Information and communication technologies, or ICTs, account for a growing share of the French economy: they generate 5.3% of the value of production and employ 2.9% of the work force. The ICT sector serves as an engine of growth, having fuelled 20% of all growth in production over the last four years. It has created over 100,000 jobs since 1994, half of them during 1998 alone. It also has indirect effects on the rest of the economy: the dissemination of information and communication technologies throughout the economy allows each industry to develop new functions, improve product-related services and supply customized products and services, thus boosting consumption and economic activity generally. In terms of employment, ICTs have a generally positive impact on the economy. Demand for ICT products now spurs as much growth and creates as many jobs as does demand for other products, according to a study conducted by BIPE on behalf of the Ministry of State in charge of Industry. The main uncertainty has to do with the precise extent of their impact. Depending on the assumptions used, ICTs will account for between +0.6 and +1.6 growth points annually over the coming years, and will create between 74,000 and 190,000 additional jobs each year.
Information and communication technologies (ICTs) play a central role in our economies today. Not only are they as powerful as many other industries generally recognized as economic heavyweights (automotive industry, transportation, etc.), they also seem to bring productivity and innovation to all sectors of the economy.

### A spur to growth

The dynamic and fast-growing ICT markets account for an ever-larger share of the French economy: 5.3% of the value of production, against 4.9% in 1996. In terms of value added, INSEE reports that they generated 4.4% of GDP in 1998.

Since 1996, the growth of the ICT sector has reached 10% a year in volume terms, a rate consistently higher than that of overall economic growth. This growth differential has even increased over time, from 4.4 points in 1996 to 9 points today. More remarkable still, ICTs are responsible for 20% of the growth in production over the last four years. INSEE estimates their share of value added in 1998 at 0.4 GDP points (13% of GDP growth). Regardless of the indicator considered, information and communication technologies have thus been a driving force in the French economy’s return to growth.

These developments mirror the key role played by ICTs in the growth observed in the United States over the last several years, though their impact is less pronounced in France. In 1998, France lagged 1.5 points behind the United States in terms of ICT share of total production. The manufacturing share of ICTs is roughly equivalent in the two countries, but IT and telecommunications services play a smaller role in France.

### Steadily climbing employment since 1994

At the end of 1998, the ICT sector employed 660,000 people, or 2.9% of the work force—half of its share in production. Employment in the sector declined until 1993-94, but since that time it has risen much more strongly than has overall employment. The ICT sector has created 108,000 new jobs, almost half of them in 1998 alone.

Employment trends have varied widely in different ICT segments. Through 1998, jobs in manufacturing declined, employment in telecommunications services levelled off and then rebounded slightly in 1998, and IT service jobs exploded. These differences are comparable to the situation in North America, except that the rebound in employment there has been much stronger, and the share of ICT jobs held by the work force is higher than in France.

Over the last decade, trends in the ICT labour market have mirrored, though in amplified form, those of employment as a whole. Job growth in the ICT sector is expected to continue even in the event of an economic slowdown. This is due to the size attained by the IT services sector, which should come to employ more labour than the manufacturing industries. The example of the United States would seem to support this hypothesis.

### Ripple effects throughout the rest of the economy, with consequences for productivity that are hard to gauge...

Besides their effects on the information technologies sector, the overall impact of ICTs on employment will depend on how far they spread to other industries. It is there that ICTs could have a job-destroying effect, given their potential for generating productivity gains. Hence the need to understand thoroughly the economic mechanisms set in motion by the dissemination of these technologies.

The ICT sector exerts a dominant influence on the rest of the economy. Most of what it produces is used, in the form of either intermediate consumption or investment, by the other economic sectors. ICTs account for only 2% of final consumption, but 11% of investment and 8% of intermediate consumption. As a result, other sectors will be stimulated by the impact of new technologies, which in some circumstances will have indirect effects on productivity, growth and employment.

Most economic analysis of the spread of ICTs looks at their impact on apparent labour productivity or total factor productivity. Although the performances of the products and services marketed have shown spectacular and sustained improvement, an important aspect of the digital transformation has long puzzled economists: in many sectors, the productivity gains have seemed incommensurate with the huge investments made in information and communication technology. Robert Solow gave this formal expression in 1987 as Solow’s paradox, better known as the “productivity paradox”: over the last 20 years a huge share of productive capital has been invested in information and communication technologies, yet productivity has increased very little, if at all.
ICTs are now believed to enhance the quality of output, if not necessarily its value. This is one possible explanation for Solow’s paradox. Indeed, a digital economy makes it possible to develop new functions, improve product-related services and supply customized products and services. Once the use of information and communication technologies is sufficiently widespread, network effects boost their utility. At the same time, these technologies provide a way to differentiate products through the services offered with them. Thus, thanks to the increased utility of their purchases, consumers benefit from the value added by information and communication technologies, without that extra value being reflected in the selling price. Many examples illustrate the diverse nature of the phenomenon: smart cards, for which industry continues to find new uses; mobile telephones, which substantially increase communication options; and the Internet, whose electronic commerce applications facilitate trade in many ways. Consumers are the beneficiaries of much of this increase in utility, whose effects are not usually taken into account in analyzing the impact of ICTs on productivity. This analytical approach thus amounts to underestimating the volume effects linked to the dissemination of ICTs and overestimating price changes. A simulation using the Divatic economic model factors in this utility shock on the French economy: an increase of one billion in the demand for ICT products boosts GDP by 2.2 billion.

Two possible future scenarios…

To assess the impact of a greater or lesser dissemination of ICTs, we have devised two possible scenarios for the next three years. The first scenario involves limited dissemination, and assumes that only the ICT sector will benefit directly from the utility effects of its own technologies over the next few years. It is a relatively conservative approach compared to the usual new economy assumptions. The second scenario, which more closely mirrors current thinking about the new economy, assumes a broader dissemination of ICTs, one that will generate utility effects in all industries, principally banking, the insurance industry, transportation and commerce. These effects were estimated on the basis of past data and “expert opinion”. This scenario depends on the spread of ICTs throughout the economy, including SMEs, on their adoption by companies for the purpose of creating new services and on consumer behaviour. Widespread training in the new technologies is also a prerequisite for the second scenario. These fields may thus be appropriate spheres for government action.

…but positive results in terms of the “utility” created

In both scenarios, ICTs spur growth and create new jobs. The demand for products from the ICT sector is now growing just as fast and creating just as many jobs as the average for other products.
Regardless of which set of assumptions is used, 85% of all new jobs will be concentrated in five industries: corporate services, intermediate products, commerce, capital goods, and automobiles and construction.

The main area of uncertainty has to do with the precise extent of ICT impact on growth and job creation. Based on the low estimate, or limited dissemination scenario, ICTs should add 0.6 of a percentage point to annual growth and create 74,000 jobs annually over the next three years. Under the high estimate, or widespread dissemination scenario, ICTs will have a much more substantial impact: a contribution of 1.6 percentage points to annual growth, and 190,000 additional jobs in each of the three years.

Digitalization therefore seems to be setting in motion a virtuous circle combining service innovation and service industrialization: innovation boosts utility, which stimulates demand; industrialization spurs innovation because of the potential offered by information and communication technologies. The two phenomena, which are intertwined and inseparable, combine to create both wealth and employment.

### Additional reading

- **Technologies et société de l’information, Chiffres clés Analyse, 1999**.