

The Future of Work in Europe

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It is indeed a great honour for me to deliver the Tommaso Padoa-Schioppa lecture at this year's Brussels Economic Forum. When I think of the greatness that was Tommaso and I see the list of the distinguished previous speakers I get my "why me" moment? I never really got to know Tommaso at a personal level, since when he was busily sorting out Italy's economic woes or building up Europe's monetary union with a grand vision of the future, I was locked up in my cubbyhole at LSE trying to understand unemployment and the plight of those without work. But I once attended a conference in Italy where the formidable Franco Modigliani was the star attraction and I remember him well arguing with the organisers that he had only agreed to come when he was told that Tommaso Padoa-Schioppa was going to be present, and yet he wasn't! This man must be great, I thought; and indeed he was. Tommaso is one of those great Europeans in a line that goes back to Robert Schuman and his contemporaries, which incidentally included Winston Churchill who in 1946 called for a United States of Europe, and we owe to him the big drive that led to the establishment of the euro and the European Central Bank. His concern was to cut the knot of the "inconsistent quartet" with a common monetary policy and despite the initial teething problems that we are all aware of – and us Greeks more than any other, I guess – I think we got there.

For today's presentation I take my lead from last year's presentation from President Juncker, who told us that coming out of the financial crisis we made "jobs and growth our number one priority in Europe" and that we must ensure that "our recovery benefits everyone". We are reminded that this was a theme close to Tommaso's heart as it should be to every European's. This is my theme today.

Work takes many different forms, from working in the market for a wage to "home production," the unpaid work of millions of people providing free services to family and friends. The things that we do at work are changing all the time. What is the cause of change and what should we expect from work in the future?

The most fundamental cause of change is technology. Technology brings new methods of production and economic growth and with economic growth we can work less and yet have a better quality of life – more and better goods and services and more time for leisure and intellectual pursuits. But although it is the main cause of change, technology is not the only influence on work. Technological knowledge today is as readily available worldwide as it has ever been. Yet, even in countries as closely connected as the ones of the European Union, there is still a lot of variation in the kinds of work people do. Important among the other factors are how much new technology and what types of it are taken up by businesses, government policy at both the micro and macro levels, the country's international competitiveness and its openness to trade. And of course there are also factors that are less influenced by the decisions of agents, like climate and natural resources.

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New technology does not benefit all sectors of the economy uniformly. Some sectors benefit more, raising their output at the existing distribution of work, whereas others may not benefit at all. Accompanying the introduction of new technology there is a shift in employment allocations across industrial sectors, known as the *structural transformation*, and although it has attracted less attention by economists than the growth effect of new technology, it is equally important when considering the impact of new technology on jobs.²

Other factors contribute to the structural transformation too but their contribution is either short-lived or smaller. Important among these is the fact that as incomes rise during economic growth demands shift from “necessities” to “luxuries”, causing a change in the relative number of jobs producing each.

My lecture today is about the structural transformations brought about by new digital technologies, associated mainly with robotics and artificial intelligence, and the transitions of workers across sectors and jobs made necessary by such structural transformations. Although much has been written about the disruptive effects of new digital technologies, and the risks they pose to many jobs, much less has been said about the job creation that will accompany the introduction of digital technologies. The challenge that societies in Europe face as the new technologies enter production is not whether there will be enough work for people to do, but whether they are prepared to make the transition to a world where labour works with robots and intelligent machines for the betterment of society. Achieving higher incomes through productivity gains due to fast computer speeds and tireless robots is the easy part; achieving standards of good work for all who want to work and a good quality of life in our cities is the bigger challenge.

Workers displaced – and workers remaining

Industry 4.0, the Fourth Industrial Revolution, Digitalization (or Digitization) are all terms referring to one fundamental change in today’s economy: The availability and introduction of new production methods based on digital technologies; automation, robotics, artificial intelligence and more reliance on capital than on labour. Although research on robotics and artificial intelligence started many years ago, commercial applications are much more recent. The key reason is data. AI needs “big data”. Computers are programmed to process data and take action on the basis of that data. The data processing might be related to the rules of a well-structured game like chess, or it might be the matching of a face to millions of faces available in a data bank.

Alongside the development of big data banks came improvements in digital technologies, like computers with very large processing capacities and robots with independent movement. So how are labour markets responding to these changes and what should we expect in the future?

As with all technological developments, the penetration of AI and robotics to the economy is not uniformly spread. Virtually all recorded production robots are in manufacturing, with a concentration in the manufacture of transport equipment. AI is used in situations in which the employee is processing data and performing routine tasks that can be programmed, like checking the balance in a bank account or searching past litigation decisions for information about the likely outcome of a case in court. Situations where the employee has to respond to unpredictable behaviour, such as looking after a child or giving

² See Baumol (1967) for a classic statement, Ngai and Pissarides (2007) and Herrendorf, Rogerson and Valentinyi (2014) for a recent survey.

tuition, cannot be taken over by the new technologies, although they may be able to help the performance of a person who takes charge.

A problem with translating these remarks into the number of jobs at risk is that these remarks refer to individual tasks, or activities that a worker does, but not necessarily to the whole job. The risk that digital technologies pose for labour and the mapping from tasks to jobs at risk of automation is the area of research that has attracted most attention in the labour economics of automation. This is partly due to the impact that the original study by Frey and Osborne (2017) has had, with a rather alarmist claim that up to 50% of jobs could be at risk over the next 50 years. Subsequent work by the OECD (Nedelkoska and Quintini, 2018) and the McKinsey Global Institute (2017), among others, has narrowed this number down to about 15% of jobs over the next 15 to 20 years. Moreover, since the jobs that involve data processing and the performance of routine office jobs, as well as most of the ones in manufacturing taken over by robots, are jobs normally done by workers with mid-range skills, the expectation is that most of the jobs lost will be in that range.

We are already seeing those changes taking place. Goos, Manning and Salomons (2009) calculated that in the fifteen years prior to 2010 European countries lost about 8% of job positions in occupations that paid mid-range wages and gained 3% of jobs in lower-paying occupations and 5% in high-paying occupations. We also know that manufacturing employment is falling rapidly, even in Germany, and the main reason is technology adoption that increases productivity whilst reducing the labour input at the same time.

These changes are important for the future of work because they give an indication of the type of workers that will need to be relocated over the next two decades. But they are also important because of the distributional implications that they have. In particular the rise in inequality; as jobs that pay mid-range wages disappear and are replaced by jobs paying more or less, a gap is opened in the middle and wage inequality increases. This is known in the literature as the polarization of employment (Autor, Katz and Kearney, 2006, Goos, Manning and Salomons, 2009) and it is one of the reasons for the observed rise in wage inequality.

Inequality is not my main theme today but its implications both for in-work poverty and the risks of political extremism are sufficiently alarming that governments need to take urgent action to avert it.

New jobs in need of workers

Rather than spend more time on the job destruction and inequality implications of new technologies, I want to devote the rest of my time to the positive aspects of them. Living standards can increase and the new technologies can be used for the improvement of the quality of life in its several dimensions, such as public and private health, the environment and working conditions. But for everyone to enjoy the benefits of new technologies, growth has to be inclusive and involve more provision for public goods, which can only be supplied by governments. There is no surer way to achieve inclusive growth than through employment. Although government transfers have an important role to play as workers move across employment sectors, their role must be temporary for each worker in transition. So where are the jobs coming from to replace the ones lost to machines?

Any activity that involves judgement independently of data processing will remain in human hands. The vast majority of these jobs are in the service sector of the economy. The key property of the new jobs that are created is their non-routine nature; looking after mental patients is the ultimate example of a job that will never be taken over by robots. But there

are many more. Any type of care, be it for patients, hotel customers or people training in the gym, will remain in human hands because the situations in which the provider of the service has to deal with is personal to the customer. Artificial intelligence has a big role to play in future for those jobs, associated with the reading and analysing of a situation and recommending a targeted service, but the provision of that service will always be in human hands.

Although there is always a lot of uncertainty when forecasting in economics, I can say with fairly good confidence that if I had to name two sectors of the economy which will create plenty of jobs in the age of automation, they will be the health and care sector and the hospitality and entertainment sector. Both sectors are ones that provide services that can be called “luxuries”, in the sense in which the economist uses the word – meaning that as incomes rise spending on them rises by more than in proportion. In addition, in the health and care sector spending is also increasing over and above the levels expected from the growth in living standards because of population ageing. In the European Union as a whole, the old age dependency ratio is expected to go up from 31% in 2015 to 54% in 2050; in other words, currently the number of people over 65 are about one third of those in the working age group of 20-64 years, and in about three decades it is expected to increase to one half.

Historically, spending on health and care has increased by 1-2% more than the growth in incomes. Across countries, wealthy societies like France and Germany spend about 12% of their GDP on health and care whereas less wealthy societies like Greece and Bulgaria spend 8%. In terms of employment the contrast is even bigger. The Nordics employ 15-20% of their workers in this sector, France and Germany about 12% and Greece and the formerly planned economies of Eastern Europe around 5%. The economies that have low employment rates in this sector are also ones that either have low overall employment rates, especially for women, or too high manufacturing employment to be justified by today’s manufacturing technologies. Taking also into account population ageing, we can say with some confidence that if the worker transitions from out of the labour force and from the automated jobs are handled correctly, job creation in the health and care sector can contribute substantially to the convergence of sectoral and overall employment rates in the European Union.

The hospitality industries³ employ different shares of workers across countries, not only because of differences in their level of economic development but also because their size depends on other factors, such as tourism and cultural wealth. On the KLEMS narrow definition of “accommodation, food services and arts and entertainment” these sectors employ about the same number of workers as the health and care sector and their share has grown fast in recent years, although not as fast as in health and care. The reason for that growth is twofold.

First, as societies become wealthier there is more demand for good quality services in hospitality and entertainment, as a way to spend one’s free time. Work related travel has also grown as work patterns have become more complex. Second, and ultimately more important for the growth of this sector, as living standards rise people take more time off work.⁴ The

³ In the KLEMS data base there is a narrow definition of a hospitality sector for “accommodation and food service activities” but here I am using hospitality more generally to include the entertainment industry such as going to the theatre or to music concerts and the activities associated with these pursuits, such as travel.

⁴ This fact is documented more expensively in the Unites States, where the American Time Use Survey is a state of the art survey on how people spend their time. In Europe we have less good information on the use of time but the available information is consistent with the American trends – if anything the trend rise in leisure time is more pronounced in Europe, because of the bigger rise in annual paid leave across Europe. See Aguiar, Hurst and Karabarbounis (2011), Burda, Hamermesh and Weil (2007) and Ramey and Francis (2009).

gains from a rise in productivity and income are shared between more spending on goods and services and taking more time off work. In addition, those who work on home production, in the provision of services for family and friends for no pay, also work less and take more time off, as living standards progress.

In the market the fall in hours of work is manifested along several dimensions, in the form of lower hours of work per week, the emergence of more part-time employment, weekends off and especially longer annual paid leave. In the home less work is associated with the introduction of home appliances such as refrigerators and washing machines, as well as the “marketization” of these services by making more use of restaurants and other services and by the hiring of home maintenance and childcare workers.⁵

The fall in hours of work and the rise of leisure time is also reflected in a very good correlation between labour productivity and annual hours of work across the countries of the OECD. In the European Union, the shortest annual hours of work are found in Germany whereas the longest in Greece, countries that are at the opposite ends of the productivity rankings.

More jobs will be created across a whole range of services outside the two sectors that I have highlighted. A common characteristic that runs through most of these jobs is the marketization of home production. In less well-off societies family members, especially female ones, do a lot of unpaid work at home, such as cleaning, cooking, looking after children and ageing parents, driving other family members to school and other destinations and many more. These activities are well documented in time use surveys.⁶ As living standards rise and education standards improve, more and more of these activities are transferred to the market where professionals do them as paid work.

In parallel, household members who engaged in these activities come out into the market to find jobs better suited to their skills. There is a substitution between home activities and market activities, driven partly by rates of return in service production of family members, affordability in the face of imperfect markets and tax incentives provided by the government. As an example of the latter, the very large participation in health and care market services in the Nordic countries is partly explained by the tax and subsidy incentives given by governments to these activities (Schettkat and Freeman, 2005, Ngai and Pissarides, 2011). This is also an explanation of the higher relative overall employment rates in these countries, when compared with other countries in the European Union. When a family is given incentives to take its underage child to a childcare centre, family members are freed to pursue their own work: two paid jobs are created simultaneously, one for the childcare professional and one for the family member, usually the mother, who does the childcare at home.

Good jobs

I have argued that alongside the destruction of jobs by robots and artificial intelligence there will be growth of employment opportunities elsewhere in the economy to absorb the displaced workers. A frequently asked question is whether there will be enough “good” jobs to take over? The hidden message here is that the jobs lost to automation are good, whereas the ones that will be created will be less good. There is no evidence of such a discrepancy and indeed some studies, e.g., McKinsey Global Institute (2017), find that the service jobs created

⁵ See Greenwood, Seshadri and Yorukoglu (2005), Freeman and Schettkat (2005) and Ngai and Pissarides (2008).

⁶ In the United States the American Time Use Survey (ATUS) is annual, starting in 2010. In Europe there is no annual survey but the Harmonised European Time Use Survey (HETUS) covers very similar ground. See the references listed in footnote 4 for more information.

will require higher skills than the ones destroyed. Of course, this does not mean that we can ignore the need to look for improvements in work. As society advances and higher standards from service producers are expected, it is natural to expect improvements in the work environment as well. Reports and surveys on the quality of work have proliferated in recent years, with the aim of improving work conditions beyond the basic work standards agreed at the International Labour Office (see in particular, OECD, 2014).

In this connection, economists and policy makers have for long focused on the productivity of jobs and on GDP measures of well-being, ignoring other factors connected with the quality of life. Although this is changing, change is still very slow. Improvements in the quality of work (and more generally, life) often go against productivity growth, at least in the short run. For example, replacing labour with machines at short notice and requiring workers to work long hours so as not to allow machines to stand idle will increase productivity but it also increases stress and dissatisfaction with work. Eventually this will lead to poorer work outcomes as well – absenteeism, poor health and a sense of uselessness. Alternatively, a company could use the new technology to improve work conditions by shifting the uninteresting parts of the job to automation. A company that works with its employees to improve standards at the workplace, offer reskilling courses at work and inform its workers of the changes brought about by technology experiences improvements in both health standards and motivation. It may work against productivity growth in the short run but it could lead to longer lasting employment relationships and to a bigger rise in a more general measure of well-being, in which GDP growth is only one component (see Bughin, Pissarides and Hasan, 2019).

As for the ability of an economy to create enough jobs, there is no doubt in my mind that a well-functioning economy can create the number of jobs required to employ all those who want to work, taking into account the frictions that every labour market has and which yield an equilibrium unemployment rate associated with the normal churning of jobs. The experience of economic growth in the second half of the twentieth century is that economies can create jobs without limit, except for the availability of labour willing to do them. One of the more remarkable facts of modern economies, like those of the OECD, is that employment and unemployment rates are more or less the same regardless of size or natural resources.⁷

The role of government

I have given a rather optimistic appraisal of work in the world of robots and AI but needless to say these things don't happen on their own. All three social partners, workers, companies and the government, have important roles to play in ensuring a smooth transition

⁷ One of the earliest proponents of the idea that barring wars, population explosions and other destructive episodes, societies will eventually reach a point where the “economic problem” of mankind, the provision of enough goods for a comfortable life, will have been solved is John Maynard Keynes (1930). He put this period 100 years from the time that he was writing, when the standard of living would be up to “eight times” as big as it was then. He argued that society would then be able to function practically without labour, because of technological improvements, but criticised this state as one that would lead to “nervous breakdowns” because we are conditioned as human beings to work towards a fundamental goal, the necessity to survive. It was in this connection that he suggested that a minimum of fifteen hours a week, or three hours a day, would be enough to satisfy our urge to work, and so avoid the mental problems that come from idleness. With the benefit of hindsight, the mistake in this reasoning, if one can call it a mistake, was the complete omission of “luxury” services from it. The idea of an economy employing 80% of its people in the provision of services, or one taking off six weeks a year on paid leave for overseas travel, was completely absent in Keynes's time, or in his thinking.

to the new world. The role of government is especially important in this context and it is on this that I focus.⁸

With the advent of new technologies some jobs become obsolete and others are created to take their place. This is a necessary process that needs to be encouraged by government policy, not impeded through restrictive “industrial policies”. Joseph Schumpeter (1942, chapter VII) described this process as the “Creative Destruction” of old and established work methods by new entrants, and is “the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in”. Despite its Marxist origins, this view of job churning has wide acceptance today by economists.

Governments need to support this process along several dimensions. First, through the removal of overregulation, which acts as an obstacle to the operations of firms. Overregulation touches many dimensions, and especially, in our context, the replacement of labour by capital as they adapt to the new technologies. Second, by creating the enabling environment for new firms to enter and take on displaced workers. There are still many obstacles in Europe to the process of creative destruction, in the form of excessive employment protection legislation in some countries and administrative and financial burdens on firm entry. Despite the efforts of European Union institutions to oversee the structural reform of many of its members during the financial crisis, the reform process was not an unmitigated success. In my view, partly responsible for this failure was the simultaneous imposition of fiscal austerity on the reform countries, which stifled the reform process. Reform is successful when it is owned by governments and domestic institutions but if it is made part of the austerity package governments will botch it up.

Creative destruction inevitably involves job loss. As I mentioned earlier, the expected job loss from new technologies is placed at about 15-20% of employment. This number is not big by the usual turnover rates of employment. It corresponds to the normal job creation and job destruction rates in advanced economies during a single year, whereas the estimates for new technologies span 10 to 15 years. There is, however, one big difference. Whereas the normal job turnover rate is between similar firms, with one firm expanding and another contracting within the same sector, the job loss due to technology involves the replacement of employees by machines with the employees nowhere to go within the sector. They will have to relocate to other sectors, which are likely to be unrelated to what they were doing before. This is where governments have an important role to play: to facilitate the transition of workers from the sectors experiencing the declining employment rates to the new expanding service sectors.

Training programmes and lifelong learning become essential for a successful transition. Training programmes are successful when the worker owns the training. In other words, workers do not do the training because they are forced by circumstances or by the threat of government sanctions, but because they think that by doing it they will improve their condition in the labour market, even when compared to what they had before they were displaced. The most successful training programmes are ones run by companies, because companies know their needs better than government, but given the nature of training, with an initial outlay and then the risk of losing the worker to a competitor, government needs to support the training programmes through subsidies or tax incentives. Another difficulty is that only large firms can reasonably be expected to be able to offer good training programmes, whereas in the service sectors that jobs are created most employment will be in small and

⁸ See also Bughin and Pissarides (2018) for a brief summary of “imperatives” for successful adoption of the new technologies.

medium sized companies (with the exception of health, where large hospitals would be usually involved). In these circumstances government may take on directly the job of training workers, through a combination of training courses and company experience.

In addition to training, governments need to support workers in transition with transfers to avoid the risk of poverty, which would disenfranchise them or make them accept unsuitable and unrewarding jobs, just because they happen to be there. In Europe we have an elaborate system of social support but standards vary widely across countries. This is one area where there could be closer cooperation between European nations, especially when it comes to causes like technological unemployment, but governments are resisting it.⁹

Education and R&D

Finally, I come to an issue that I have neglected for too long, how do we prepare a society for the coming of robots and other intelligent machines? Here again government has an important role to play. The new technologies will require new skills. Although reskilling and lifelong learning in later life become more important in the world of robotics, preparation has to start from school. The worker of the future needs to have a “portfolio” of skills to deal with a fast changing work environment that will give her flexibility in adapting to new situations. This portfolio will have to contain the obvious STEM skills, which are the ones most frequently emphasized by politicians, but equally importantly it will have to include soft skills that will enable the person to work effectively with other people in sectors like care and entertainment.

Social skills are undervalued currently and are not taught at school at all. Decades if not centuries of education have conditioned us to thinking that a proper education is one that teaches science, mathematics, literature, history and geography, but not “soft” subjects like sociology and social psychology. This has to change if jobs in these sectors are to become well-paid, respectable and “good” jobs that young people will be proud to enter. The social status of these jobs needs to rise and the best way to achieve this change, although inevitably slow, is by offering them at school as serious subjects. With this background standards of service in the workplace will rise, bringing a rise in wages too.

Occupations do adapt to circumstances: for example, the appreciation of “good food” in restaurants is a fairly recent phenomenon and it followed awareness of the importance of food for health and for mental and physical fitness. The result is an upgrading of the social standing of the occupation of a chef with the result that it is now a sought after occupation by young people and it is even treated with glamour in the media. Similar developments should be encouraged in other occupations. For example, more social awareness of the importance of good care, based on a broad knowledge of human health and development,

⁹ Universal basic income (UBI) is another policy that needs more careful consideration and more pilot studies. It is a simple system to operate and it is an effective safety net. It also rewards people who choose to stay home to work for the family, so it is good as a social policy. In my view the limited experiment in Finland in 2017-18 was successful, in the sense that it showed that people on UBI did not face disincentives over and above those embedded in the current targeted programmes, and felt happier. But making it unconditionally and universally available might be too expensive for government budgets and some conditionalities are needed to deal with special cases, like disability, large families and job search. Opposition to UBI is often focused on the fact that it is available to employed people as well. Because of this, however, it has to be accompanied by a rise in marginal tax rates, which introduce another form of redistribution – the person on average income pays additional tax equal to the UBI level and persons on lower incomes get subsidised by persons on higher incomes. This feature of the policy is similar to Milton Friedman’s “negative income tax” proposal – but it is one that arouses opposition by like-minded individuals.

could elevate the status of the job of the care giver to higher levels and so raise the financial and social rewards from participating in it.

Research and learning at university level are also extremely important, given the complexity of the new technologies. Someone will have to invent and develop the next AI software that will drive the machines and this is done through R&D and through collaborations between industry, government and the universities. R&D needs government support because of the social benefits from it, and the risk that the research outcomes might be poached. There is a much differentiated performance in R&D in Europe, with the more successful technology adopters doing even more R&D than the technological laggards. This is not good for the future; it forewarns of even more diversity in technology adoption, productivity growth and prosperity in the future. The average R&D spending in the European Union is about 2% of GDP, with just over half of it being done by business.¹⁰ But even more important than this low level is the fact that there is almost a perfect divide between the countries of Southern Europe and the formerly planned economies of Central and Eastern Europe, which lie below the average, and the rest, which lie above (the only exceptions are the United Kingdom and Ireland, which are below the line). Given that the countries of Southern and Eastern Europe are also the ones that are lagging behind in technological development and in the structural transformation away from heavy industry and inefficient methods of organization, the future does not hold promise that they will achieve convergence acting on their own. But the willingness of EU-wide collaboration in this most international of activities does not seem to be there – with the exception of the gallant efforts of the European Research Council.

Concluding remarks

In conclusion, I want to reemphasize the optimistic tone of my delivery. Robotics, artificial intelligence and automation offer vast possibilities for the betterment of our societies. But if we leave the market alone to do it there is no guarantee that it will do it successfully for everyone. Some people may be left behind and the transition to the new era may be slower and more painful than it needs be. Governments, in collaboration with employers and workers, can achieve better outcomes; in the European Union even better outcomes can be achieved if the cross-border collaborations deepen further.

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¹⁰ These figures are for 2017 and they are from the OECD statistical portal. Eurostat gives slightly different figures which tell the same story.

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