

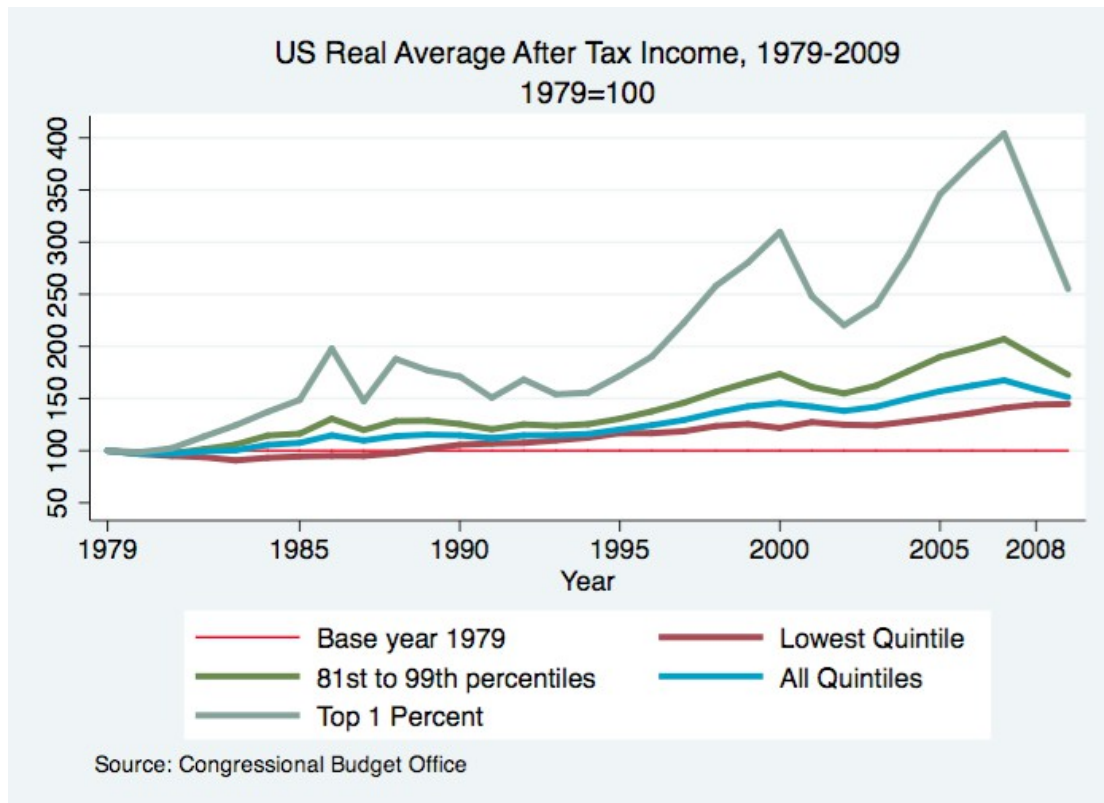
The Rise of the Machines: When Will a Robot Take Your Job?

In *The Terminator*, a highly intelligent computer becomes self aware and destroys nearly all of humanity, leaving only a few brave souls left to fight the robot soldiers, memorably impersonated by Arnold Schwarzenegger. The fictional date of this catastrophic event – August 29th 1997 – has long since come and gone without this darkest of technological dystopias coming to pass. However, though, few people truly fear that machines will take our *lives*, the fear that they will take our *livelihoods* is gaining momentum, as they encroach on a growing number of human jobs. Jobs that only recently seemed exclusively in the human domain – customer service, care for the elderly, even driving – are now performed increasingly well by machines or computer software. When computers take over all the jobs, what are we humans going to do? Is this “The End of Work” a phrase popularized in Rifkin’s 1995 book of the same name?

The publication of Rifkin’s book is nearly 20 years in the past, and history should provide us with guidance to assess his claims. First, Rifkin was certainly not the first to fear technological development. The earliest example of fear of job loss from technological development is probably the Luddites of the early 19th century. This group of textile artisans feared the introduction of labor-saving technology brought about by the industrial revolution and took to destroying the new factories and machines in the dark of night. It was not until the police violently cracked down on the activists and many of the organizers were executed or sent to the Australian colonies that the nightly raids stopped. Though the dark predictions of mass unemployment didn’t come to pass, a century later a particular subgroup of manual laborers did experience exactly that. The mechanization of agriculture and transportation made millions of horses redundant and the United Kingdom saw its population drop from several million in the early twentieth century to only a few hundred thousands in the thirties. The label “Luddite” has since become a derogatory term for anyone who fears the progress of technological development.

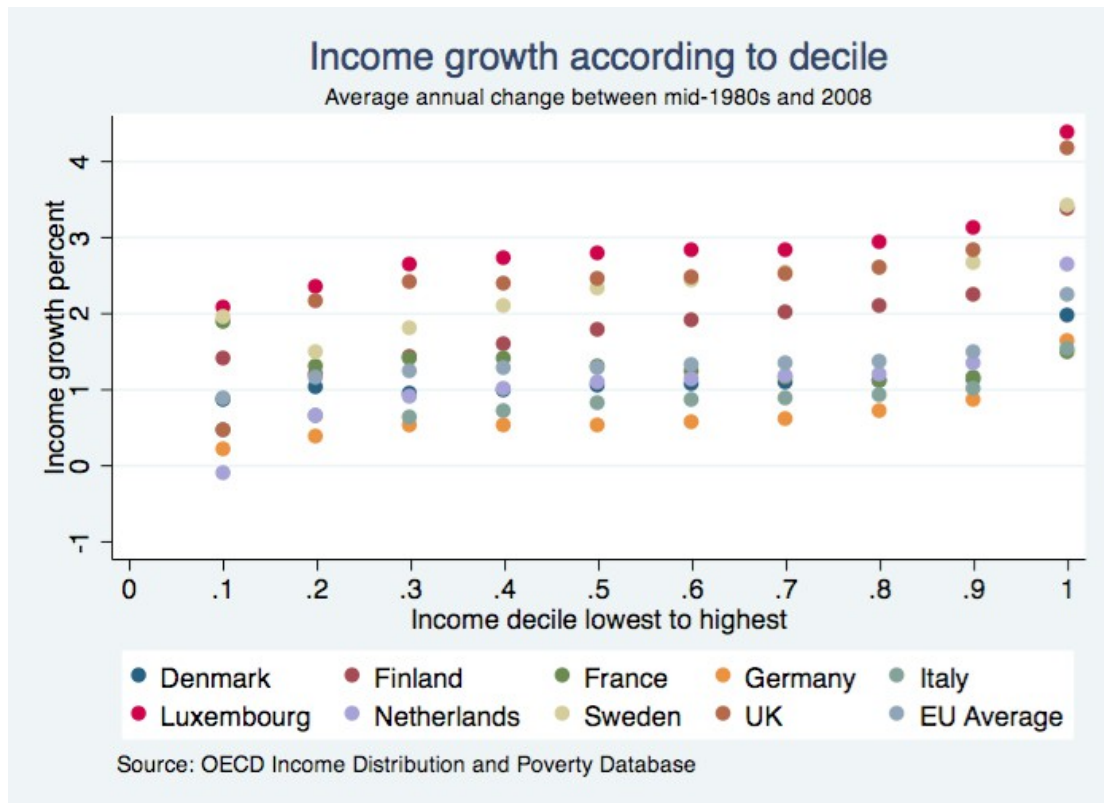
Although the original Luddites were silenced their fears have reemerged regularly since and for 200 years the end of work has supposedly been just around the corner. Rifkin himself predicted a continuously rising rate of unemployment which history has yet to deliver. Even in the midst of the current economic malaise, the unemployment rates in the Eurozone and the United States (12,0 and 7,3 per cent in August 2013, respectively, according to OECD statistics) are only a little higher than those of 1995 (10,7 and 5,6 per cent, respectively). Clearly, we have not yet become horses.

These dark predictions arise from a fundamental misunderstanding of basic economic principles. In a market economy the price – the wage in the case of the labor market – moves to ensure that supply meets demand and there are a few underutilized resources. The problem will therefore not be one of *unemployment* but one of *inequality* if not all parts of the labor force are equally prone to replacement by computers. In fact, technological development is often described as primary cause of the rise of American inequality. The graph below depicts the rise in inequality since 1979.



It is clear that whereas the lower end of the income distribution has only seen marginal improvements over the past 30 years – there is in fact an active debate as to whether they have gained at all – the higher percentiles have gained substantially. The last couple of years reflect the consequences of the financial crisis, which has generally reduced incomes, but more dramatically so for the better off. It is doubtful that these effects will be permanent.

Although, the trends are the most dramatic in the United States inequality has increased quite substantially in European countries since the mid 1980s as well. The figure below from the OECD shows the income growth in the tenth deciles for 9 selected European countries. Though income growth has been fairly balanced for the middle 6 deciles, it is clear that the worst off are falling behind and the wealthiest are running ahead.



So why do economists think that technological development is an important cause of higher inequality? ¹ Think of each job as consisting of a number of tasks, i.e. answering the phone, designing a building, inserting widget 237 into hole A23 on an assembly line. It is possible to categorize workers according to what type of tasks they primarily perform and doing this it becomes clear that jobs can typically be categorized according to how “routine” they are. Not in the sense of boring, but in the sense of being codifiable as a set of instructions understood by a computer program. *Routine* jobs include cashiers, repetitive assembly line workers, bank tellers and much of record keeping, whereas *non-routine* jobs include authors, lawyers, and doctors, but also gardeners, janitorial services and - pending the practical success of the Google car - also truck driving. Employees performing non-routine tasks are not easily replaceable and are in fact often made more productive by computers, both because they can acquire information more easily and because they can spread the results of their work more easily. In the United States, this classification turns out to be have been a strong predictor for income and employment growth across occupations. As the numbers of bank tellers, secretaries, and accountants have dwindled, employment in non-routine jobs in particular in services have increased as people have found new jobs, albeit often at lower wages.

So people have in general found new jobs, and for the foreseeable future there will be enough work; the question is whether we as a society are willing to accept the resulting market wage. In the face of increasing inequality, the answer is most likely ‘no’. If not, then what can we do about it?

As the Luddites so clearly demonstrated, the solution is not to prevent the introduction of machines or new production technology. Imagine if they had had their way; we

¹ Though there is complete agreement about the fact of rising inequality in the United States, there is less agreement about the dominant cause. Besides technological change, changes to the tax system, financial deregulation, and international competition from low-income countries (in particular China) are often mentioned as possible causes.

would still be toiling away in backbreaking manual labor on the countryside as in the early 19th century. Gradually increasing the minimum wage cannot provide a solution either. By forcing the wages of those competing most directly with technology up we will only increasingly stack the cards against them and it will become more difficult for them to find jobs with resulting increasing unemployment. In a similar manner, increasingly generous unemployment benefits will only further discourage people from finding employment. As long as we are not ready as a society to have a large fractions of the population idle this cannot be a solution either.

The solution must be education and continuous skill upgrading so as to ensure that all benefit from technological development. That means training people in the type of skills that computers cannot easily perform. In the coming decades that will most likely be in medicine, in educational services, and in a growing industry of personal trainers and assistants.