

## MULTI-FACTOR PRODUCTIVITY

Growth accounting typically involves breaking down the growth of gross domestic product (GDP) into three components – the contribution of labour, the contribution of capital, and multi-factor productivity (MFP).

MFP is the change in GDP that cannot be explained by changes in the quantities of capital and labour that are made available to generate the GDP. MFP is sometimes described as disembodied technological progress, because it is the increase in GDP that is not embodied in either labour or capital. MFP comes from more efficient management of the processes of production through better ways of using labour and capital, through better ways of combining them, or through reducing the amount of intermediate goods and services needed to produce a given amount of output. Growth in MFP is a significant factor in explaining the long-term growth of real GDP.

### Definition

The growth accounting framework, as applied here, decomposes annual growth in GDP into growth in labour and capital inputs and multi-factor productivity growth. The rate of growth of GDP is a weighted average of the rates of growth of capital and labour inputs. The weights attached to each input are the output elasticities for each factor of production. Since output elasticities cannot be directly observed, the factor shares of labour and capital are often used as weights. The rate of multi-factor productivity growth is the part of GDP growth which is not explained by the measured contribution of the factor inputs.

### Comparability

The growth accounts for OECD countries are based on the *OECD Productivity Database* where the main problems of consistency of data sources and comparability across countries are addressed.

### Long-term trends

Multi-factor productivity growth was one of the factors that helped strengthen growth in Greece, Japan, New Zealand, Sweden and the United States between the periods 1995-2000 and 2000-2005.

In other countries, including Australia, Belgium, Canada, Finland, Germany, Ireland, the Netherlands and the United Kingdom, MFP growth slowed down from 1995-2000 to 2000-2005. Multi-factor productivity growth was positive during the period 1995-2000 and negative in the period 2000-2005 in Austria, Denmark, Italy and Portugal.

Output is measured as real GDP, compiled according to the 1993 *System of National Accounts*, although there may be some differences in how countries convert current price GDP to real GDP. Labour input is measured as total hours actually worked, and capital input is measured as the flow of capital services, based on an identical method for all countries.

Since MFP is obtained as a residual – i.e. that part of GDP growth that is left over when the growth of labour and capital inputs have been deducted – MFP necessarily contains any errors that may have been made in measuring GDP and labour and capital inputs. This is a particularly important issue as regards the measurement of capital inputs in the form of computers, software and communications equipment. To correct for differences in methods between countries, the OECD uses a standard method for these types of capital goods.

It must also be emphasised that the data used here relate to the total economy and therefore include the government sector. Measuring output and productivity for the government sector is difficult and statistical practices as well as the size of the government sector may vary between countries. This should be kept in mind when interpreting the present series.

### Source

- OECD Productivity Database, [www.oecd.org/statistics/productivity](http://www.oecd.org/statistics/productivity).

### Further information

#### Analytical publications

- OECD (2004), *Understanding Economic Growth A Macro-level, Industry-level, and Firm-level Perspective*, OECD, Paris.
- OECD (2003), *The Sources of Economic Growth in OECD Countries*, OECD, Paris.
- OECD (2005), *OECD Science, Technology and Industry Scoreboard*, OECD, Paris.

#### Methodological publications

- OECD (2001), *Measuring Productivity – OECD Manual Measurement of Aggregate and Industry-level Productivity Growth*, OECD, Paris.
- Schreyer, P., P.-E. Bignon and J. Dupont (2003), *OECD Capital Services Estimates*, OECD Statistics Working Papers, No. 2003/6, OECD, Paris.

#### Websites

- OECD Compendium of Productivity Indicators, [www.oecd.org/statistics/productivity](http://www.oecd.org/statistics/productivity).

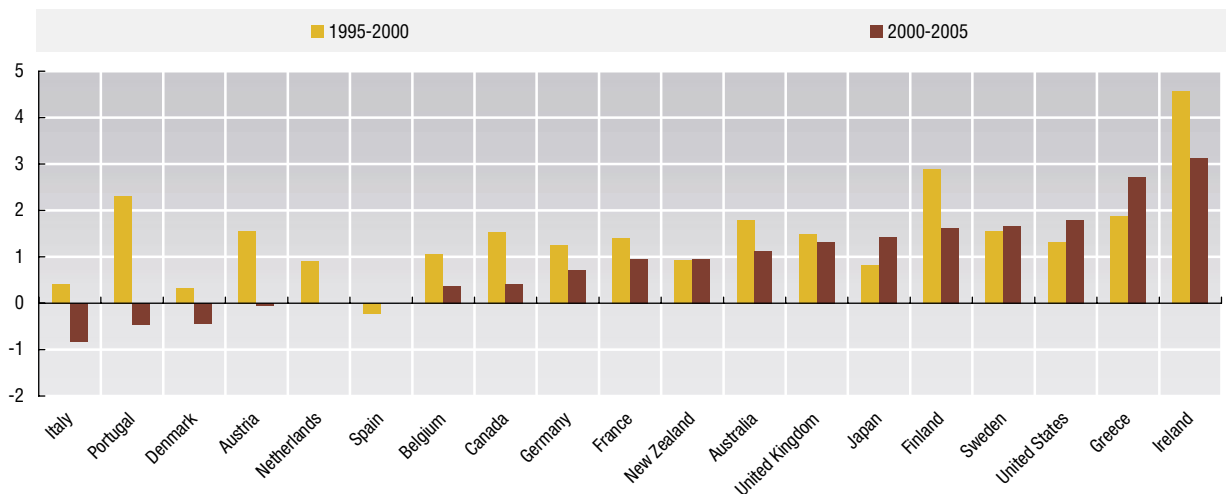

**Multi-factor productivity**

Annual growth in percentage

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	3.5	1.1	0.7	1.3	3.6	2.3	2.7	1.0	-0.5	2.3	0.7	2.0	-0.4	..
Austria	..	..	..	..	0.9	0.4	2.0	2.5	2.0	-0.4	0.2	-	..	..
Belgium	0.6	1.0	3.0	0.8	0.4	1.3	0.4	1.8	1.4	-0.9	1.1	0.9	..	..
Canada	0.8	0.5	1.7	0.9	-0.3	3.0	1.1	1.8	2.1	-	0.9	-0.2	0.1	1.3
Denmark	1.2	0.4	5.2	1.0	1.3	0.2	-1.1	-0.1	1.1	-1.5	-0.4	0.7	..	..
Finland	0.7	3.2	3.8	2.3	2.7	3.2	3.5	1.5	3.7	2.0	1.0	2.0	..	..
France	1.4	-0.2	1.6	2.0	-0.1	1.5	1.9	1.0	2.8	0.2	1.9	0.8	0.4	0.8
Germany	1.5	0.3	2.2	1.7	1.3	1.7	0.7	0.8	1.9	0.9	0.6	0.5	0.6	0.9
Greece	-2.1	-3.5	1.1	1.1	2.7	4.3	-0.7	0.5	2.7	3.7	2.4	2.2	..	..
Ireland	4.2	2.0	2.5	4.6	4.1	7.6	3.4	4.7	3.7	2.9	4.0	2.7	..	..
Italy	1.2	1.5	3.0	2.5	-0.7	1.4	-0.8	0.3	1.9	-0.6	-1.0	-0.9	..	..
Japan	0.2	1.1	0.4	1.4	0.8	1.0	-0.9	1.2	2.1	0.7	1.3	1.5	2.3	..
Netherlands	1.0	1.4	2.4	1.7	-1.5	1.4	1.6	2.8	0.2	-0.4	0.9	-0.6	..	..
New Zealand	-0.1	2.7	0.6	-0.5	-	1.0	0.1	2.5	1.1	0.6	1.3	..	..	..
Portugal	..	..	..	..	3.5	3.3	1.4	0.5	3.0	-0.7	-0.5	-0.1	..	..
Spain	1.1	0.7	1.8	0.3	0.2	-0.1	-0.5	-0.4	-0.4	-0.1	-0.2	0.1	0.1	..
Sweden	0.7	0.5	2.0	1.5	0.7	2.2	1.4	1.2	2.3	-0.1	2.6	2.6	..	..
United Kingdom	2.5	2.5	2.3	0.9	1.1	0.9	1.4	1.4	2.6	0.6	1.4	1.9	..	..
United States	2.5	0.1	0.8	-0.3	1.7	1.0	1.1	1.5	1.3	0.8	2.1	2.3	2.4	1.5

 StatLink <http://dx.doi.org/10.1787/684571114544>
**Multi-factor productivity**

Average annual growth in percentage, 1995-2000 and 2000-2005 (or closest comparable periods)


 StatLink <http://dx.doi.org/10.1787/713605483818>