



European Employment Policy Observatory (EEPO)

EEPO Thematic Seminar

Employment and Technology

4 April 2014, Rue Joseph II 54, Brussels

Seminar Notes

This seminar was aimed at officials of the European Commission and included presentations by Dr. Maarten Goos (Associate Professor of Economics, University of Leuven) and John Hurley (Eurofound). The seminar focused on the impact technology has on the creation and/or suppression of jobs in the near future and which sectors will provide for the “job rich recovery”. The seminar also discussed the issue of job polarisation and how to improve skills provision to make technology a driver for growth.

1 The societal impact of recent technological progress

Dr Goos’s presentation addressed the question of the impact of technological progress on society (workers; sectors of firms and regional agglomeration of sectoral activities; consumer attitudes towards new technologies, urgent challenges for governments given recent and future technological progress) and more particularly how technology can change the quality of jobs, impact on growth of sectors and regions and what can be done to build trust in society to make use of technological advances and what government can do to help accommodate technology in society.

Job growth, as well as economic growth following the Industrial Revolution (from 1850 until 1980) and the more recent Computer Revolution (from 1980 onwards) calls for innovative optimism rather than pessimism about the future of work and well-being. However, to reap the benefits of recent and future digital technologies, policy makers face a number of important headwinds. For example, whereas new technologies abound, an important bottleneck for innovation leading to more and better jobs and economic growth is whether workers can provide the necessary skills to work with these new technologies. Another example is that, while the Industrial Revolution improved the quality of jobs and led to less inequality, evidence for the Computer Revolution points towards the other direction - namely, that technology is no longer unambiguously increasing job quality because of job polarisation and increasing inequality.

The following trends regarding the impact of recent technological progress on **workers** were highlighted:

- Fears of technology automating many jobs and of technological unemployment exist today (but are not new – e.g. Luddites during the Industrial Revolution). For example, a recent study conjectures that 47% of all jobs could be automated by 2035.
- However, evidence does not warrant these fears suggesting that technology will not fully automate most jobs and many new jobs will be created because of new technologies. Artificial intelligence is still in its infancy and humans are still better than computers (or have a “comparative advantage”) in performing intelligent tasks.
- Smart policies therefore develop worker talents that complement new technologies (similar to the debate on smart migration policies and how migrants can complement native workers). Note that these smart policies should not be restricted to more and better education but also account for job polarisation of labour markets due to recent technological progress (because new technologies have been able to do mostly routine manual tasks concentrated in middling jobs – e.g. machine operators and office clerks –

in contrast to non-routine manual low-paid jobs – e.g. waiters, cleaners – and non-routine cognitive high-paid jobs – e.g. managers). For example, smart policies also include the development of interaction and problem-solving skills in low-educated service occupations- the excellent waiter or hairdresser is irreplaceable.

The following trends regarding the impact of recent technological progress on **sectors** of firms were highlighted:

- Because some sectors cannot as easily make use of new technologies (e.g. education compared to manufacturing), these sectors suffer from “Baumol’s cost disease” – the fact that unit labour costs and therefore output prices in these sectors are rising relative to sectors that can more easily innovate.
- To safeguard competitiveness of sectors that can innovate less, policies should develop the technological potential in less innovative sectors and/or allow for stronger wage growth in more innovative sectors (and/or lower (minimum-)wages in less innovative sectors if lower-tail inequality is not a concern).

The following trends regarding the impact of recent technological progress on sectoral agglomeration across **regions in Europe** were highlighted:

- European regions differ in their high-tech employment intensity with high-tech hubs characterised by strong local employment multipliers (of 3 to 4).
- But there are also regions with very limited high-tech employment and there is little “catching-up” by these less innovative regions.
- Policies should stimulate high-tech employment in less-innovative regions and/or allow for stronger wage and price growth in more innovative regions to make less innovative regions more competitive (and/or internally devalue wages and prices in less innovative regions if this is desirable).

The societal impact of and economic benefits from recent technological progress also depend on the extent to which **consumers** accept new technologies and consider these new technologies to be an advantage.

The following urgent challenges for European **policy makers** were highlighted:

- Policy makers can improve the efficiency of how workers, firms, consumers and governments interact with new technologies. For example, big data policies can help students to choose a field of study or better match jobseekers to vacancies; policies to create public support for new technologies and governments can use new technologies in the provision of public goods.
- Policy makers should also safeguard equity in society in two ways. Firstly, make sure workers can provide the skills (education, on-the-job training, lifelong learning) necessary to support new technologies. Secondly, stop top-income inequality from rising because capital returns are high relative to economic growth. To do this, there is a need for coordinated taxation of wealth and/or stronger economic growth from new technologies.

2 Job polarisation in Europe: insights from the European Jobs Monitor

Mr Hurley's presentation focused on the analysis of data from the European Jobs Monitor and discussed whether the crisis had an impact on job quality and whether job structures have changed over a long period of time. The European Jobs Monitor describes structural change in the labour market, focusing on 'jobs' (i.e. an occupation in a given sector), which are then assigned to five quintiles, from low-paid to high paid.

Overall the analysis of data for the EU member states shows two main patterns in terms of employment shifts: polarisation and upgrading. Before the crisis (1995-2007 period), the aggregate EU employment shifts were upgrading with some polarisation while the polarisation was more marked during the 'core' recession period (2008-2010). In the context of the crisis, net loss of jobs has been observed in the middle range, while low-paid jobs slightly increased and the number of high-paid jobs also increased. The reason for the destruction of middle range wage jobs is the decline of (male) manufacturing and construction sector, while services jobs, where polarisation is more marked, showed resilience or even expanded in the case of private knowledge intensive services or ICT professional services. Overall, employment in the top quintile has been more resilient than in any other quintile of the wage structure.

When comparing Member States, different employment shift patterns emerge, from upgrading (Luxembourg, Sweden), polarisation (France, Netherlands) and hybrid trends (Spain, Finland). In a small number of countries (Italy, Hungary) during the recession, one can also observe downgrading employment shifts, i.e. relatively greater employment growth in lower than higher quintiles.

Across the EU, the gender employment gap continued to close during the crisis due to the fact that female work was less affected by the crisis and women are better represented in jobs in service sectors which continued to experience employment growth (e.g. education, health). It was further observed that non-standard, low paid employment in the context of the recession grew, contributing to polarisation. In the period 2011-2013 part-time work expanded across all jobs but especially at the bottom of the wage ladder.

The soon-to-be-published European Jobs Monitor annual report (2014) also includes some exploratory analysis of what may be the determining factors of the observed patterns of employment change. The principal explanatory factors – or groups of factors – are technological change, trade / globalisation and labour market institutions (e.g. minimum wage, levels of employment protection, union coverage).

It can be assumed that on the one hand technology will foster upgrading occupational change – a demand for more high skilled labour in line with the predictions of skill-biased technological change. However, the routine-biased technological change hypothesis predicts relatively greater employment growth at the top and bottom of the wage structure (polarisation). Eurofound analysis shows that the **clearest driver of structural employment change is the cognitive task content of jobs, strongly associated with upgrading. There was no evidence of polarising routine biased technological change. Routine-intensive jobs may be easier to replace by machines but this effect tends to be similar to that of cognitive tasks (adding to upgrading). The degree of direct social interaction of jobs is more correlated with job polarisation than the routine task content, though this was not a large effect.**

It seems furthermore that polarisation is observed principally when jobs are categorised in terms of wages. Other job quality ranking criteria - skills or broader multidimensional job quality indicators – tend to reveal observed employment shifts in a more positive light with a more monotonic positive skew towards higher quintile employment growth.

3 Some of the key messages from the seminar can be summarised as follows:

Further research is needed to analyse the impact of technology on the labour market and future employment shift patterns due to current uncertainty. Both presenters agreed that policies matter to steer the progress and impact of technology in the labour market and society and to address increasing polarisation of the labour market. Job polarisation seems to rather be linked to labour market institution variables, which need to be identified at Member State level. Yet, it should be borne in mind that high-tech workers do benefit from substantial wage premiums (taking into account the wealth that high-tech industries generate) and face more favourable labour market outcomes (e.g. lower unemployment rate).

It was noted that there is a debate in the literature about the impact of polarisation, it is argued on the one hand that wage differentials can motivate individuals to move up the salary ladder, or on the other hand that they create frustration among the lowest paid workers with a negative impact on their productivity. According to Mr Hurley, growing levels of inequality are economically inefficient in the long-term. One key question was if policy makers can and should do anything to counteract wage polarisation, or assume it is unavoidable in order to allow job creation. Some economists (cf Thomas Piketty), have argued that increasing wage inequalities would unfortunately be a standard pattern across history, while that convergence of wages in post WW2 Europe has been an exception, attributable to a variety of factors such as, high employment rates across Europe, growth of the redistributive welfare state and strong worker representation. Still, wage inequalities would call for further policy action.

One remark in the context of polarisation was the note that capital is more mobile than labour, thus reforms of income tax should be done in a coordinated way to improve the re-distribution.

Top quintile jobs (high paid jobs) showed resilience during the crisis which can give a direction for future education and training policies. It was however noted that recent employment growth in top quintile jobs was concentrated in core and older age cohorts. Younger workers, aged under 30, have not benefitted from recent growth in better paid jobs despite having the most recently acquired human capital. There is also suggestive evidence of over-qualification with third level graduates accounting for the biggest share of employment growth in low-paid jobs. A key issue for policy makers is how to develop the future skills base that will be able to use technology, drive technological innovation, and integrate technology effectively inside firms so that it becomes a driver for job growth.

Equality of education and training opportunities must be guaranteed to decrease future income inequalities but also to provide for a more equal technical knowledge base. A broader debate about which type of skills are needed to make technology an effective tool inside a company and what kind of professions are connected to this is an essential research question for the future. Integrating lifelong learning programmes into a firm's operational process is the ultimate aim to achieve the "right" work organisation that can generate growth and increase competitiveness.

This debate will also drive the search on where future jobs will be created. Certainly, high knowledge intensive sectors will continue to develop (as they have already shown strong resilience during the crisis). In that context, occupational guidance needs to be improved to help young people choose a field of study based on real labour market prospects.

Another key factor in addition to skills policies is the geographical mobility of workers, as regions currently differ in their ability to innovate and create technological hubs.