

Seminar 2016-11-28

“What the research can teach us about automation”

What can we learn from the research on automation and digitalization? This question was answered at a seminar organized by IFN on Monday. Keynote speaker was Professor Melanie Arntz, ZEW in Mannheim and Heidelberg University. She has studied the effects of automation on labor markets in the OECD. Arntz explained that the discussion is often too doom-laden. From IFN Professor Lars Persson and Ph.D. Mårten Blix presented their research in the field. In a panel, chaired by digitization expert Sara Öhrvall, Annika Winsth, chief economist Nordea, also participated.

Automation will change our future, said Sara Öhrvall, expert on digitalization and moderator at this IFN-seminar. She forecasted that by 2018 we will probably have 1.3 million robots “working” in the market. Still, the question is if robots will take over a significant part of our jobs.

“The fear for automation comes from the automation potential. What we guess will happen”, explained the keynote speaker Professor Melanie Arntz, ZEW in Mannheim and Heidelberg University. She mentioned a study by Frey/Osborne (2013) claiming that 47% of all jobs in the US are at risk. “I think this is very much an exaggeration” said Arntz, adding that researchers, if possible, have the responsibility to add some evidence to the alarmistic public debate.

Frey and Osborne in their study have an occupation-based approach. They assume that all workers within an occupation are subject to the same risk of automation. This means that if you add up workers with a risk of at least 70% to be automatable 47% of all US workers are at risk. “Their assumptions are probably false to some extent, said Arntz at the seminar in Stockholm referring to an OECD study by Arntz, Gregory and Zierahn (2016).

In this study it is taken into account that employees in jobs that Frey/Osborne classified as “high risk” often perform hard-to-automate tasks. And, explained Melanie Arntz “bundles of tasks vary not only between, but also within occupation” indicating that “the risk of automation has to be assessed at the level of individual workplaces, based on actual tasks performed”. Having this work-place approach Arntz and her colleagues found that only 9% of US jobs at risk. “We have dug into this question recently and found that you have to take into account the heterogeneity within occupations. The reason being that the distribution of tasks within an occupation is highly skewed. In essence there is nobody as a representative worker in an occupation.”

In regards to all OECD countries, according to Arntz, the risk is on average 9%, the lowest being 6% and the highest 12 %. In Sweden the risk is about 7% and in Germany 12%. A driving force for the differences, explained Melanie Arntz, is education. Also, as digitalization is a process of transformation, “countries further down this road probably have a lower risk because jobs and tasks tend to adjust to this new division of labor between machines and humans”. The researchers also found that with larger ICT investments in the past the risk of job loss is lower. “For Sweden the ICT

[Information and communications technology] investments have been about 3% of GDP compared to Germany where it is only 1.3%”.

The workplace approach also makes it possible to look at the risk by education. “Risk in Sweden falls dramatically with education” said Arntz. “Up to 40% of low-educated Swedish workers face high risk of automation” claimed Arntz.

What are the consequences for the labor market at large?

Many hurdles might slow down the process, said Melanie Arntz. For example a slow adaption to new technologies (though, faster in Sweden than in Germany). “We have to remember that it doesn’t happen overnight. Just think about legal and other regulatory hurdles, as data protection. We also have hurdles related to societal preferences. For example in the care industry we have a preference to interact with a human rather than a robotic. And this will of course slow down the process of adapting to technologies even if it is possible.” Also, explained Arntz, in regards to businesses and their willingness to use new technology there are major differences even though workers adjust to what’s new.

Last but not least, new jobs are created. “Two colleagues of mine have studied the changes in labor demand that new technologies brought to the European labor market in the last ten years” said Arntz arguing that the study conveys several messages: Technologies are labor saving (loss of almost 10 million jobs during the last ten years), making companies more productive. In this way the firms increase market shares and create jobs – almost the same as the loss. “A third positive multiplier effect is that with the demand there are new incomes that get consumed which increases the demand for labor. How large this effect is depends on where the earned money is used. Still, we find something positive effects on average, but it depends of who owns the capital incomes in the digital economy and how is it spread. This Melanie Arntz sees as a main challenge for the future.

Following the keynote speech Professor Lars Persson, IFN, gave a talk based on a governmental report (*Digitaliseringens dynamik – en ESO-rapport om strukturomvandlingen i svenskt näringsliv* by Fredrik Heyman, Pehr-Johan Norbäck and Lars Persson). The researchers have studied what jobs that is at risk in the automation process. “We find that education is crucial” said Persson at the Stockholm seminar. “Employees with low education run a much larger risk of losing their job.” He specified the process: “We establish a large increase in jobs for high-educated workers with low-risk jobs. And a large decrease in jobs for low-educated with high-risk jobs.” He summed up: “In Sweden we have been able to use new technology to create a very positive creative destruction process. This was especially true during the period 1996-2009.”

The IFN-researchers have found that education is protection against automation but high wages are not. “Jobs without high education but high salary tend to disappear,” said Lars Persson adding that job polarization is a big problem. This means that not only low-skill/low-educated jobs disappear but also medium skill jobs. We find this in Sweden, he said. “Though compared to the US we have many more pushed into high wage jobs.”

Persson showed that if you substitute machines for labor you increase productivity. In addition people can do more today within their jobs using smart machines. The researchers find that the

connection is stronger in firms with low educated employees, in young firms and in industries with low initial but increased use of ICT.

Lars Persson raised the question how, more specifically, new technology affects the creative destruction process. Giving the answer that the technology:

1. Solves information and computational problems: Making firms make faster and better decisions.
2. Makes it possible to tailor goods and services, and to make small scale production efficient. "You can make things that fit the consumer much better. And at the same time small firm can better compete with large firms."
3. Mitigates adverse selection and moral hazard problems. "Today you have car rental firms that can see when you drive reckless and at that point the insurance doesn't cover. This makes the insurance payment go down as the drivers drive better."
4. Utilizes previously unused private assets and work time. For example Uber and Airbnb, as well as crowd funding.

Network effects is one of the big problems today, explained Lars Persson. If you are a successful company like Apple and Facebook you make a lot of profit. That's a good sign. "The problem is that it comprises only a few owners and employees and that can create polarization. We have to be aware of that."

What can be done to facilitate the new technology?

Better competition, was the first solution Persson suggested. He argued that stronger product market competition reduces market power and benefits consumers, young firms and productive employees. Secondly he said that a well-functioning market for start-ups is crucial.

Smart education was the second key that Lars Persson presented. He mentioned skill formation at an early age as most efficient but we also need continuous learning. "There is a paper in *The Economic Journal* showing why highly educated people might be protected. It is not that they find more jobs but that they keep their jobs and take part in continuous on the job training. That seems to be the key."

Last in his presentation Lars Persson raised the question of today's abundant information on the internet that can create problems: Everybody can't be equally informed and all information is not correct. He suggested: "To capture the possibilities of new technologies, society has to deregulate but also regulate in an efficient way."

The middle class in the OECD countries has been shrinking during the last three decades, said Mårten Blix, IFN – the third presenter at the IFN seminar, posing the questions: To what extent is the new technology new? To what extent can we rely on past experiences?

"With the industrial revolution ultimately the productivity increased as did the welfare, including education. But we have had disruptive periods that were not easy to adjust to, said Blix mentioning the introduction of electricity. "Though digitalization is probably going to be much broader and faster. " He explained that the issue is our ability to adapt to the pace of progress."

Blix refer to the service sector. This sector is large in many countries and heterogeneous. "We see many advances in this sector. For example financial advice can now be offered 24/7. In journalism we see the possibility of automated writing. And there is research showing that it is no longer so easy to distinguish text written by human hand and robots."

Mårten Blix remarked that many of these changes come slowly, not year to year but over a period of ten years or more. He argued that the change means different things to different continents." In Europe we have ridged labor markets in many countries and we have since long build up institutions. Though, today the new technology allows us to bypass some of these." He gave examples from the still small but growing sharing economy, with digital platforms that can match work and workers, bypassing the collective wage bargaining. OECD shows that since mid-1990s the new jobs are non-standard job; Standard jobs defined as self-employment, temporary work and part-time work. "There is an incentive to bypass some of the regulations, and this can potentially be more important to Europa with our welfare states."

Demography is likewise a strong changing force. Societies are aging. In addition the Swedish labor market is suffering from a miss-match between skills needed and skills held. "This is an additional incentive to automate," said Blix. In Europa is has been hard to find workers for the automobile industry. And this is also a problem in other sectors, such as the health care industry. "In japan we are seeing a lot of robots introduced in the care of elderly, basically because it is a difficulty to finding enough people to work in this sector. I think this is coming to Sweden, especially to the sparsely populated regions in the North where it is more difficult to find staff."

High taxes on labor are yet another incentive to automate. "It is very clear that the price of labor compared to the price of machines is a factor that should be entered into this equation." Blix explained that the research literature so far has not discussed this issue. Though, with new possibilities to automate and outsource work via digital platforms the price of labor compared to machines will be a component. "We know that over longer periods of time substitution between leisure and work and the black economy can be quite significant. When switching between these is possible at a much higher level the tax-factor definitely applies", Blix noted.

Finally Mårten Blix mentioned problems on the regional and municipal level. "Ideally we would like to have a diversified economy, to be resilient to [financial] chocks." Blix referred to data showing that in a number of Swedish municipalities people are working for more or less one single private employer. "Ericsson is discussing downsizing in Borås and Kulma. Some of these areas can be really vulnerable."

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