<b>United States</b>	<b>3.3</b>	<b>0.7</b>	<b>2.1</b>	<b>0.4</b>	<b>-2.5</b>	<b>2.3</b>
<b>European Union (EU-15, old)(a)</b>	<b>2.3</b>	<b>0.5</b>	<b>2.7</b>	<b>0.5</b>	<b>-4.2</b>	<b>0.9</b>
Austria	2.3	1.1	3.5	1.9	-4.5	1.0
Belgium	2.2	0.9	2.9	0.8	-2.9	0.8
Denmark	2.0	-0.2	1.7	-1.2	-4.5	1.1
Finland	3.6	0.7	4.1	0.8	-6.9	0.7
France	2.2	0.6	2.2	0.3	-2.3	1.1
Germany	1.3	0.4	2.4	1.0	-5.0	1.3
Greece	3.7	2.4	4.4	2.0	-1.1	-0.2
Ireland	7.3	0.0	5.7	-3.1	-7.6	-0.5
Italy	1.4	-0.6	1.4	-1.1	-4.9	0.9
Luxembourg	4.7	2.0	6.3	0.0	-3.6	1.1
Netherlands	2.6	1.1	3.5	2.0	-4.5	1.0
Portugal	2.4	0.1	1.9	0.0	-2.8	0.2
Spain	3.6	1.2	3.5	0.9	-3.7	-0.3
Sweden	2.9	0.4	2.5	-0.4	-4.6	1.5
United Kingdom	2.9	0.4	3.0	0.5	-4.8	1.1
<b>European Union (EU-12, new)(b)</b>	<b>3.6</b>	<b>3.3</b>	<b>6.1</b>	<b>3.8</b>	<b>-3.2</b>	<b>1.1</b>
Bulgaria	2.2	3.4	6.0	5.8	-4.5	-1.5
Cyprus	3.4	2.9	5.0	3.6	-0.8	0.1
Czech Republic	2.6	2.8	6.0	2.5	-3.7	1.2
Estonia	7.1	0.5	7.0	-3.6	-10.9	-0.1
Hungary	4.0	0.1	1.0	0.6	-5.0	-0.7
Latvia	6.5	0.4	9.5	-4.7	-14.6	-5.7
Lithuania	5.9	1.2	9.4	2.7	-14.7	-5.6
Malta	2.0	1.8	3.7	2.1	-2.2	0.7
Poland	4.2	4.6	6.6	4.8	0.9	2.5
Romania	2.2	3.4	6.1	6.1	-6.2	0.7
Slovakia	4.1	4.8	9.5	6.0	-4.5	2.6
Slovenia	3.9	2.5	6.6	3.4	-5.8	1.8
<b>European Union (EU-27, enlarged)(c)</b>	<b>2.4</b>	<b>0.8</b>	<b>3.1</b>	<b>0.9</b>	<b>-4.1</b>	<b>0.9</b>
<b>Japan</b>	<b>1.1</b>	<b>-0.5</b>	<b>2.4</b>	<b>-0.7</b>	<b>-5.6</b>	<b>1.5</b>
<b>Other</b>						
Australia	3.6	2.4	3.6	2.2	0.6	2.2
Canada	3.3	0.6	2.5	0.4	-3.2	1.5
Iceland	4.5	-0.3	5.4	1.3	-12.2	1.8
Mexico	3.6	2.0	3.2	1.4	-1.5	2.7
New Zealand	3.2	0.7	3.0	-1.1	-0.8	1.4
Norway	2.9	1.4	3.1	2.1	-1.7	0.6
South Korea	4.3	2.3	5.0	2.2	-2.9	3.4
Switzerland	1.7	1.5	3.5	1.7	-2.8	0.6
Taiwan	4.4	1.8	5.5	0.1	-2.9	2.3
Turkey	4.2	1.9	4.6	0.9	-4.5	3.9

Note: Growth rates are based on the difference in the log of the levels of each variable.

(a) referring to membership of the European Union before 2004

(b) referring to new membership of the European Union since 2004

(c) referring to all current members of the European Union

Source: The Conference Board Total Economy Database, January 2010

Table 7

**Total Hours Growth (Annual Average, Percent), 1995-2010**

	1995- 2005	2005- 2009	2007	2008	2009 (estimate)	2010 (projection)
<b>United States</b>	<b>0.9</b>	<b>-0.9</b>	<b>0.7</b>	<b>-0.9</b>	<b>-5.1</b>	<b>-0.7</b>
<b>European Union (EU-15, old)(a)</b>	<b>0.8</b>	<b>0.0</b>	<b>1.5</b>	<b>0.3</b>	<b>-3.1</b>	<b>-1.1</b>
Austria	0.8	0.2	1.3	1.7	-2.9	0.1
Belgium	0.8	0.9	1.4	2.1	-1.3	-1.0
Denmark	0.9	0.9	3.6	1.5	-3.8	-2.1
Finland	1.2	0.1	2.0	1.3	-4.3	-2.4
France	0.4	-0.2	2.4	-0.1	-2.6	-0.7
Germany	-0.3	0.1	1.8	1.3	-2.8	-1.5
Greece	0.2	1.0	-0.2	0.1	-1.1	-0.8
Ireland	3.2	-0.8	3.2	-1.6	-8.8	-3.5
Italy	0.9	0.2	1.3	-0.5	-1.7	-0.6
Luxembourg	2.6	3.3	4.8	4.4	0.7	-1.4
Netherlands	1.0	1.0	2.0	1.2	-0.8	-1.3
Portugal	1.3	-0.7	-1.7	1.5	-2.4	-0.4
Spain	3.1	-0.8	1.9	-0.6	-7.5	-2.1
Sweden	0.3	0.6	3.1	1.5	-3.5	-1.2
United Kingdom	0.7	-0.5	0.7	-0.5	-2.8	-0.6
<b>European Union (EU-12, new)(b)</b>	<b>-0.6</b>	<b>0.7</b>	<b>2.3</b>	<b>1.6</b>	<b>-2.7</b>	<b>-0.8</b>
Bulgaria	-0.4	1.7	3.2	2.9	-2.3	-1.4
Cyprus	2.0	1.9	2.9	2.3	-0.3	0.0
Czech Republic	-0.6	0.9	2.0	1.9	-2.0	-1.4
Estonia	-0.2	-1.3	0.6	-1.4	-9.5	-2.6
Hungary	1.2	-1.1	-0.4	-1.2	-3.0	-0.8
Latvia	0.2	-2.4	1.6	-1.9	-12.6	-5.7
Lithuania	0.6	-0.7	3.8	1.1	-8.6	-2.5
Malta	0.4	1.6	4.1	2.9	-0.6	0.6
Poland	-0.8	1.9	3.9	3.4	-0.9	-1.1
Romania	-1.6	-0.3	0.8	-0.1	-3.6	0.8
Slovakia	-0.7	1.3	2.3	2.3	-2.1	0.0
Slovenia	-0.2	0.9	3.0	2.7	-2.7	-2.0
<b>European Union (EU-27, enlarged)(c)</b>	<b>0.5</b>	<b>0.1</b>	<b>1.7</b>	<b>0.6</b>	<b>-3.0</b>	<b>-1.0</b>
<b>Japan</b>	<b>-1.0</b>	<b>-1.3</b>	<b>0.5</b>	<b>-0.8</b>	<b>-5.9</b>	<b>-1.2</b>
<b>Other</b>						
Australia	1.4	1.2	2.8	2.1	-2.0	1.7
Canada	1.7	0.5	2.1	1.1	-3.0	0.4
Iceland	1.1	2.0	5.1	0.9	-3.3	-2.3
Mexico	2.5	1.5	1.4	3.4	-1.2	0.5
New Zealand	2.3	0.3	0.1	1.4	-1.3	-1.1
Norway	0.6	2.4	4.3	3.3	-1.2	0.5
South Korea	0.0	-0.5	-0.5	-2.0	-0.3	0.8
Switzerland	0.4	1.3	1.9	2.6	-0.7	-0.3
Taiwan	0.3	1.1	1.6	0.6	1.1	1.1
Turkey	-0.1	0.9	1.5	2.1	-1.3	0.7

Note: Growth rates are based on the difference in the log of the levels of each variable.

(a) referring to membership of the European Union before 2004

(b) referring to new membership of the European Union since 2004

(c) referring to all current members of the European Union

Source: The Conference Board Total Economy Database, January 2010

**Table 8** reports the levels of labor productivity for advanced economies expressed in U.S. dollars converted at purchasing power parities to account for differences in relative price levels across countries (column 1). The table also reconciles the relative level of labor productivity (in per-hour terms) for each country compared to the United States (column 2) with the relative of average GDP per capita (column 8). This reconciliation is done by taking account of the differences for working hours per person employed (column 4) and the employment-to-population ratio in each country relative to the United States (column 6).

The table shows some important differences in the way labor productivity and per capita income compare. For example, output per hour in the **Netherlands** is at 58.2 U.S. dollars per hour in 2009, which is 1.8 percent above the level in the United States. However, working hours per employed person in the Netherlands are only 1,379 hours per year compared 1,742 hours in the United States, partly because of the higher share of part-time workers in the Netherlands. As a result, the relative level of Dutch output per worker is lowered by 21.2 percentage points –

from 101.8 percent to 80.6 percent relative to the United States. However, the number of employed persons relative to the total population is higher in the Netherlands (0.52) than in the United States (0.46), which brings the ratio of per capita income to 91 percent up by 10.2 percentage points from 80.6 percent.

The ranking of countries in terms of productivity and per capita income is relatively stable over the years and only changes gradually over time. **Norway** and **Luxembourg** are always typically high on productivity and per capita income relative to the United States because of their concentration of economic activity in oil production (Norway) and the financial sector (Luxembourg). **Belgium** and the **Netherlands** come out higher on productivity than on per capita income because of lower hours or (in the case of Belgium) lower participation. **France** and **Germany** come out below the United States, but the difference in levels relative to the United States is considerably smaller on productivity than on per capita income, whereas these two ratios are more comparable for the United Kingdom.

Table 8

### Labor Productivity and Per Capita Income Levels and the Effects of Working Hours and Labor Utilization, 2009 (Estimate)

	Labor productivity per hour			Effect of working hours (4)	Labor productivity per person as % of U.S. (5)=(2)+(4)	Effect of employment/population ratio (6)	Average per capita income		
	GDP/hour (US\$) (1)	as % of U.S. (2)	Rank (3)				GDP/capita (US\$) (7)	as % of U.S. (8)=(5)+(6)	Rank (9)
Luxembourg	76.9	134.4%	1	-14.9%	119.5%	66.3%	85,467	185.8%	1
Norway	76.8	134.2	2	-24.0	110.3	21.4	60,564	131.6	2
Belgium	58.5	102.2	3	-11.2	91.0	-7.2	38,554	83.8	11
Netherlands	58.2	101.8	4	-21.2	80.6	10.2	41,768	90.8	7
United States	57.2	100.0	5	0.0	100.0	0.0	46,008	100.0	3
France	56.0	97.9	6	-11.8	86.0	-12.6	33,791	73.4	19
Germany	53.4	93.3	7	-18.8	74.5	4.1	36,163	78.6	16
Ireland	53.2	92.9	8	5.4	98.3	-0.3	45,106	98.0	4
Austria	50.8	88.8	9	-4.3	84.5	6.0	41,620	90.5	8
Sweden	50.0	87.4	10	-6.9	80.5	5.3	39,486	85.8	10
Australia	49.6	86.8	11	-2.3	84.5	8.4	42,734	92.9	6
United Kingdom	48.5	84.8	12	-5.0	79.8	1.5	37,391	81.3	14
Denmark	47.2	82.6	13	-8.2	74.3	9.0	38,332	83.3	12
Canada	46.9	81.9	14	-1.8	80.2	7.6	40,356	87.7	9
Finland	46.8	81.8	15	-2.9	78.9	1.2	36,879	80.2	15
Spain	45.3	79.2	16	-5.3	73.8	1.7	34,769	75.6	17
Switzerland	45.1	78.9	17	-3.6	75.2	20.1	43,857	95.3	5
New Zealand	43.2	75.5	18	-2.2	73.3	-8.4	29,876	64.9	24
Italy	40.7	71.2	19	2.0	73.2	-5.0	31,353	68.1	22
Japan	40.3	70.5	20	-0.8	69.7	4.6	34,167	74.3	18
Iceland	37.3	65.2	21	1.7	66.9	15.7	38,014	82.6	13
Greece	35.1	61.4	22	13.0	74.5	-4.4	32,242	70.1	21
Taiwan	33.5	58.6	23	13.9	72.6	-0.2	33,270	72.3	20
Cyprus	33.3	58.3	24	3.7	61.9	-8.6	24,520	53.3	27
Slovak Republic	32.2	56.3	25	0.9	57.2	-7.5	22,851	49.7	28
Slovenia	31.9	55.7	26	6.8	62.5	2.5	29,905	65.0	23
Malta	30.0	52.4	27	4.7	57.2	-7.6	22,797	49.6	29
Poland	28.3	49.5	28	-1.1	48.4	-5.8	19,588	42.6	33
Czech Republic	27.1	47.4	29	6.0	53.4	5.3	26,999	58.7	26
South Korea	26.0	45.5	30	13.5	59.0	2.8	28,433	61.8	25
Hungary	25.3	44.3	31	6.3	50.5	-6.3	20,372	44.3	32
Portugal	25.2	44.1	32	3.6	47.7	0.8	22,329	48.5	30
Estonia	23.2	40.5	33	5.2	45.7	-1.1	20,523	44.6	31
Lithuania	22.8	39.9	34	3.8	43.7	-6.5	17,088	37.1	34
Turkey	20.9	36.6	35	3.7	40.3	-13.7	12,212	26.5	39
Latvia	19.5	34.0	36	2.6	36.6	-1.5	16,129	35.1	35
Mexico	17.6	30.8	37	8.1	38.9	-6.1	15,130	32.9	36
Romania	16.3	28.4	38	2.0	30.5	-3.5	12,423	27.0	38
Bulgaria	15.3	26.7	39	-1.4	25.3	3.3	13,178	28.6	37
EU-12 (new)(b)	24.2	42.3		1.7	44.0	-3.3	18,698	41	
EU-15 (present)(a)	48.5	84.7		-7.3	77.5	-0.7	35,305	77	
EU-27 (enlarged)(c)	43.1	75.3		-4.6	70.8	-1.7	31,796	69	
Euro Area	48.0	83.8		-7.3	76.5	-1.7	34,444	75	

(a) referring to membership of the European Union before 2004

(b) referring to new membership of the European Union since 2004

(c) referring to all current members of the European Union

Note: Gross domestic product levels are expressed in 2009 US\$, converted by Purchasing Power Parities.

Source: The Conference Board Total Economy Database, January 2010

Table 9 shows labor productivity (in person employed terms), both in terms of growth rates from 1995-2009 and relative levels for 2009 for 111 countries. The countries are organized by geographic area. The labor productivity for the world economy slightly stagnated since 2005, mainly because of the productivity slowdown in advanced economies. During the 1995-2005 period, productivity growth rates were most rapid in **Eastern Europe** and **Central Asia**, mainly because of large transitional productivity increases. Since 2005, **East Asia** and **Pacific** and **South Asia** have taken over productivity leadership, to a large extent because of China and India but also because of an acceleration in productivity growth in several other countries in these regions, such as Vietnam and Sri Lanka. Productivity growth also accelerated in other emerging regions, including **Latin America**, **Africa**, and the **Middle East**.

Many emerging and developing economies also suffered from the global crisis in terms of slowing productivity growth in 2009, in particular in Eastern Europe and Central Asia, and most countries in Latin America and East Asia and Pacific. The countries that suffered the most were open economies, such as **Singapore**, **Taiwan**, **Thailand**, and **Uruguay**, and resource intensive economies, including **Kuwait** and **Venezuela**.

Comparisons of relative productivity levels show large differences, with East Asian economies, including China, generally showing much lower levels of labor productivity than Latin American countries and countries in the Middle East. The latter are generally much more capital intensive or resource intensive, whereas labor intensive production processes in East Asia lead to significantly lower levels of output per person employed.

Table 9

**Growth and Level of Labor Productivity (GDP per Person Employed), 1995-2009  
(Annual Average Growth, 1995-2009, and Level as Percent of U.S. in 2009)**

	Annual average growth					GDP per person employed, % of U.S., 2009
	1995-2005	2005-2009	2007	2008	2009 (estimate)	
<b>World</b>	<b>2.0</b>	<b>1.7</b>	<b>3.4</b>	<b>1.4</b>	<b>-1.0</b>	<b>25.8%</b>
<b>Northern and Western Europe</b>	<b>1.4</b>	<b>-0.1</b>	<b>1.2</b>	<b>-0.4</b>	<b>-2.9</b>	<b>80.6%</b>
Austria	1.5	0.2	1.7	0.1	-3.0	84.5%
Belgium	1.2	-0.1	1.3	-1.0	-2.1	91.0
Denmark	1.5	-0.9	-1.0	-2.0	-1.8	74.3
Finland	2.0	0.1	2.0	-0.8	-4.0	78.9
France	1.2	0.3	0.9	-0.2	-0.5	86.0
Germany	1.0	-0.5	0.8	-0.4	-4.9	74.5
Iceland	3.2	-2.4	1.4	0.2	-9.9	66.9
Ireland	3.0	0.3	2.2	-2.3	0.5	98.3
Luxembourg	1.2	-1.4	2.0	-4.7	-4.7	119.5
Netherlands	1.2	-0.2	1.0	0.5	-4.0	80.6
Norway	1.9	-0.8	-0.9	-1.0	0.1	110.3
Sweden	2.4	-0.2	0.4	-1.3	-2.3	80.5
Switzerland	1.1	0.0	1.7	-0.9	-2.0	75.2
United Kingdom	1.8	0.3	2.4	-0.2	-2.8	79.8
<b>Southern Europe</b>	<b>1.2</b>	<b>0.2</b>	<b>1.2</b>	<b>-0.4</b>	<b>-1.4</b>	<b>61.8%</b>
Cyprus	1.3	1.1	1.8	1.0	-0.5	61.9%
Greece	2.8	1.8	3.0	1.9	-0.2	74.5
Italy	0.3	-1.2	0.2	-1.4	-3.8	73.2
Malta	1.1	0.4	0.5	0.2	-1.6	57.2
Portugal	1.3	0.5	1.9	-0.5	-0.4	47.7
Spain	0.1	1.3	0.5	1.5	3.2	73.8
Turkey	3.6	1.0	3.1	-1.2	-3.2	40.3

Table 9 (continued)

**Growth and Level of Labor Productivity (GDP per Person Employed), 1995-2009**  
**(Annual Average Growth, 1995-2009, and Level as Percent of U.S. in 2009)**

	<i>Annual average growth</i>					<i>GDP per person employed, % of U.S., 2009</i>
	<i>1995-2005</i>	<i>2005-2009</i>	<i>2007</i>	<i>2008</i>	<i>2009 (estimate)</i>	
<b>Eastern Europe and Central Asia</b>	<b>4.2</b>	<b>3.1</b>	<b>5.9</b>	<b>3.6</b>	<b>-3.1</b>	<b>33.0%</b>
Albania	7.4	4.6	6.1	6.5	0.5	24.6%
Armenia	11.4	6.6	13.6	7.2	-7.3	21.1
Azerbaijan	12.3	15.0	21.6	9.2	2.8	0.0
Belarus	6.8	4.7	6.5	7.0	-3.1	31.1
Bosnia Herzegovina	12.1	0.5	0.5	1.3	-6.3	25.6
Bulgaria	2.2	1.5	3.2	2.6	-2.5	25.3
Croatia	2.8	1.2	1.9	1.3	-3.5	52.3
Czech Republic	2.9	1.9	3.3	1.3	-1.6	53.4
Estonia	7.5	1.3	6.2	-3.8	-1.4	45.7
Georgia	6.7	8.8	14.1	8.2	4.2	18.3
Hungary	2.6	1.1	1.1	1.9	-2.0	50.5
Kazakhstan	5.1	3.0	5.5	0.3	-1.9	26.9
Kyrgyz Republic	2.2	2.9	5.5	4.6	-0.7	7.3
Latvia	6.0	1.4	6.0	-5.4	-2.0	36.6
Lithuania	6.1	2.4	6.6	3.2	-6.1	43.7
Macedonia	2.2	1.2	1.5	1.7	0.8	38.8
Moldova	4.4	3.8	3.8	6.6	-4.8	11.9
Poland	4.6	1.9	2.2	1.1	1.6	48.4
Romania	4.9	3.9	5.8	5.8	-2.9	30.5
Russian Federation	3.7	3.7	7.0	4.7	-3.8	37.1
Serbia Montenegro	0.3	1.0	0.9	5.0	-3.4	1.6
Slovak Republic	4.2	3.5	7.4	3.3	-2.4	57.2
Slovenia	3.9	1.3	3.6	0.7	-3.1	62.5
Tajikistan	2.6	8.0	6.9	13.3	6.5	10.6
Ukraine	4.3	2.2	7.7	2.3	-8.0	19.0
<b>North America (NAFTA)</b>	<b>1.9</b>	<b>0.6</b>	<b>0.9</b>	<b>0.2</b>	<b>0.4</b>	<b>85.2%</b>
Canada	1.3	-0.4	0.2	-1.1	-1.5	80.2%
Mexico	1.4	0.5	1.6	-0.9	-0.3	38.9
United States	2.1	0.9	1.0	0.9	1.0	100.0
<b>Latin America</b>	<b>0.5</b>	<b>2.5</b>	<b>4.0</b>	<b>3.7</b>	<b>-0.2</b>	<b>24.1%</b>
Argentina	1.2	3.6	7.6	5.0	-2.1	38.6%
Bolivia	-0.1	0.7	1.5	2.6	-2.4	11.7
Brazil	0.3	2.6	3.5	4.0	1.5	21.2
Chile	1.7	-0.8	2.6	1.1	-3.0	33.5
Colombia	-0.1	2.8	4.4	-0.1	-3.1	23.4
Ecuador	0.3	1.8	2.4	5.5	-1.0	20.3
Peru	1.6	1.1	0.7	7.0	-1.7	22.9
Uruguay	2.3	-3.3	2.4	6.1	-4.6	28.2
Venezuela	0.1	2.7	5.2	1.9	-3.0	32.1

Table 9 (continued)

**Growth and Level of Labor Productivity (GDP per Person Employed), 1995-2009**  
**(Annual Average Growth, 1995-2009, and Level as Percent of U.S. in 2009)**

	<i>Annual average growth</i>					<i>GDP per person employed, % of U.S., 2009</i>
	<i>1995-2005</i>	<i>2005-2009</i>	<i>2007</i>	<i>2008</i>	<i>2009 (estimate)</i>	
<b>Africa</b>	<b>1.7</b>	<b>2.6</b>	<b>3.6</b>	<b>2.8</b>	<b>0.1</b>	<b>6.6%</b>
Angola	4.8	8.6	14.9	8.8	-3.2	11.7%
Burkina Faso	2.9	1.8	0.9	2.2	1.7	2.8
Cameroon	1.4	1.3	2.0	1.6	0.8	6.2
Côte d'Ivoire	-0.8	0.0	-0.8	-0.1	2.1	4.4
DR Congo	-2.5	2.0	3.0	2.9	0.2	0.9
Egypt	1.8	3.6	3.7	3.8	2.6	18.6
Ethiopia	1.0	6.0	6.2	6.4	4.4	1.7
Ghana	1.8	3.4	2.6	4.1	2.6	3.6
Kenya	-0.3	1.8	4.2	-1.0	0.4	3.6
Madagascar	-0.5	2.1	4.2	4.9	-2.4	2.3
Malawi	0.8	5.0	5.4	6.4	4.2	2.0
Mali	2.0	1.5	0.8	1.6	1.6	4.9
Morocco	2.2	4.2	1.7	4.5	5.1	13.3
Mozambique	6.4	4.9	5.0	4.8	3.4	2.0
Niger	0.7	2.0	0.5	6.3	-1.5	2.2
Nigeria	4.1	3.1	4.3	3.4	1.1	7.3
Senegal	1.5	-0.2	1.5	-0.7	-1.2	4.4
South Africa	0.8	0.7	2.8	0.9	-4.9	27.2
Sudan	2.8	4.6	6.0	3.0	1.2	0.1
Tanzania	2.8	3.8	4.0	4.3	3.1	2.7
Tunisia	2.7	2.8	4.1	2.5	1.6	23.3
Uganda	3.3	5.3	4.5	5.1	4.7	3.0
Zambia	1.4	3.2	3.4	2.9	2.8	4.2
Zimbabwe	-3.3	-6.1	-7.2	-15.2	4.5	0.0
<b>Middle East</b>	<b>0.3</b>	<b>1.1</b>	<b>2.2</b>	<b>1.1</b>	<b>-0.5</b>	<b>36.3%</b>
Bahrain	2.1	4.7	6.2	4.6	3.1	78.6%
Iran	0.7	1.4	4.4	-0.7	-1.0	31.4
Iraq	3.4	4.0	-2.1	5.8	10.0	15.9
Israel	0.8	2.1	4.2	3.0	-1.0	74.8
Jordan	1.7	3.5	5.1	4.2	0.9	22.8
Kuwait	0.1	0.8	-0.1	3.4	-2.5	78.6
Oman	1.1	3.6	4.1	4.1	2.5	72.7
Qatar	3.0	0.9	0.0	0.9	1.5	113.3
Saudi Arabia	-0.3	-0.5	-0.1	1.0	-2.9	69.7
Syria	-1.0	0.1	-0.2	0.7	0.0	15.5
Yemen	0.6	0.3	-0.3	0.0	2.4	11.5

Table 9 (continued)

**Growth and Level of Labor Productivity (GDP per Person Employed), 1995-2009  
(Annual Average Growth, 1995-2009, and Level as Percent of U.S. in 2009)**

	<i>Annual average growth</i>				<i>2009 (estimate)</i>	<i>GDP per person employed, % of U.S., 2009</i>
	<i>1995- 2005</i>	<i>2005- 2009</i>	<i>2007</i>	<i>2008</i>		
<b>East Asia and the Pacific</b>	<b>3.3</b>	<b>4.7</b>	<b>6.7</b>	<b>3.9</b>	<b>2.4</b>	<b>19.6%</b>
Australia	1.8	0.6	0.8	0.2	0.4	84.5%
Cambodia	3.6	5.5	7.2	5.0	2.0	3.2
China	6.7	9.6	11.5	8.6	8.2	14.6
Hong Kong	2.0	1.7	3.8	1.5	-3.3	90.5
Indonesia	1.5	2.1	3.6	1.0	-0.3	9.9
Japan	1.6	0.1	1.9	-0.6	-2.5	69.7
Malaysia	2.4	2.2	3.5	3.4	-1.4	38.0
New Zealand	0.8	-0.4	2.0	-3.5	0.3	73.3
Philippines	1.8	2.8	4.7	2.0	0.8	10.7
Singapore	2.3	-5.2	2.6	-7.2	-14.2	75.0
South Korea	3.2	1.6	3.7	1.6	-2.5	59.0
Taiwan	3.5	0.5	3.8	-1.0	-4.0	72.6
Thailand	1.4	0.7	3.2	0.5	-4.8	15.5
Vietnam	4.5	5.2	6.1	4.4	4.3	6.5
<b>South Asia</b>	<b>3.8</b>	<b>4.8</b>	<b>5.9</b>	<b>3.9</b>	<b>3.6</b>	<b>8.1%</b>
Bangladesh	2.6	4.6	4.4	4.2	5.4	5.4%
India	4.2	5.2	6.2	4.0	3.9	8.0
Pakistan	1.6	1.3	5.1	2.8	0.8	9.8
Sri Lanka	1.0	7.1	7.5	4.0	4.0	15.3

Note: Gross domestic product levels are expressed in 2009 US\$, converted by Purchasing Power Parities.

Note: World labor productivity growth is based on labor productivity of the 111 countries included.

Note: Growth rates are based on the difference in the log of the levels of each variable.

Source: The Conference Board Total Economy Database, January 2010

## TOTAL FACTOR PRODUCTIVITY

While labor productivity measures the average output per unit of labor input (employment or hours), total factor productivity (TFP) divides output over the combined input of labor and capital, and therefore measures the efficiency by which the combined inputs are being used. In practice, total factor productivity growth is measured as the output growth that remains after the contribution of the combined inputs, weighted by their share in total output, is deducted from total output growth. **Tables 10 through 12** show the summary of TFP growth rates by major region and country, and the country-specific growth rates organized by geographical area respectively.

For the **world economy**, which includes 104 countries, the output growth of 4.4 per cent from 2005-2008, was due to an increase in labor input which contributed 0.7 percentage point to output growth. Another 0.2 percentage points was due to an improvement in the quality of the labor force, measured as the skill level of the labor force according to their level of educational attainment. Most of the output growth in the world has been due to a rise in capital, other than information and communication technology (ICT): it accounted for half (2.2 percentage points) of total output growth (4.4 percent). ICT capital contributed only 0.1 percentage point to output growth from 2005 to 2008, leaving a residual growth (TFP) of 1.2 percent. In contrast, during the earlier 1995-2005 period, ICT capital contributed 0.5 percentage points to output growth, leaving a TFP residual of 0.6 percent. The acceleration of TFP growth after 2005 might represent a more efficient use of capital, which may relate to either ICT or non-ICT capital.

The panels for the aggregate **advanced and emerging economies** show that the faster output growth rates of emerging and developing economies (at 7.3 percent relative to 2.0 percent from 2005 to 2008) is largely due to the faster increase in non-ICT capital, especially in China and India, and a much higher efficiency by which the inputs are being used, especially in China.

During the most recent years (2007 and 2008), total factor productivity has remained at much higher growth rates in emerging and developing economies than in advanced economies. While the United States, Japan, and the Euro Area all experienced zero or negative TFP growth rates in 2008, the overall TFP growth rates for emerging and developing economies was still at 1 percent, although lower than the average of 2.4 percent from 2005 to 2008. However, even among emerging economies there are substantial differences: **China** showed an increase of 1.4 percent in TFP growth in 2008, which was modest compared to 2.6 percent in **Brazil**, but much better than the -0.7 percent decline in **India**. In India, the contribution of capital to growth remained at the same level despite a significant deceleration in output growth in 2008.

Table 10

**Sources of Output Growth**

	World				Advanced				Emerging			
	95-05	05-08	2007	2008	95-05	05-08	2007	2008	95-05	05-08	2007	2008
GDP Growth	3.6	4.4	5.1	3.1	2.7	2.0	2.7	0.5	4.9	7.3	8.1	6.1
<b>Contribution of:</b>												
Labor	0.6	0.7	0.8	0.4	0.4	0.6	0.8	-0.1	0.7	0.8	0.8	0.8
Labor Quality	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2
Non-ICT Capital	1.6	2.2	2.2	2.3	1.2	1.0	1.0	1.0	2.4	3.9	3.9	4.0
ICT Capital	0.5	0.1	0.1	0.1	0.5	0.1	0.0	0.1	0.5	0.1	0.1	0.1
TFP Growth	0.6	1.2	1.9	0.1	0.4	0.2	0.7	-0.7	1.0	2.4	3.1	1.0

	United States				Japan				Euro Area			
	95-05	05-08	2007	2008	95-05	05-08	2007	2008	95-05	05-08	2007	2008
GDP Growth	3.3	1.7	2.1	0.4	1.1	1.2	2.4	-0.7	2.2	2.1	2.7	0.6
<b>Contribution of:</b>												
Labor	0.6	0.4	0.5	-0.6	-0.6	0.1	0.3	-0.4	0.5	0.7	1.1	0.3
Labor Quality	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Non-ICT Capital	1.4	1.0	1.0	0.9	1.0	0.8	0.8	0.9	0.9	0.9	0.9	1.0
ICT Capital	0.5	0.1	0.0	0.0	0.5	0.0	-0.1	0.0	0.3	0.1	0.1	0.1
TFP Growth	0.6	0.1	0.5	0.0	-0.1	0.1	1.2	-1.3	0.3	0.2	0.5	-0.9

	China				India				Brazil			
	95-05	05-08	2007	2008	95-05	05-08	2007	2008	95-05	05-08	2007	2008
GDP Growth	7.8	10.8	12.2	9.2	6.3	8.1	8.6	6.5	2.4	5.1	5.5	5.7
<b>Contribution of:</b>												
Labor	0.5	0.3	0.3	0.2	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.7
Labor Quality	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.2
Non-ICT Capital	5.6	7.4	7.4	7.3	4.2	6.1	6.3	6.2	1.3	1.8	1.8	2.2
ICT Capital	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	1.1	0.1	0.1	0.1
TFP Growth	1.2	2.9	4.3	1.4	1.1	1.0	1.4	-0.7	-1.2	2.1	2.7	2.6

Note: Growth rates are based on the difference in the log of the levels of each variable.

Note: Growth rates for 1995-2005 and 2005-2008 are the averages of yearly growth rates.

Source: The Conference Board Total Economy Database, January 2010

Table 11

**Total Factor Productivity Growth by Major Region, 1995-2008**

	1995-2005	2005-2008	2007	2008
United States	0.6	0.1	0.5	0.0
EU-15	0.3	0.2	0.5	-1.0
Japan	-0.1	0.1	1.2	-1.3
Other Advanced*	0.7	0.5	1.6	-0.8
<b>Advanced Countries</b>	<b>0.4</b>	<b>0.2</b>	<b>0.7</b>	<b>-0.7</b>
China	1.2	2.9	4.3	1.4
India	1.1	1.0	1.4	-0.7
Other developing Asia	0.3	1.9	2.7	0.9
Latin America	-0.4	1.4	2.0	0.5
Middle East	0.8	1.0	1.5	0.1
Africa	1.1	2.1	2.1	1.2
Central & Eastern Europe	1.6	0.9	1.2	-1.3
Russia and other CIS**	4.2	5.9	6.8	4.0
<b>Emerging Market and Developing Countries</b>	<b>1.0</b>	<b>2.4</b>	<b>3.1</b>	<b>1.0</b>
<b>World</b>	<b>0.6</b>	<b>1.2</b>	<b>1.9</b>	<b>0.1</b>
<b>Addenda:</b>				
EU-12	2.1	1.9	2.1	0.1
EU-27	0.5	0.4	0.7	-0.9
Euro Area	0.3	0.2	0.5	-0.9
OECD	0.4	0.2	0.7	-1.2

Note: This table is based on estimates for 104 countries (see table 12).

Note: Total Factor Productivity Growth measures the growth of GDP over the combined contributions of total hours, workforce skills, machinery and structures, and IT capital.

Note: Growth rates are based on the difference in the log of the levels of each variable.

Note: Averages of yearly growth rates are shown for 1995–2005 and 2005–2008.

\*Other Advanced includes Canada; Switzerland; Norway; Israel; Iceland; Cyprus; Korea; Australia; Taiwan, Province of China; Hong Kong; Singapore; and New Zealand.

\*\*CIS: Commonwealth of Independent States

Source: The Conference Board Total Economy Database, January 2010

Table 12

**Total Factor Productivity Growth, All Countries, 1995-2008**

	1995-2005	2005-2008	2007	2008
<b>World</b>	<b>0.6</b>	<b>1.2</b>	<b>1.9</b>	<b>0.1</b>
<b>Northern and Western Europe</b>	<b>0.6</b>	<b>0.3</b>	<b>0.5</b>	<b>-1.0</b>
Austria	0.2	0.3	0.9	-1.1
Belgium	0.3	-0.3	0.7	-1.9
Denmark	-0.3	-1.5	-1.9	-3.3
Finland	1.6	1.1	1.7	-1.4
France	0.4	-0.1	-0.6	-0.9
Germany	0.8	0.7	0.6	-0.7
Iceland	2.7	-0.5	-0.1	-0.2
Ireland	1.8	-1.4	0.8	-4.9
Luxembourg	1.3	-0.1	1.9	-4.4
Netherlands	0.4	1.0	1.4	0.2
Norway	0.2	-1.8	-1.6	-2.0
Sweden	1.1	-0.4	-0.7	-2.6
Switzerland	-0.1	0.8	1.4	-0.9
United Kingdom	0.5	0.6	1.2	-0.5
<b>Southern Europe</b>	<b>-0.1</b>	<b>-0.3</b>	<b>0.3</b>	<b>-1.7</b>
Cyprus	1.1	0.8	1.5	0.2
Greece	1.4	1.0	2.8	0.1
Italy	-0.3	-0.4	-0.1	-1.3
Malta	0.4	0.8	0.1	-0.3
Portugal	0.0	0.1	2.0	-2.0
Spain	-0.6	-0.4	0.1	-1.0
Turkey	0.0	-1.5	-1.0	-4.2
<b>Eastern Europe and Central Asia</b>	<b>3.1</b>	<b>4.2</b>	<b>4.9</b>	<b>2.3</b>
Albania	1.9	2.6	2.7	3.1
Armenia	6.1	3.6	5.6	-0.1
Azerbaijan	10.8	16.5	18.8	7.1
Belarus	4.4	-0.4	-1.5	-0.7
Bosnia Herzegovina	3.9	-1.9	-2.4	-3.3
Bulgaria	-0.2	0.9	0.8	0.3
Croatia	1.7	1.2	1.0	-0.4
Czech Republic	1.2	2.5	3.4	-0.1
Estonia	6.0	1.0	3.7	-5.1
Georgia	5.1	6.9	10.7	3.2
Hungary	1.4	0.6	-0.3	-0.1
Kazakhstan	5.1	0.2	0.9	-3.6
Latvia	1.3	-1.7	1.7	-8.6
Lithuania	3.2	1.9	3.2	-1.2
Moldova	4.2	4.0	1.4	4.5
Poland	2.9	2.0	2.0	0.3
Romania	2.2	2.1	1.3	0.9
Russian Federation	4.3	6.8	7.6	5.1
Slovak Republic	3.4	4.6	6.3	2.7
Slovenia	0.0	0.6	1.4	-1.5
Tajikistan	6.4	4.9	3.5	7.0
Ukraine	3.4	6.0	8.3	2.7

Table 12 (continued)

**Total Factor Productivity Growth, All Countries, 1995-2008**

	1995-2005	2005-2008	2007	2008
<b>North America (NAFTA)</b>	<b>0.5</b>	<b>0.0</b>	<b>0.3</b>	<b>-0.5</b>
Canada	0.7	-0.9	-0.6	-1.8
Mexico	0.2	-0.3	0.2	-2.6
United States	0.6	0.1	0.5	0.0
<b>Latin America</b>	<b>0.7</b>	<b>1.1</b>	<b>1.8</b>	<b>0.0</b>
Argentina	1.2	3.9	5.2	2.9
Bolivia	-0.4	2.4	2.1	2.9
Brazil	-1.2	2.1	2.7	2.6
Chile	-1.5	-1.1	0.6	-0.3
Colombia	-1.2	1.7	2.5	-2.6
Ecuador	0.4	1.3	0.4	3.7
Peru	1.1	2.5	2.0	4.5
Uruguay	1.6	0.2	2.6	5.3
Venezuela	-1.3	2.6	3.2	-0.1
<b>Africa</b>	<b>1.1</b>	<b>2.1</b>	<b>2.1</b>	<b>1.2</b>
Burkina Faso	2.5	0.7	-0.6	0.3
Cameroon	1.0	0.3	0.9	-0.4
Côte d'Ivoire	-0.8	-0.7	-0.5	-0.3
Egypt	1.3	2.3	1.9	2.3
Ethiopia	-0.9	2.7	1.8	3.3
Kenya	-0.4	1.2	3.0	-2.1
Madagascar	0.5	1.8	2.2	2.0
Malawi	0.9	4.0	4.1	5.0
Mali	2.0	0.8	0.2	0.8
Morocco	1.6	1.8	-0.6	1.8
Mozambique	3.7	2.6	2.5	1.4
Niger	0.3	0.7	-2.0	4.0
Nigeria	4.2	2.4	2.6	1.2
Senegal	-0.9	-2.5	-1.1	-3.1
South Africa	-1.1	-0.3	0.1	-2.2
Sudan	3.2	6.1	6.6	3.4
Tunisia	2.2	2.7	3.5	1.8
Uganda	1.1	2.8	1.9	2.2
Zambia	2.3	0.7	0.5	0.1
Zimbabwe	-3.5	-9.2	-7.0	-14.7
<b>Middle East</b>	<b>0.8</b>	<b>1.0</b>	<b>1.4</b>	<b>0.1</b>
Bahrain	1.0	0.1	0.8	-0.8
Iran	1.1	2.0	4.3	-0.8
Iraq	4.7	3.6	-0.1	6.5
Israel	0.1	2.7	3.5	2.0
Jordan	2.1	3.6	4.2	3.2
Kuwait	2.6	0.8	-1.4	1.7
Oman	0.2	0.3	-0.3	1.0
Qatar	2.7	1.5	1.1	1.4
Saudi Arabia	0.2	-1.3	-1.8	-1.1
Syria	-0.6	-0.2	-0.3	0.1
Yemen	-0.6	-0.3	-0.2	0.1

Table 12 (continued)

**Total Factor Productivity Growth, All Countries, 1995-2008**

	1995-2005	2005-2008	2007	2008
<b>East Asia and the Pacific</b>	<b>0.6</b>	<b>2.0</b>	<b>3.2</b>	<b>0.5</b>
Australia	0.1	-1.5	-1.0	-2.4
Cambodia	5.0	4.6	5.3	2.5
China	1.2	2.9	4.3	1.4
Hong Kong	-0.5	2.2	2.9	0.0
Indonesia	0.2	2.5	3.1	1.4
Japan	-0.1	0.1	1.2	-1.3
Malaysia	0.1	2.1	2.4	1.5
New Zealand	-0.2	-1.8	1.4	-5.4
Philippines	1.2	3.1	4.4	1.6
Singapore	0.6	0.5	3.9	-4.9
South Korea	2.1	2.9	4.0	2.2
Taiwan	0.4	1.5	4.6	-1.0
Thailand	0.1	1.2	1.9	-0.5
Vietnam	-0.7	1.0	1.5	-0.3
<b>South Asia</b>	<b>1.1</b>	<b>1.1</b>	<b>1.6</b>	<b>-0.3</b>
Bangladesh	-0.3	1.2	1.3	1.1
India	1.1	1.0	1.4	-0.7
Pakistan	1.1	0.5	2.7	0.7
Sri Lanka	0.0	4.7	4.3	2.1

Note: Total Factor Productivity Growth measures the growth of GDP over the combined contributions of total hours, workforce skills, machinery and structures and IT capital.

Note: Growth rates are based on the difference in the log of the levels of each variable.

Note: Averages of yearly growth rates are shown for 1995-2005 and 2005-2008.

Source: The Conference Board Total Economy Database, January 2010

## About This *Productivity Brief* and The Conference Board *Total Economy Database*

This productivity brief offers an up-to-date and timely overview of annual data on key productivity, output, and input trends through 2009, and projections for 2010 based on The Conference Board *Total Economy Database*.<sup>1</sup> The basic statistical tables in this brief provide a comprehensive overview of growth rates of productivity GDP and employment (and in many case also hours worked) for 123 economies in the world, representing 97 percent of the world's population and 99 percent of global output. Productivity is defined as "GDP per person employed" or (where available) "GDP per hour worked". We also provide estimates of levels of productivity, expressed in U.S. dollars, and adjusted for differences in relative prices between countries using purchasing power parities.

A new feature in this year's version of the *Total Economy Database* are measures of total factor productivity, which measures output over the combination of multiple inputs, including labor and capital input (machinery, equipment and structures), and with adjustments for changes in the quality of labour (measured as educational attainment of the workforce) and changes in the composition of capital assets (notably the increased importance of information and communication technology capital).<sup>2</sup>

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<sup>1</sup> Until 2007, this database was published jointly with the Groningen Growth and Development Centre at the University of Groningen in The Netherlands, but is currently maintained by The Conference Board. The data series are compatible, however, with more detailed productivity series at the industry level, which are part of the EU KLEMS Growth and Productivity Accounts, which is maintained by a consortium led by the University of Groningen, and in which The Conference Board is a participant ([www.euklems.net](http://www.euklems.net)).

<sup>2</sup> This extension of the database was made possible through close cooperation with scholars from Harvard University and the University of Groningen. The data are updates and an extension of earlier work by Dale Jorgenson and Khuong Vu, "Growth Accounting within the International Comparison Program," *ICP Bulletin*, Vol. 6, No. 1, March 2009, pp. 3-19; Abdul Azeez Erumban, Measurement and analysis of capital, productivity and economic growth, University of Groningen, 2008, ([dissertations.ub.rug.nl/faculties/feb/2008/a.e.erumban](http://dissertations.ub.rug.nl/faculties/feb/2008/a.e.erumban)); and Marcel P. Timmer and Bart van Ark (2005), "IT in the European Union: A driver of productivity divergence?" *Oxford Economic Papers*, vol. 57 no. 4, pp. 693-716.

This brief is a prelude to our annual *Performance* report. The 2010 edition will be released in the Fall, and include the final figures for 2009 and a more detailed assessment of the results. The data underlying these tables, including annual series on productivity, output, population, labor and capital input are publicly available from The Conference Board website database ([www.conference-board.org/economics/database.cfm](http://www.conference-board.org/economics/database.cfm)). Additional graphical presentation of the data is available from the Total Economy Database Dashboard, which can also be downloaded from the website.

## Data Sources for Productivity Estimates

All data in this report are derived from the The Conference Board *Total Economy Database*, version January 2010. The database makes use of information from the latest national accounts, labor surveys, and other employment statistics available for individual countries. In order to maximize international consistency, the figures are largely derived from international sources, such as the National Accounts, Economic Outlook, Employment Outlook and Labor Force Statistics of the Organisation for Economic Cooperation and Development (OECD), the Statistical Office of the European Union (Eurostat), the International Monetary Fund (IMF) World Economic Outlook Database, the International Labour Organization (ILO), and the World Bank World Development Indicators. For many countries data from international sources have been supplemented with those from national statistical offices to increase timeliness when possible.

The estimates for 2009 are preliminary estimates and those for 2010 are derived from a variety of forecasts and projections, in particular The Conference Board Global Economic Outlook (November 2009), the OECD Economic Outlook (December 2009), and the IMF World Economic Outlook Database (October 2009).

Historical estimates, pre-1990, are obtained from a database underlying Angus Maddison (2009), *Statistics on World Population, GDP, and Per Capita GDP, 1-2006 AD* (updated in 2009) (see [www.ggdnc.net/Maddison/Historical\\_Statistics/horizontal-file\\_03-2009.xls](http://www.ggdnc.net/Maddison/Historical_Statistics/horizontal-file_03-2009.xls)).

The measures of productivity levels in Tables 8 and 9 are expressed in terms of U.S. dollars adjusted for differences in relative price levels across countries using purchasing power parities (PPPs) as published by the OECD. The published numbers are based on PPPs for 2009, which are updated with deflators from 2005 PPPs from the World Bank/ICP PPP-round, but with adjustments obtained from Alan Heston (University of Pennsylvania; Penn World Tables) to reflect global weighting, a change in the effect of the net foreign balance using PPP rather than exchange rate, and a 12 percent downward adjustment of the PPP for China in order to better reflect the impact of lower prices in rural areas in China.<sup>3</sup>

To obtain estimates on Total Factor Productivity, additional series were needed on investment in machinery, equipment and structures, to create capital stock and measures of capital services delivered. The data on investment by asset types is based on Penn World Tables, extended with OECD and United Nations National Accounts data, and with estimates from Jorgenson & Vu and WITSA Digital Planet Report 2008 for IT investment. The estimates for educational attainment levels of the labor force are compiled from Barro and Lee dataset (2000), EUKLEMS ([www.euklems.net](http://www.euklems.net)) and projections by International Institute for Applied System Analysis (IIASA) (2008).

All growth rates in this report are presented as differences in the log of the levels of each variable instead of a percentage change in the actual level in order to facilitate the aggregation to regional averages and a decomposition of growth sources. As a result the presented growth rates can be slightly different from the actual growth rates for individual countries, especially for countries with large annual changes in levels, such as China. The growth estimates for major regions of the world economy are weighted by the average shares of nominal GDP (converted at current PPPs) for each current and previous year.

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<sup>3</sup> Angus Deaton and Alan Heston, "Understanding PPPs and PPP-based national accounts," Princeton University and University of Pennsylvania, November 2008 (updated November 2009) ([www.nber.org/papers/w14499](http://www.nber.org/papers/w14499)). The adjustments are more fully discussed in the methodological notes in the Total Economy Database ([www.conference-board.org/economics/database.cfm](http://www.conference-board.org/economics/database.cfm)). The Total Economy Database also publishes a series of output and labor productivity measures which are converted at 1990 PPPs obtained from Angus Maddison ([www.ggdc.net/Maddison/Historical\\_Statistics/horizontal-file\\_03-2009.xls](http://www.ggdc.net/Maddison/Historical_Statistics/horizontal-file_03-2009.xls)), but with a downward adjustment of 22.6 percent to China's GDP level in U.S. dollars, reflecting a partial adjustment to the more recent PPP estimates of the World Bank.

## About the author

**Bart van Ark** is Senior Vice President and Chief Economist of The Conference Board. He leads a team of 20-plus economists who produce a portfolio of widely watched economic indicators and growth forecasts, as well as in-depth global economic research. A Dutch national, he is the first non-U.S. Chief Economist in The Conference Board's 90-year history. Van Ark is an expert in international comparative studies of economic performance, productivity, and innovation. He previously was The Conference Board's consulting director of international economic research for 10 years, responsible for its annual flagship publication on productivity and instrumental in helping expand its comparative analytical capabilities to look at productivity and labor- and consumer-market research across countries and regions.

Van Ark obtained his master's and Ph.D. degrees in economics from the University of Groningen in The Netherlands.

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