



DIGITALISATION AND PRODUCTIVITY IN THE FINANCIAL SECTOR

MATTI POHJOLA
AALTO UNIVERSITY SCHOOL OF BUSINESS



FK | Finanssialan Keskusliitto



Työsuojelurahasto
Arbetskyddsfonden
The Finnish Work Environment Fund



DIGITALISATION AND PRODUCTIVITY IN THE FINANCIAL SECTOR

SUMMARY

Digitalisation and globalisation have permanently changed the financial sector and its operating environment. The physically intangible nature of financial services means they can be digitised and produced also by other providers besides banks and insurance companies. Payment services, for example, are already provided by online stores and social networking services. Three billion people use the Internet, two billion have mobile phones, and one and a half billion are on Facebook.

Digital services platforms, or “ecosystems”, are in a positive feedback loop of growth. They attract innovative Internet companies, who create supply and specialise in customer data analysis, which in turn attracts and engages new customers – digital natives in particular. Over 90% of Finns aged 25 or less use one or more social networking services.

Therefore, the most successful companies of the future will be those able to combine people, digital platforms, efficient working methods and global business, while responding to customer needs. Every company aiming for growth needs a digital strategy.

Banks and insurance companies can thrive in competition by increasing their productivity through digital technology. Successfully doing so maintains productivity and jobs and improves work well-being. While productivity in the finance and insurance business is notably higher than the national economy average, it grows slowly. The best way to speed up the growth is to develop new products and improve operating models.

Financial companies have three main ways to succeed in the competition. First way is to continuously develop services. Development does not have to depend on ground-breaking innovations, because great ideas are often born while solving smaller problems. Incremental development is typical for small Internet companies that are just starting out, but can also be a less risky way for banks and insurance companies to reach the forefront of digital and mobile services.

The second way is to develop the skills, knowledge and working methods of employees. This will add further service value to customers beyond that which comes from digital services alone. The importance of expertise and trust – the traditional competitive advantages of the financial sector – will become even more pronounced in the future, as digital services increase the amount of data available. This data has to be refined into confidential information that has value for the customer. The challenge lies in finding the right methods to combine expertise with digital channels, when expertise is available only at fixed times and digital channels are open all the time. There is a clear need for flexible hours and telework, and the issue is equally relevant to managers as well as employees.

The third way is to create a corporate culture that ensures that customer expectations for digital services are met. Everything that can be digitised has to be digitised. This will require investments not only in information technology, but also in leadership, incentive and reward systems. As a strategic task, the responsibility falls on the company's board of directors.

Matti Pohjola

Aalto University School of Business

GLOBALISATION AND DIGITALISATION AS ECONOMIC FORCES OF CHANGE

At the turn of the 20th century, nationalism and industrialism paved Finland's path to economic success. The recipe was simple: wood was ground and pulped into paper, and ores were refined into metals using electricity. As added value improved, so did productivity, wages, and the standard of living.

Industrial sectors – forestry and metalworking in particular – were at the spearhead of development. Economic policies prioritised the competitiveness of industrial exporting sectors. Service sectors, which relied on domestic demand, had to adapt to the framework set by the growing exports sector.

Today, we live in a different world. Globalisation and digitalisation are the new forces of change. Growth is driven by information intensive service sectors – those that use digital technology to reform their products and operations. They include trade, information and communications, financing and insurance, as well as other business services. Information and communications is the fastest growing sector and new strength of the Finnish economy. In terms of value added, it is already twice the size of forestry and two thirds of the size of the metal industry.

The new forces of change have been brought about by the fast development of information and communication technologies (ICT). Digitisation – rendering information such as numbers, words, images and audio in binary strings of ones and zeros, also known as bits – means that it is now possible to transfer information at the speed of light between locations through the Internet.

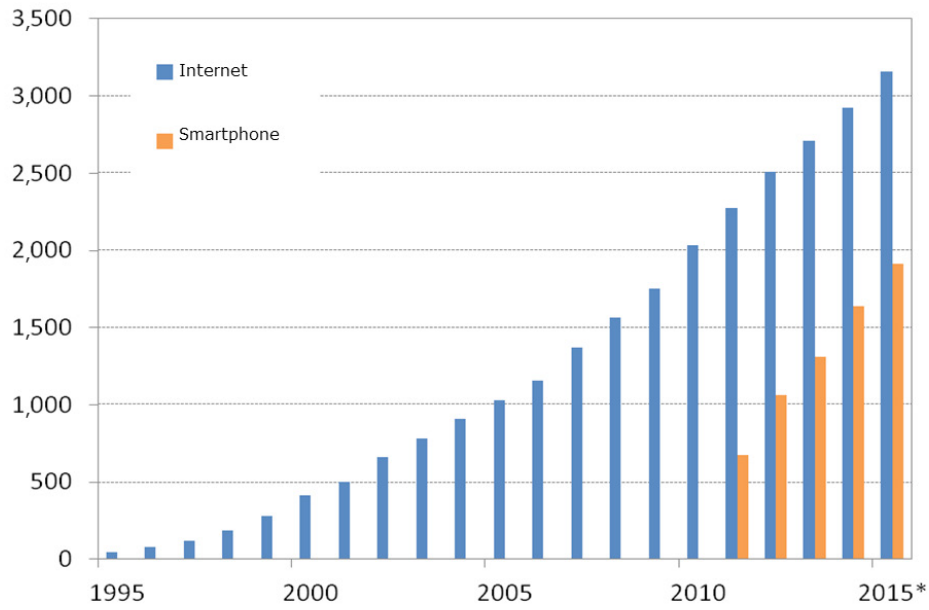
Although the Internet was not commercialised until mid-1990s, it is already regularly used by three billion people (figure 1), of which nearly two billion have smartphones. With the development of sensor technology, devices and machines, such as cars, can become networked and form an Industrial Internet – commonly referred to as the Internet of Things. According to different estimates, 15–50 billion devices will have been connected to the Internet by the year 2020. The Internet is, indeed, the largest infrastructure ever built by humans, and among other things functions as the first genuinely global marketplace. It enables the trade of goods, services and labour, as well as the coordination of the internal and external operating processes of companies. In this way it changes the nature of information intensive work and companies' operating models.

The fast development of information technology has resulted in the biggest decrease in prices in the history of economics – bigger than the one brought about by the development of electricity. The performance of microprocessors (the "brains" of computers and digital telecommunication equipment) has, on average, doubled every 18 months, and the cost of processing power has thus halved in the same amount of time. Purchasing the processing power of an iPad 2 (about 1.6 billion calculations per second) on Commodore 64 home computers some decades ago would have cost 4 million dollars in current money; for IBM 360 computers, as much as 4 billion (figure 2).

Information technology is so inexpensive that it is available to almost everyone. Modern tablet computers reach the same levels of performance as the super computers that cost millions some 10–15 years ago. Artificial intelligence has become a part of our everyday lives: computers and robots can now speak and understand spoken language, make medical diagnoses, win quiz contests, drive cars, and imitate many other such actions that have used to require human intelligence. In theory, current super computers have four times the calculating power and ten times the memory capacity of the human brain. Over the next two years, the world's calculating power will grow more than it ever has in the entire history of civilization. All the information that can be digitised will be digitised.

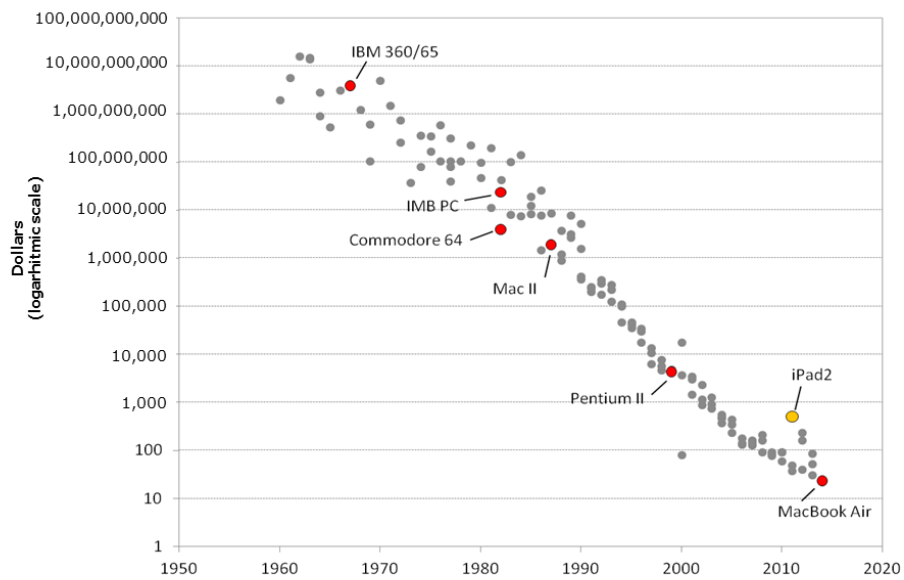
Many researchers consider digitalisation and the Internet to have had more impact on technological development than anything since James Watt's steam engine, which spawned the industrial revolution (Brynjolfsson and McAfee 2014; Pohjola 2014).

Figure 1. Internet and smartphone users in the world (million persons, * = forecast)



Sources: <http://www.internetlivestats.com/internet-users/> ;
<http://www.emarketer.com/>

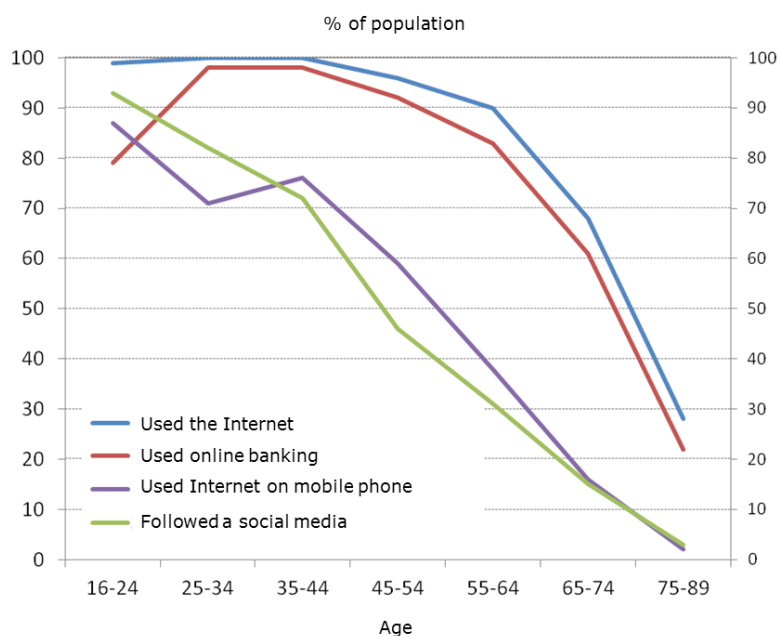
Figure 2. Cost of iPad 2 equivalent performance power of computers



Source: <http://www.frc.ri.cmu.edu/~hpm/book97/ch3/processor.list.txt>

Internet services have become an integral part of daily lives at home and at work. Nearly all young and middle-aged Finns use the Internet and online banking (figure 3). In the use of mobile phone internet and social media, the same applies only to the youngest age group. As these digital natives grow older and the prices of services continue to drop, the situation will soon change.

Figure 3. Previous 3 months' Internet use among different age groups in Finland, 2014



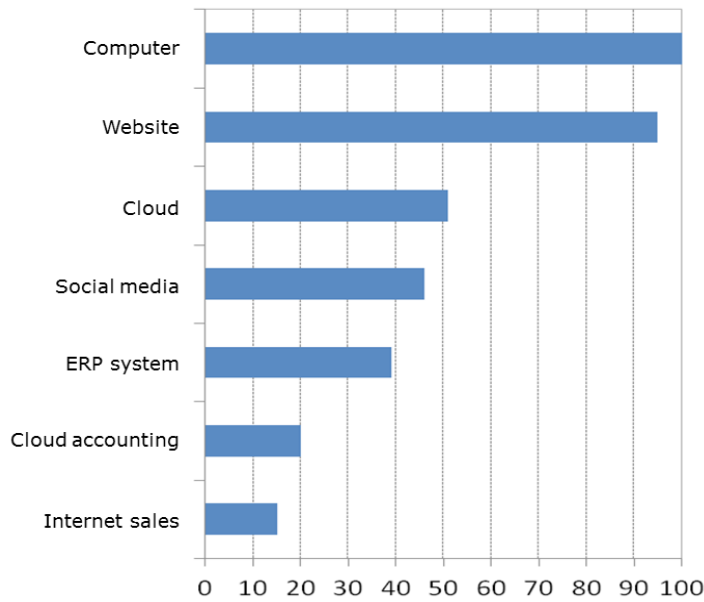
Source: Statistics Finland, Use of information and communications technology by individuals

All Finnish companies with more than ten employees have a computer, and nearly all have a website (figure 4). About half of Finnish companies utilise cloud services and social media. Enterprise resource planning systems (ERP), cloud accounting, and Internet sales are more rare, but are quickly becoming more common. Finland has scored as one of the top countries in EU comparison based on every indicator that Eurostat (2013) uses to measure companies' use of information technologies. According to the competitiveness analysis recently published by the World Economic Forum (2014), Finland has the best digital resources in the EU, followed by Sweden in the second place.

ICT use can also be examined by looking at the investments made by companies and public sector entities. Computers, telecom equipment and software are productive capital assets, which companies and organisations can accumulate in order to boost their production potential. As prices fall, ICT capital is used to replace other machines and devices as well as structures.

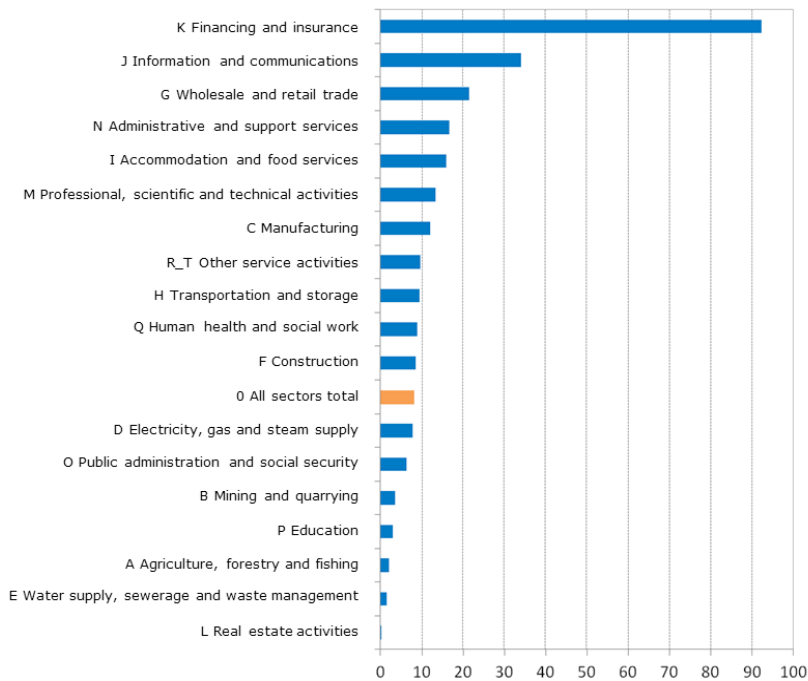
Because ICT is so cheap compared to machinery, equipment and buildings, ICT investments comprise less than ten percent of all investments (incl. residential buildings) (figure 5). The differences between the main sectors of the national economy are notable, however. Financing and insurance is by far the most ICT intensive sector, in which practically all investments have been in information and communications technology. Other sectors that invest in ICT more than average are information and communications, and the trade sector.

Figure 4. Use of ICT in Finnish companies with at least 10 employees in 2014, % of all companies.



Source: Statistics Finland, Use of information technology in enterprises

Figure 5. Proportion of ICT investments in each sector in 1998-2013,



Source: Statistics Finland, National accounts

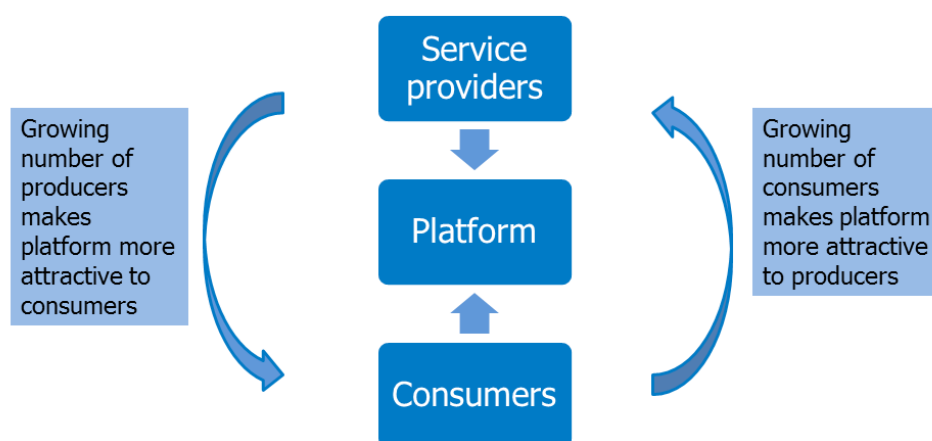
Digitalisation has not only changed daily life at home and at work, but also has an unprecedented impact on the structures of the economy. Technological progress will continue to make digital products even more significant for the productivity, consumption and wealth of the national economy. Computer programs and games, phone calls, music, movies and other media, electronic books and databases, many financing services, and digital TV programs are examples of such products. Their value is not reliant on their physical form.

Digital products – computer software, for example – are fundamentally different from traditional, physical products. Once a program has been created, it can be copied practically without limitations on capacity. In a digital economy, production is replication. It is theoretically possible for a single producer to fill the entire global demand: in these markets, the winner can take it all.

On the other hand, the prospect of immense profits attracts dozens upon dozens of new entrepreneurs, which depresses profits. It is not possible to attain a large market share only with technological prowess, because technology is within everyone’s grasp. Success is therefore also based on other factors, such as business competence and market control.

Internet-based business is a two-sided market in which the providers and consumers of services meet through different platforms (figure 6)¹. These platforms include, for example, smartphone operating systems (Android, iOS, Windows), online stores (Amazon, Alibaba, eBay), and social media services (Facebook, Google+, Instagram). Credit cards are an example of pre-Internet platforms that connect customers and sellers.²

Figure 6. Positive growth cycle of digital service platforms.



In addition to having digital platforms, these markets are characterised by their interesting positive externality: the benefits received by each consumer increase with the number of producers, and the benefits received by each producer increase with the number of consumers. Thus, for example, when payment services are linked with online stores (like PayPal with eBay), the size of the market also grows. As a result, both parties are willing to pay more to a large platform than to join a small platform. Due to economies of scale, the value of the platform grows faster than the number of participants, and markets become focused on few, competing platforms, also called “digital ecosystems”. It is also possible for a single, winning platform to take over an entire market

1 See e.g. Eisenman, Parker & Van Alstyne (2006).

2 The first credit card company Diners Club began its operations in New York in 1950.

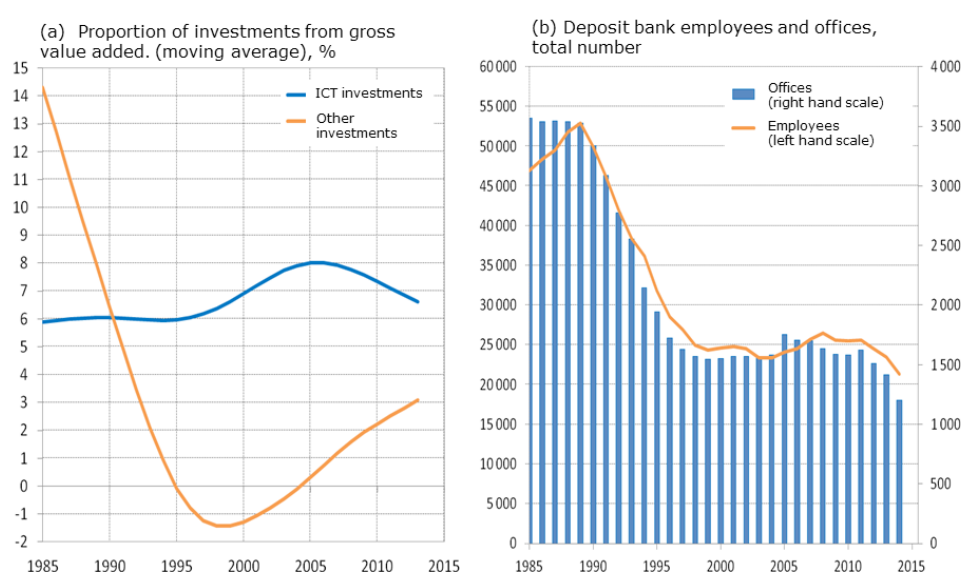
Pricing is rather simple in ordinary, one-sided markets: the price is set higher above the marginal costs of production according to how inflexible demand is. Customers willing to pay are thus charged higher prices. In a two-sided market, pricing is more complicated because profit and expenses are formed on both sides of the market. If the consumers are more price-sensitive than the producers, it may even be profitable to offer free access to the platform – growing consumer volume attracts more service providers into the market, and the profits collected from them may surpass the losses from the lowered customer prices. As digital products can be copied almost without cost, their free distribution does not generate significant additional expenses.

Another special characteristic of these platforms is the disappearance of business sectors. Bits do not recognise the borders between sectors; or any borders, in fact. In principle it is possible to offer and consume basically any kinds of digital services through the platforms. Some social media services (e.g. Facebook) already offer financing services. The blurring of sector borders is already evident in Finland, as well, in that one retail chain already provides banking services while a financial sector company, in turn, provides health care services. In a digital economy, the sectors of an industrial economy will be replaced by platforms. The financial sector, too, is here face-to-face with one of its history's major challenges.

DIGITAL REVOLUTION IN THE FINANCIAL SECTOR

The physically intangible nature of financing and insurance services means they can be completely digitised with ICT. In fact, the sector has already been adapting to the technological progress, replacing offices as well as employees with digital technology. The value added proportion of ICT investments has exceeded the proportion of other investments since the early 1990s, and is even now double in proportion (figure 7a)³. Change was particularly swift in the 1990s, when deposit banks halved the number of their employees and offices in response to the switch towards e-services (figure 7b). In recent years, the numbers have taken another dip.

Figure 7. Financial sector investments, deposit bank employees and deposit bank offices.

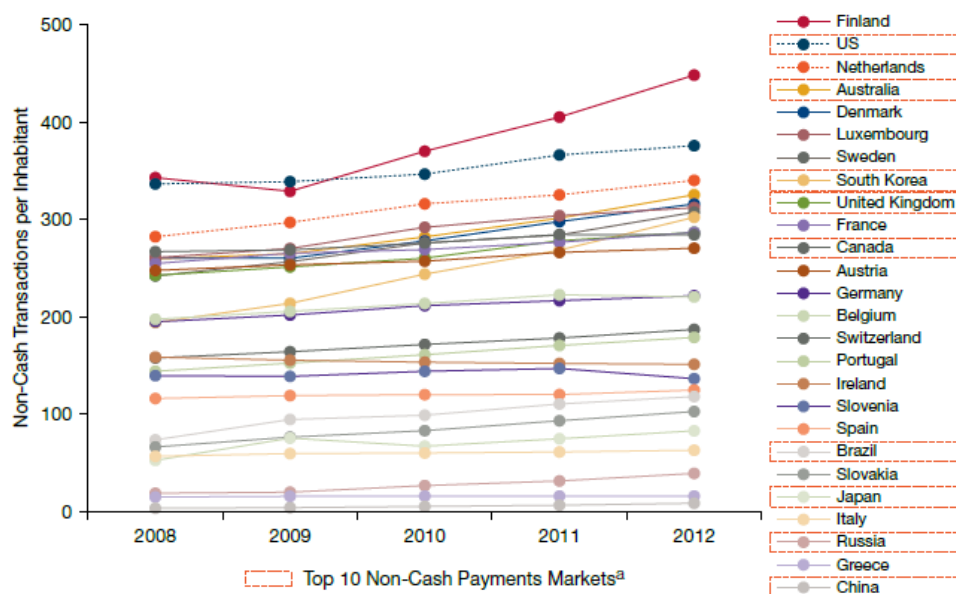


Source: Statistics Finland and the Federation of Finnish Financial Services

Invoice payments are a convenient way to examine the digital revolution of the financial sector, because they dominate the banking activities of the average citizen. Finns have switched to non-cash payment methods at a clearly faster rate than the rest of the world (figure 8). The readiness to adopt new models and platforms presents opportunities for customers but is a threat from the banks' viewpoint: many of these new payment methods can be provided by other entities besides traditional banks. They are related to the growth of e-commerce and mobile payments resulting from the increasing popularity of smartphones and tablets (figure 9). In the past decade, the global volume of online store payments has grown at an annual rate of 15 percent, and mobile phone payments at a staggering rate of 60 percent. About 15 percent of mobile payments have been transmitted by entities other than banks. (Capgemini 2014)

³ In recent years, the proportion of ICT investments has been on the decline, likely due to outsourcing.

Figure 8. Use of non-cash payment methods (transactions per inhabitant per year)

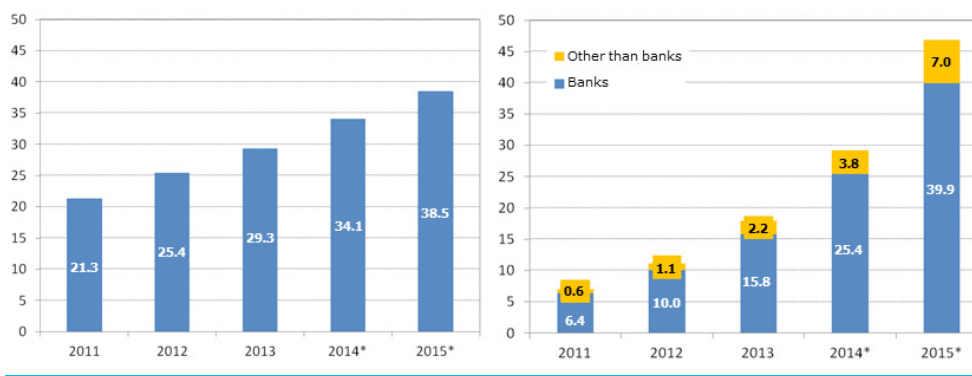


Source: Capgemini (2014, p. 10)

Figure 9. Global development of new payment methods (billion payments per year, * = forecast)

(a) Online store payments

(b) Mobile payments



Source: Capgemini (2014)

Market players who have entered the field from outside of the financial sector have, for now, focused on the development of easily automated payment services. Payments are part of the value chain of the digital platform (online store or social media service), which means that the integration of payment services will increase turnover and improve customer satisfaction (Dapp 2014).

The volume of mobile payments can be expected to skyrocket due to smartphones becoming more widely available. This is increasing the number of Internet users especially in developing countries, which have under-developed traditional banking and payments systems. At the same time, the e-commerce and social media markets are growing, and the positive growth cycle of digital platforms is speeding up. This forms an incentive for the continued development of new innovations in payments and financing. Such innovations are mainly made by Internet companies, not by traditional banks (Dapp 2014).

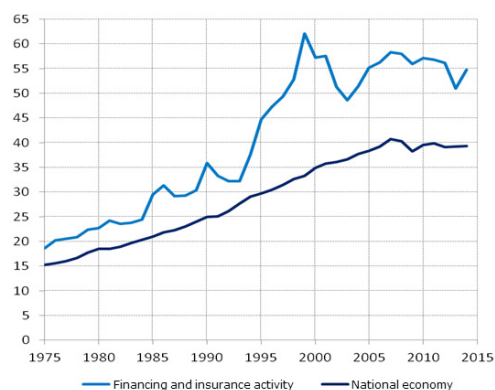
The positive growth cycle of digital platforms presents a challenge for banking and insurance companies with traditional operating models. The digital market mercilessly discards companies it does not need, which is evident from the diminishing numbers of record stores, travel agencies and local bank offices. While the necessity of financial services will hold fast, banks and insurance companies are not necessarily indispensable (Walker 2014).

The financial market's role in the national economy is to intermediate financing from surplus to deficit economic participants. This immaterial process can be completely digitised and in theory managed by other entities besides banks. The crowdfunding of start-up companies is one example of financing mediated via the Internet. Its volumes have been relatively small for now, but are swiftly growing.⁴ As yet, strong market confidence and regulation work to the benefit of banks. New participants have nevertheless made innovations, which especially the heavy users of digital technology value highly. These innovations are based on the utilisation of information acquired through the Internet, and on the personalisation of services. Because all customers will be digital natives in the future, not only banks but also the entire financial sector must develop their operating models with new technology. The key to success is in increasing productivity.

4 The Ministry of Finance (2014) estimated the market was €2 million in Finland and \$3 billion in the US in 2013.

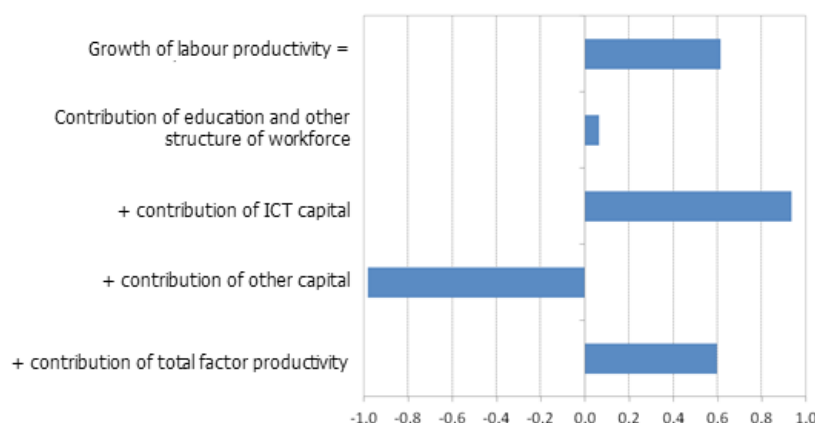
Productivity in the financing and insurance business is notably higher than the national economy average (figure 11). It grew quickly in the 1990s with the sharp decrease in labour input, but has remained level for the last ten years. The sector is troubled by the same issue as the rest of the national economy: labour productivity development has come to a standstill.⁶

Figure 11. Labour productivity (fixed-price gross value added per hour worked) in 1975-2014.



Source: Statistics Finland, National accounts

Figure 12. Average annual growth (%) of labour productivity in financing and insurance activities and contributions of productivity sources (% points) 1998-2014



Source: Statistics Finland, Productivity surveys

We must examine the sources of productivity to find out why. First of these sources is education; investments in intellectual capital. Higher competence means higher quality of labour. Labour productivity of financing and insurance activities grew at an annual average rate of 0.6 percent during 1998–2014. Approximately 0.1 percentage points of this growth was the result of structural changes in the work force (figure 12), referring to education, age and gender.⁷ The small size of the contribution is explained by the fact that financial sector employees are already highly educated. In the total payroll, the proportion of employees with higher education degrees was about three

6 Sweden has fared much better than Finland in terms of productivity from the perspectives of both the national economy as well as financing and insurance services (Homström, Korkman & Pohjola 2014).

7 For example, if educated workforce has a higher income level than uneducated workforce, the growth contribution of education is either the result of workforce moving to better paying jobs through education, or the result of the salary increase brought by education growing larger. Salary is considered to represent marginal productivity, i.e. how much increasing workforce increases production.

quarters in 2010, whereas the national proportion is only fifty percent. Education's biggest impact on productivity was already planted in past decades.

Another source of productivity growth are investments in physical capital: machinery, devices and physical structures or buildings. The higher the amount and quality of equipment in use, the larger the output. Because capital stock consists of several capital goods, the structure of capital is also relevant: if more investments are made in high-return capital, the capital contributes more to the increase of labour productivity. Thus replacing offices with e-services raises the productivity of banking activities, as customer relationships move online. During the observation period, ICT capital increased labour productivity at an annual rate of one percentage point, but the negative influence of other capital cancelled out this increase. The total result was slightly negative.

Technology is the third source of productivity. It includes the knowledge of how the factors of production at hand (labour and capital) can be utilised to increase value added. Technology is realised either as new products or as new methods of producing already existing products. The contribution of technology cannot be estimated directly; it has to be calculated indirectly as a residual by deducting the contributions of education and capital from the measured growth of value added.⁸ Interpreting the factor known as total factor productivity therefore calls for caution, because as a residual term it captures the impact of other factors besides technology (e.g. usage rate of production capacity).

According to figure 12, labour productivity of the financial sector has increased almost entirely as a contribution of total factor productivity. The means of increasing productivity can therefore be found from among the factors that create new products and operating models.

8 This growth accounting can be presented in the following way for a case with one labour input and one capital input. Let ΔY , ΔH and ΔK be the detected changes in production, hours of work, and size of capital, and w be real wage, and r be the measure of the marginal productivity of capital. Then $\Delta Y = w\Delta H + r\Delta K + R$, in which R denotes the impact of other factors than input (e.g. technology) on the growth of production. R is computed as residual $R = \Delta Y - w\Delta H - r\Delta K$. The effects on the growth rate of productivity Y/H can be computed by deducting the growth rate of hours worked from the growth rate of production: $\Delta Y/Y - \Delta H/H$. See Pohjola (2014) for further details.

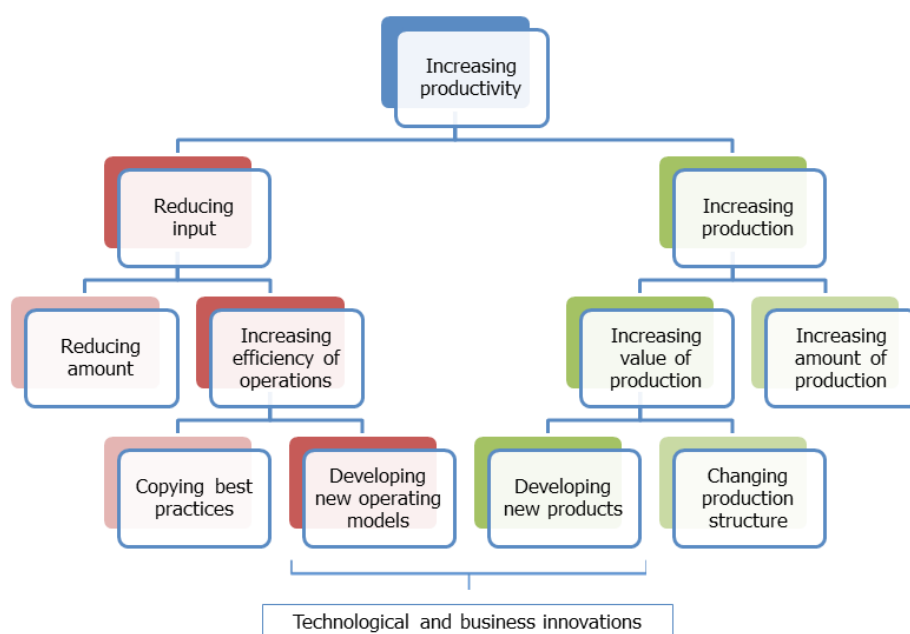
INCREASING PRODUCTIVITY

The profitability of a company is linked to its costs and pricing, but it is also affected by the productivity of a given input: the higher the quantity and quality of its output, the higher the value added (gross margin on sales) is, and the higher wages the company can afford. The market prices of products and inputs can rarely be influenced by the company itself, which leaves productivity as the only way to increase profitability. The positive side of this is that productivity is entirely left for the company to decide. It is not commanded by anyone from the outside.

Productivity is also an important factor for the welfare of the society. Social welfare does not conflict with company profitability when labour productivity is high: companies can pay good wages to their employees, and yet keep their profitability.

Figure 13 summarises the means by which companies can improve their productivity. As productivity is the ratio of production to input, there are two alternatives: decreasing input or increasing production. They are shown in red and green in the figure.

Figure 13. Ways to increase productivity



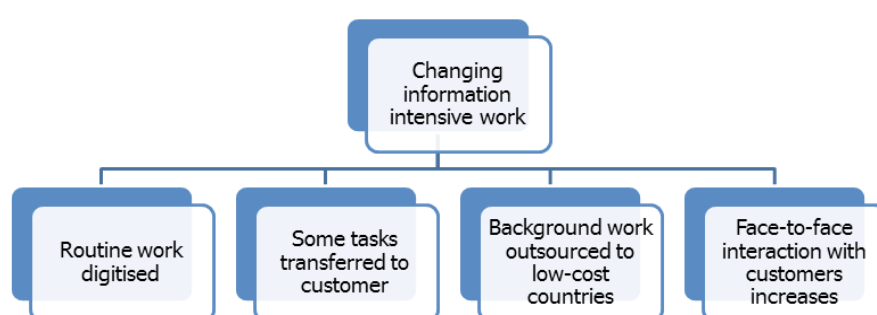
If the company operates in a declining market, in which demand is inelastic in terms of price, it must choose the direction of decreased input. It can then raise productivity either through direct cuts on input – for example, decreasing the number of hours worked – or by improving the effectiveness of the input by implementing new operating models. These can be copied from other market participants or developed at the company.

For a company operating in a market with growing demand, the alternative of increasing production is better. It can be undertaken by raising either the volume or value of production. The latter option can then involve either changes to the production structure – switching from low-margin products to high-margin products – or the development of entirely new products. As new products fill new needs, the market is, in principle, as limitless as the demand.

Operations and new products can be developed by adopting new technologies and new business models. As presented in the previous sections, digital technology works as a source of innovations in all information intensive work; financial sector included.

Digital technology automates information intensive work along the same principles as electricity automated industrial work in its time. As ICT can be applied anywhere, operations can also be reformed anywhere: at home, in companies and public sector entities, as well as in the manufacturing industry and service sectors. All routine work, such as the payment of invoices, is digitalised and handed over to terminals. Part of the labour is outsourced to customers, who use their personal devices to carry out the tasks. This course of action has already been implemented in the financial sector for years. Because the use of digital services is not tied to their place of production, background work can be moved to low-wage countries or countries with flexible terms of employment. Services based on face-to-face meetings and interaction with customers are, in turn, growing in volume (figure 14).

Figure 14. Changing information intensive work



Source: Matti Lehti

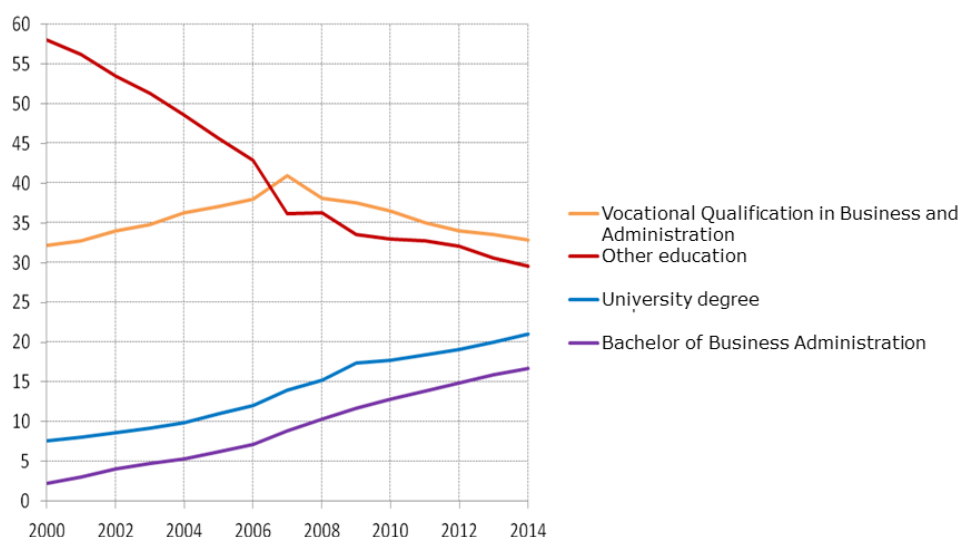
The change in information intensive work arises from the new division of labour between humans and computers. The impact of digitalisation and robotics on professions and tasks has been studied by categorising them according to two factors: how routine and how manual the tasks are (figure 15). Rule-based, routine work can be coded and is therefore easy to automate. A new development is that this no longer only applies to manual work, but also to non-manual, cognitive tasks, such as office work. Non-routine work – both manual and cognitive – is more difficult to automate.

Labour market polarisation refers to this specific phenomenon. Medium-wage jobs and tasks that require secondary education will disappear with the automation of information intensive work. The change will have much less impact on low-educated manual work, and cognitive tasks requiring higher education will instead increase in number. This hypothesis is supported by a number of empirical studies, which show that the wage bill share of middle-educated employees has shrunk in many industrialised countries (Michaels, Natraj and Van Reenen 2014). For Finland, the evidence is not very strong yet.

Figure 15. Impact of ICT on tasks

Task type		Examples	Amount of work after ICT's impact	Level of education
Routine	Manual	Factory work	Decreasing	Lower and middle
	Non-manual	Traditional office work	Decreasing	Middle
Non-routine	Manual	Cleaning, security, transportation	No notable effect, expected to decrease in future	Lower
	Non-manual	Management, analysis, teaching, creative work	Increasing	Higher

Figure 16. Educational structure of financial sector employees (percentages of degrees)



Source: Federation of Finnish Financial Services

The educational structure of the financial sector has changed at a fast rate, with higher-level (BBA and university) degrees increasing, and middle-level (vocational) qualifications and other education decreasing in proportion (figure 16). For now, this is likely the result of changing age structure and rising overall levels of education rather than digitalisation, however. The effects of digitalisation as described in the previous section remain yet to be seen.

Some researchers have taken the forecast further than in figure 15, and also believe that non-routine manual work can be automated. The development of artificial intelligence and mobile robotics is so fast, that according to Frey and Osborne (2013) as much as 47 percent of the United States workforce is in tasks that can, at the likelihood of 70 percent, be fully automated within 10 to 20 years.⁹ Finland's corresponding estimate is 36 percent (Pajarinen and Rouvinen 2014).

Tasks requiring creativity, social interaction, human senses and fine motoric skills will only increase, as will tasks that involve the motivation or teaching of others. People should focus on tasks in which they have the advantage over robots. Robots may be good at solving problems, but are unable to

⁹ Financial sector tasks that rated the highest likelihood – 98 percent – included tellers, loan officers, insurance appraisers (auto damage) and credit analysts.

choose which problems to solve. The ideas need to come from humans. There will thus be growing demand for new entrepreneurship that combines the best sides of both humans and machines. There is also high demand for tasks that complement cheap computers and the excessive flow of information. The new growth of productivity is based on the digital union of intellectual capital and ICT (Brynjolfsson and McAfee 2014).¹⁰

As digital and mobile technology develops, all financial services will eventually be moved online to digital platforms, which can be owned either by financial or non-financial sector companies. Total digitalisation of business operations means all service channels are fused into one seamless structure. Routine tasks – such as invoice payment and insurance payouts – will disappear completely as a result of digitalisation. The reduced amount of work will increase labour productivity (figure 14).

The expert services that are currently only available at physical offices will move to digital channels, where they are provided by phone or in an online chat. Combining expertise from the fields of ICT and financial services brings value added, which generates productivity benefit. The volume of information will grow with digitalisation, but investment, financing and insurance handling decisions require that this information be transformed into knowledge. In that area, expertise still beats computers, and the demand for this kind of expertise is growing (figure 15). For the productivity benefit to realise, three things are necessary: broad knowledge and understanding of products (investing, financing, and insurance), sales competence, and more flexible working hours. The demand for expertise grows because raw information can always be digitally copied to anyone who needs or asks for it. The need for flexible working hours grows because digital channels are open 24/7 all year round.

Banks and insurance companies can use their customer expertise to their advantage in the competition with the digital platforms owned by Internet companies. On the other hand, Internet companies are innovative and able to utilise the customer data they collect from their service users. To maintain their competitive position, financial sector participants must therefore make use of all the opportunities digitalisation offers.

Digital technology will not cause any change by itself – ultimately, its productivity benefits arise from how the technology is applied. Although ICT equipment, programs and services may not be expensive, the development of new products and operating models is costly. Companies must invest in competent employees. According to some estimates, the costs of complementary investments may be ten-fold the size of ICT expenses. The risk of failure is also great; it is therefore vital for every company to form a digital strategy.

MIT professor Erik Brynjolfsson (2005) has pinpointed the seven characteristics of successful ICT use in companies:

- 1) Analogue processes must be replaced with digital processes. The IT system should be the core infrastructure of the company.
- 2) Information must be shared. Information processing comprises 70 percent of the work done in major companies.
- 3) Employees must be given more decision rights. Information will only bring added value to the company if it is used in decisions. It does not have power if the ones who possess and use it have no power to make decisions.
- 4) Incentive systems must value accomplishments. Employees should be rewarded when they use information and make decisions. Otherwise the company will suffocate under a flood of information.
- 5) The corporate culture must be invested in. Promoting cooperation between employees is as important as technology.

¹⁰ The use ICT and employee communication networks have been found to have strong complementary effect on each other as factors for increasing productivity in recruitment service provision (Aral, Brynjolfsson and Van Alstyne 2009).

- 6) The right people must be recruited. The productivity benefit of technology is higher according to how competent its users are.
- 7) Intellectual capital must be invested in. Fulfilling these practices requires continuous training within the company.

Brynjolfsson estimates that although most companies make successful investments in ICT, only twenty percent invest in all the other six points of the list. The productivity boost will only work if all these practices are carried out. Changing one factor at a time may even impair the overall situation, because it will eat up the changing costs without giving back any benefits.

Case example of the effects of a new operating model: telework

Telework is work carried out outside of the premises provided by the employer. A recent scientific study made on the productivity effects of telework divided the study participants randomly into two groups: half teleworked from home, and half formed a control group who worked at the premises of the same employer. The target group to undertake the nine-month study consisted of 250 volunteers from the Shanghai call centre of a Chinese travel agency. (Bloom, Liang, Roberts and Ying 2015)

The productivity boost turned out to be larger than expected: in terms of calls received, labour productivity increased by 13 percent. Increase in efficient working time comprised 9 percentage points of this growth, and 4 percentage points were ascribed to a larger number of calls per time unit. After the study ended, the company decided to make telework a permanent practice, and all its employees (not only the study participants) were given the choice of their preferred working method. After this voluntary selection, the productivity boost rose up to 22 percent.

Employee turnover also decreased by half, which is evidence of improved work well-being. Weaker career opportunities were a negative aspect of telework according to the experiences reported by the study participants.

CONCLUSIONS

Digitalisation and globalisation have permanently changed the financial sector and its operating environment. Financial services are already provided in digital platforms, which have evolved outside of the sector itself. As of yet, these services mostly consist of relatively simple services, such as payments. However, growing digital platforms attract service developers from among innovative Internet companies, who specialise in the analysis of customer data. This in turn will attract and bind consumers as customers to these platforms. The most successful companies of the future will hence be those able to combine people, digital platforms, efficient working methods and global business, while responding to the needs of the digital native customer. Every company aiming for growth therefore needs a digital strategy.

The financial sector appears to be holding fast to the belief that regulation and customer confidence will protect it from external competition (Dapp 2014). However, computers have been designed for the very purpose of automating rule and algorithm-based processes. Financial services and their regulation are exactly such processes, and can therefore be digitised. For now, confidence seems to work to the benefit of the sector, because people have clearly more trust in bankers than in the Internet.

Financial companies have three ways to succeed in the competition.¹¹ First way is to continuously develop services. Development does not have to depend on ground-breaking innovations, because great ideas are often born while solving smaller problems. The problem is that incremental innovations are usually not appreciated. Only massive breakthroughs are taken for innovation, whereas in reality innovation can very well be a continuum of smaller ideas and quick experiments. Incremental development is typical for small internet companies that are just starting out, but can also be a less risky way for larger organisations to reach the forefront of digital and mobile service development.¹²

Another strategy is to develop employee competence and operating models. This will add further service value to customers beyond that which comes from digital services alone. Expertise and confidence are the traditional competitive advantages of the financial sector. Their importance will become even more pronounced in the future, as digital services increase the amount of available data. This data has to be refined into confidential information that has value for the customer. The challenge lies in finding the right methods to combine expertise with digital channels, when expertise is available only at fixed times and digital channels are open all the time. There is the need for flexible working hours and telework.

The third way is to create a corporate culture that ensures that customer expectations for digital services are met. Everything that can be digitised has to be digitised. This will require investments not only in information technology, but also in leadership, incentive and reward systems. As a strategic task, the responsibility falls on the company's board of directors.

These procedures will help the sector attain new growth in total productivity. This growth can maintain productivity and jobs, and improve overall work well-being.

11 See also Nenecker, Gulati and Niederkorn (2014).

12 Holmström, Korkman and Pohjola (2014) examine the topic from the general perspective of the entire national economy.

References

- Aral, S., Brynjolfsson, E. and Van Alstyne, M. (2009), "Information, Technology, and Information Worker Productivity", *Information Systems Research* 23, 849–867.
- Bloom, N., Liang, J., Roberts, J. and Ying, Z. J. (2015), "Does working from home work? Evidence from a Chinese experiment", *Quarterly Journal of Economics* (currently in print).
- Brynjolfsson, E. (2005), "VII Pillars of Productivity", *Optimize*, May 2005, Issue 22.
- Brynjolfsson, E. and McAfee, A. (2014), *The Second Machine Age*, W.W. Norton & Company, New York.
- Capgemini (2014), *World Payments Report 2014*, <https://www.worldpaymentsreport.com/>
- Dapp, T. F. (2014), *Fintech – The digital (r)evolution in the financial sector: Algorithm-based banking with the human touch*, Deutsche Bank Research,
- [https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000345837/Fintech+%E2%80%93+The+digital+\(r\)evolution+in+the+financia.PDF](https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000345837/Fintech+%E2%80%93+The+digital+(r)evolution+in+the+financia.PDF)
- Holmström, B., Korkman, S. and Pohjola, M. (2014), *Suomen talouskriisin luonne ja kasvun edellytykset*, memo to the Economic Council, <http://vnk.fi/hankkeet/talousneuvosto/julkaisut/holmstrom-korkman-pohjola-25022014/fi.pdf>.
- Nenecker, O., Gulati, S. and Niederkorn, M. (2014), "The digital battle that the banks must win", McKinsey&Company, Insights & Publications, http://www.mckinsey.com/insights/financial_services/the_digital_battle_that_banks_must_win
- Eurostat (2013), "ICT usage in enterprises 2012", *Statistics in Focus* 6/2013.
- Frey, C. B. and Osborne, M. A. (2013), "The Future of Employment: How Susceptible Are Jobs to Computerization", unpublished article, http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
- Eisenman, T., Parker, G. and Van Alstyne, M.W. (2006), "Strategies for Two-sided Markets", *Harvard Business Review* 84:10, 92–101.
- Michaels, G., Natraj, A. and Van Reenen, J. (2014), "Has ICT Polarized Skill Demand? Evidence from Eleven Countries over Twenty-five Years", *The Review of Economics and Statistics* 96, 60–77.
- Pajarinen, M. and Rouvinen, P. (2014), "Computerization Threatens One Third of Finnish Employment" ETLA Briefs 22, <http://pub.etla.fi/ETLA-Muistio-Brief-22.pdf>
- Pohjola, M. (2014), *Suomi uuteen nousuun: ICT ja digitalisaatio tuottavuuden ja talouskasvun lähteinä*, Finnish Technology Industries.
- http://teknologiateollisuus.fi/sites/default/files/file_attachments/pohjolan_raportti_suomi_uuteen_nousuun.pdf
- The Ministry of Finance (2014), *Report on Crowdfunding Survey*, http://www.2014.vm.fi/vm/en/04_publications_and_documents/01_publications/07_financial_market/20140313Report/name.jsp
- Walker, A. (2014), "Banking without banks: Exploring the disruptive effects of converging technologies that will shape the future of banking", *Journal of Securities Operations and Custody* 7, 69–80.
- World Economic Forum (2014), *The Europe 2020 Competitiveness Report: Building a More Competitive Europe*, Geneva, http://www3.weforum.org/docs/CSI/2012/Europe2020_Competitiveness_Report_2012.pdf.