

Summary

A debate has arisen in recent years about whether the business sectors in developed countries are now facing radical changes in the wake of developments within Information and Communication Technology (ICT). There is talk of a second age in the so-called 'ICT revolution', in which not only routine work but also more advanced work involving more cognitive tasks, may be carried out by 'smart' robots. Brynjolfsson and McAfee (2014) argue, for example, that advanced new technologies will soon replace a number of occupations, such as professional drivers, accountants and laboratory technicians.

These rapid technological developments arouse both threats and expectations. Some researchers highlight the risks of exclusion of certain types of labour and predict that income inequality may increase as a result of this. Other researchers emphasise the opportunities that new technologies may give rise to in the form of increased productivity and thereby increased prosperity.

One aim of this report is to provide an overview of the economic research examining how technological change (digitalisation) is impacting the industrial reorganization of the business sector. Another aim is to discuss how an effective, technology-driven industrial reorganization can be achieved in the business sector. These issues will be addressed in part on the basis of existing theory and in part through an empirical analysis of the Swedish business sector.

The theoretical analysis shows that how firms use the new technologies is crucial for a successful, digitally driven industrial reorganization. One success factor has proved to be using digitalisation to develop strategies that effectively solve information and communication problems. For example, car rental companies can reduce their insurance premiums by using sensors

to detect potential abuses in the handling of their rental cars. Another success factor involves using technology to create personalized goods and services, as well as making use of idle private assets. One example of the latter is Uber, which uses privately owned cars in its operations.

Digitalisation also means that the role of firms as intermediaries between sellers and buyers is changing. Many successful firms that have experienced high productivity growth in recent years have made the most of the opportunities provided by digitalisation by functioning as platform operators where buyers and sellers can meet. It is important in this role to take into account the indirect network effects that occur between the various groups, and to serve in the role of both information manager and certifier. One example of this is Airbnb, which uses private homes in its activities. In such markets, the value often increases on one side of the market (e.g. for those renting out their homes) through an increase in the number of actors with desired qualities on the other side of the market. This increases the potential for better matching.

Moreover, digitalisation of the business sector means that the significance of the impact of networks on consumption is becoming increasingly important, which in turn can lead to market failures. For example, there is a risk that firms will jointly adopt less efficient technical standards. Various kinds of collaboration will be important for solving this problem. One example of a successful development of a standards procedure was when trade organisations and government agencies pushed for the GSM standard for mobile telephones in Europe. There is also a risk that firms will try to use their large customer base and strong market position to prevent new firms or start-ups with new innovations and business ideas from entering the market. Measures to ensure fair competition on these innovative markets will be crucial to ensure an effective, digitally driven structural transformation. One well-known example of this involved the measures taken by the European Commission against Microsoft in order to prevent Microsoft from connecting various software programs to its own operative system to reduce competition on the market.

The possibility of small innovative firms being bought-up by large established firms has also proved to be an important driving

force of dynamic and economically efficient entrepreneurship, particularly in network industries.

The empirical analysis examines the impact of digitalisation on occupational, employment, and productivity dynamics in the Swedish business sector during the period 1996–2013.

Productivity growth in the Swedish business sector was consistently strong during the period 1996–2007. During the acute financial crisis of 2008–2009, however, productivity dropped drastically to then recover somewhat during the period 2010–2013. The empirical analysis shows that the impact of digitalisation on productivity differs depending on the type of firm or industry concerned. An increase in the average probability of automation (used as a measurement of digitalisation) for the employees in a firm is associated with increased productivity in firms in the manufacturing sector, but not in the service sector. Firms in the manufacturing sector thus seem to have been successful at making the most of digitalisation to boost productivity. An increase in the average probability of automation for the employees of a firm is associated with increased productivity in firms that have less qualified workers, but to a lesser extent in firms that have a high proportion of employees with a university education. This indicates that automation has until now had an impact primarily on firms that have a larger proportion of less qualified workers.

The empirical analysis also shows that the share of occupations with a high probability of automation has declined in the business sector. This decline has primarily taken place in the manufacturing industry, which indicates that the digitally driven structural transformation has already had a powerful effect on the manufacturing sector.

When examining trends over time in specific occupations, we also see a negative relationship between the probability of automation and changes in the share of people employed. The higher the probability of automation is in any occupation, the worse its employment development has been in terms of the occupation's share of total employment. Furthermore, there are indications of increased job polarisation, with a growing proportion of people employed in low and high wage occupations, combined with a decreasing proportion of people employed in occupations in the mid-wage category.

High wage jobs that have increased in proportion are those that have a low risk of automation, but at the same time a high risk of being moved abroad (offshoring). The low-wage jobs that have increased their proportion of employment are at low risk of offshoring, but are instead at high risk of automation.

Finally, the analysis shows that the estimated probabilities of automation are strongly associated with education levels. The risk of job loss because of automation is almost three times higher for an individual with only compulsory school education than for an individual who has obtained a doctorate degree.

Overall, our analysis has shown that there are features of the digitalisation and automation process that indicate an impact on the demand for labour. Digitalisation may impact many different types of occupations and may act as both a substitute and a complement to these. It appears to reinforce the transmission of certain skills and talents, which means that differences in productivity between various individuals in society can be expected to increase. The value of the right education and further education will thereby become increasingly important for the opportunity to be employed and for good wage development.

How the growth of business sector productivity will be impacted by digitalisation depends on the effectiveness of important institutions in society. High productivity growth in the digital economy requires: (i) effective product market competition to avoid that a small number of dominant firms in network-intensive industries generate the majority of the profits; (ii) the ability of the labour market to adapt to changes in demand for various occupational skills; (iii) well designed contract law, tax law and ownership regulations to ensure that the business opportunities offered by digitalisation can be realised; and (iv) that regulations are developed to achieve an internet that is reliable and protects privacy. Well-functioning institutions will ensure the growth of aggregate productivity, both by enabling individual firms to increase their productivity and by allowing less productive firms and occupations to be replaced by other, more productive, alternatives.