

SOURCES OF PRODUCTIVITY GROWTH IN THE 21ST CENTURY – FINDINGS FROM THE OECD GROWTH PROJECT

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Growth and productivity are on the policy agenda in many OECD countries, and therefore also affect work of the OECD. The organisation was asked in 1999 by its member countries to examine the variation in growth performance in the OECD area, analyse its causes and provide guidance for policy making. The strong performance of the United States at the time and related claims about a “new economy” were among the reasons for this demand, as was the poor performance of several other OECD countries at the time. A final report was presented to the OECD Ministerial meeting in May 2001 (OECD, 2001*a*). Further results were released in 2003 (OECD, 2003*a*; 2003*b*). This note briefly summarises the main findings of the OECD work on growth and draws some implications for policy and statistical development.

Economic growth in the OECD area has varied considerably over the post-war period. In the 1950s and 1960s, most OECD countries grew rapidly as they recovered from the war and applied US technology and knowledge to upgrade their economies. This catch-up period came to a halt in the 1970s; average growth rates of GDP per capita over the 1973-92 period for much of the OECD area were only half that of the preceding period. The strong growth of some countries in the second half of the 1990s should be seen in the light of this overall slowdown in growth and productivity performance.

Estimates of growth in GDP per capita show that a few OECD countries, including Australia, Canada, Finland, Ireland and the Netherlands, registered markedly stronger growth of GDP per capita over the second half of the 1990s compared with the 1980-1995 period (OECD, 2003*a*). Several other countries, including the United States, also experienced some improvement. In contrast, the increase in GDP per capita in several other OECD countries, including Japan, Germany and Italy, slowed, sometimes quite markedly.

The divergence in growth performance in the OECD area is partly due to differences in labour utilisation. Countries such as Australia, Ireland and the United States, together with a few other countries, improved labour productivity and labour utilisation at the same time -- *i.e.* more people worked more productively. In contrast, some European countries had strong productivity growth, but low employment growth, particularly in the first half of the 1990s.

Labour productivity, meanwhile, can be increased in several ways: by improving the quality of labour used in the production process, increasing the use of capital and improving its quality, and attaining greater overall efficiency in how these factors of production are used together, or multi-factor productivity (MFP). MFP reflects many types of efficiency improvements, such as improved managerial practices, organisational changes and more innovative ways of producing goods and services.

The quality of labour is the first factor that plays a fundamental role in labour productivity growth. The rise in the educational attainment among workers over the 1990s is only one sign of this role; increases in the level of post-educational skills may be even more important, although few hard measures are currently

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available. Improvements in the quality of labour have directly contributed to labour productivity growth in virtually all OECD countries (OECD, 2003a).

Investment in physical capital is the second factor that plays an important role. It expands and renews the existing capital stock and enables new technologies to enter the production process. While some countries have experienced an overall increase in the contribution of capital to growth over the past decade, information and communications technology (ICT) has typically been the most dynamic area of investment. This reflects rapid technological progress and strong competitive pressure in the production of ICT goods and services and a consequent steep decline in prices. This fall, together with the growing scope for application of ICT (including the impact of Y2K), has encouraged investment in ICT.

While ICT investment accelerated in most OECD countries, the pace of that investment and its impact on growth differed widely. For the countries for which data are available, ICT investment accounted for between 0.2 and 0.8 percentage points of growth in GDP per capita over the 1995-2001 period. The United States, Australia and Canada received the largest boost; Germany, France and Italy a much smaller one. Software accounted for up to a third of the overall contribution of ICT investment to GDP growth in OECD countries (OECD, 2003b).

The final factor that accounts for some of the pick-up in labour productivity growth is a faster increase in trend multi-factor productivity growth in the 1990s. MFP growth rose particularly in Australia, Canada, Denmark, Finland, Ireland and Sweden (OECD, 2003a). In the second half of the 1990s, the trend in MFP improved further in several countries, including the United States. This improvement reflects a break with slow MFP growth in the 1970s and 1980s and may be due to several sources. Better skills and better technology may have caused the blend of labour and capital to produce more efficiently, organisational and managerial changes may have helped to improve operations, and innovation may have led to more valuable output being produced with a given combination of capital and labour. MFP growth is measured as a residual, however, and it is difficult to provide hard evidence on all of these factors. Some is available, though.

First, in some OECD countries, MFP reflects rapid technological progress in the production of ICT. Technological progress at Intel, for instance, has enabled the amount of transistors packed on a microprocessor to double every 18 months since 1965, and even more rapidly so between 1995 and 1999. While the ICT manufacturing sector is relatively small in most OECD countries, it can make a large contribution to growth if it expands much more rapidly than other sectors.

MFP also reflects the effects of competition. Analysis of productivity growth at the firm level shows that the impacts of competition, such as the entry and exit of firms and changes in market shares are important drivers of productivity growth (OECD, 2003a). New firms typically use a more efficient mix of labour, capital and technology than existing firms, which in the long term has a positive effect on MFP growth. This is particularly true of industries that have grown rapidly in response to the new technological opportunities, such as the ICT sector, where new firms play a key role. In contrast, growth in mature industries is typically driven by productivity growth within existing firms or by the exit of obsolete firms.

Third, R&D and technological change are important drivers of MFP growth (Guellec and Van Pottelsberghe, 2001). Foreign R&D is particularly important for most OECD countries (the United States being an exception), since the bulk of innovation and technological change in small countries is based on R&D that is performed abroad. But domestic R&D, *i.e.* business, government and university research, is also an important driver of MFP growth. It is also important in tapping into foreign knowledge; countries that invest in their own R&D appear to benefit most from foreign R&D.

The fourth driver of MFP that can be identified is the use of ICT in the production process. This effect can be interpreted in several ways. For example, ICT may help firms gain market share at the cost of less productive firms, which could raise overall productivity. In addition, the use of ICT may help firms to expand their product range, to customise the services offered, to respond better to client demand, or in short, to innovate. Moreover, ICT may help reduce inefficiency in the use of capital and labour, e.g. by reducing inventories. The diffusion of ICT may also help establish ICT networks, which can give rise to spill-over effects. These effects have proven difficult to identify over the past decade, even though ICT has diffused rapidly. In recent years more evidence has emerged that ICT use can indeed help raise MFP growth. First, certain ICT-intensive services, such as wholesale and retail trade and finance, have experienced an above-average pick-up in MFP growth in recent years, e.g. in the United States, Canada and Australia (Pilat, Lee and Van Ark, 2002). Second, there is growing evidence from firm-level studies in many OECD countries that ICT can help to improve the overall efficiency of capital and labour, if it is combined with improved organisational set-ups, improved skills and accompanying innovations (OECD, 2003b). Third, countries that experienced a more rapid diffusion of ICT in the 1990s typically experienced a more rapid pick-up in MFP growth in the 1990s than countries where the diffusion process was slower (OECD, 2001a).

What is clear from the OECD work is that growth is not the result of a single policy or institutional arrangement. ICT is one factor explaining growth disparities, but will not on its own steer countries on to a higher growth path. Other conditions must be satisfied in the areas of innovation, human capital, business creation and sound fundamentals. Acting in one of these areas alone is not enough to improve growth; rather, it requires comprehensive action in all of them combined to create the conditions for future innovation and change. The OECD growth study therefore encouraged governments to adopt a comprehensive growth strategy based on a combination of actions in order to: strengthen economic and social fundamentals; facilitate the diffusion of ICT; foster innovation; invest in human capital and; stimulate firm creation.

The OECD work on growth also drew on a wide range of statistics and indicators. It drew heavily on empirical analysis of productivity growth, confirming the importance of this indicator and the underlying statistics on GDP and factor inputs (labour and capital, both in quantitative and qualitative terms). The empirical work also demonstrated that several "new" factors now play an important role in OECD economic growth. These include investment in ICT (including software), as well as its production and use; technology and innovation; entrepreneurship and the exit and entry of firms, as well as human capital. Organisational factors are also increasingly considered important as drivers of growth, primarily as organisational change is important to make effective use of ICT (OECD, 2003b). In many of these areas, new or improved statistics have been developed over the past few years that have enabled some new drivers of growth to be more clearly identified. This work includes new guidelines for the measurement of software investment, which should eventually improve the available statistics, as well as improved guidelines for the measurement of R&D, through a new version of the OECD *Frascati Manual*. Work has also started to explore the inclusion of R&D as an asset for investment in the national accounts, as is already the case with software. Other areas of statistical work are also under development, e.g. a revision of the OECD *Oslo Manual* that gives guidelines for innovation surveys.

A better understanding of growth and productivity not only depends on improvements in statistics; it also requires a better use of existing data. The OECD work has benefited greatly from analysis at the firm level, based on the combination of a variety of official statistics at the firm level. This has enabled the analysis of enterprise dynamics and competitive processes and has given new insights in growth and productivity (OECD, 2003a; 2003b).

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