'If men have the talent to invent new machines that put men out of work, they have the talent to put those men back to work.'

Chris Pissarides investigates whether President Kennedy’s claim is still true.

Is new technology good or bad for jobs?

Governments throughout the world strive for technological progress. Economists agree that differences in technological attainment are the main cause of differences in incomes and wealth across the world. So is it not odd that we should even be raising the question of how good new technology is for jobs? If it is not good for jobs, what is it good for? How can new technology achieve so many good things if it is bad for jobs?

But odd as it may seem, the question is being asked whenever there is talk of new technology. Adverse comment takes different forms. Sometimes it is in connection with the romanticised machine-breaking of the Luddites of early nineteenth century Britain, the skilled workers who lost their jobs to machines. More frequently, it is in connection with a more boring comparison of statistics across nations. In the 1990s, new technology was making American labour more productive, employment was rising and unemployment was falling to levels that seemed to defy analysis. Europe’s productivity gains were smaller but its labour market performance was even worse. Talk of Europe’s ‘jobless recovery’ became the vogue (though currently, it is the United States that is going through a jobless recovery, as explained by Richard Freeman and William Rodgers in the last issue of CentrePiece).

Why might new technology be bad for jobs, despite its many other good things, and what is in the numbers? Recent work I have done at the CEP in collaboration with Giovanna Vallanti and Sandra Bulli sheds light on this question.

Ironically, it is sometimes easier for the layperson to come up with reasons why new technology may be bad for jobs than it is for the trained economist. The layperson will almost certainly think of the Luddites’ plight or the loss of manufacturing employment. If new technology invents machines that can do the job that workers are doing, then, the argument goes, it must be bad for jobs.

But the economist will point to the fact that new technology makes jobs more productive. More productivity means more wealth and more wealthy individuals spend more. So new jobs are needed to satisfy their new needs. As John F Kennedy put it, ‘if men have the talent to invent new machines that put men out of work, they have the talent to put those men back to work.’ The key is that those men need to get back to work to produce the extra goods that a wealthier society requires.

Of course, new technology is not always of the kind that puts men out of work. I am writing this article on a machine that weighs three kilos. It cost my employer less than a week of my wages and does an incredible number of things, much more than I could ever do with my hands and my secretary’s typewriter before this machine was invented. Yet neither my secretary nor I lost our jobs. We both learned how to work with the new technology and this has made us more productive.

True, some workers do lose their jobs.
when new technology is invented. Not as many workers now stand along an assembly line as in 1936, when Charlie Chaplin immortalised it in Modern Times. But then not as many workers sat behind desks in 1936 as in 1987, when Tom Wolfe wrote The Bonfire of the Vanities.

The internet has made many airline ticket sellers in high streets redundant, but it has opened up demand for programmers, despatch workers and online payment administrators.

New technology replaces the old with the new; it brings change to the labour market. Some jobs become more productive, some jobs become obsolete and some new types of jobs are born. The labour market of modern societies is in a continuous state of flux and one key reason is new technology.

New fashions, demographics and natural phenomena also contribute to change. But the main reason for the big changes in the labour market – the decline of agricultural employment, the rise and then decline of heavy industrial employment, the rise of the office worker – is technological change.

This change is good for jobs overall because it makes the average job more productive. But the question of employment remains: is it also good for the volume of employment or is a society undergoing faster technological change than another necessarily operating at a lower level of employment than another?

The answer to that question is in the numbers. Our theoretical work notes that there are different kinds of technology and some are good for jobs and some bad. If a large fraction of technology is of the kind that makes jobs obsolete, the workers who lose their jobs will need to be re-employed elsewhere. Although demand for new jobs will increase in response to the rising wealth accompanying the new technology, job creation and the matching of the displaced workers with the new jobs takes time.

An economy undergoing fast technological change needs to be continually realocating workers from the industries that introduce labour-saving technology to new industries, and the result is likely to be higher transitional unemployment. But if technology is primarily of the kind that increases the productivity of workers at their place of employment, like the introduction of computers in offices, people are more likely to hold on to their jobs and employment will on average be higher.

Our work uses statistical information from the United States, Japan and most countries in the European Union to identify the kinds of technology that have hit labour markets in the last 30 years. We find surprising results. Virtually all technology is of the kind that is good both for productivity and jobs. We find no evidence of massive job destruction at the level of the economy as a whole as a result of the introduction of new technology.

Even if some sectors of the economy are adversely affected by new technology, these adverse effects do not have an impact on the aggregate economy. In the last 30 years, both aggregate productivity and aggregate employment benefited greatly from the introduction of new technology. Modern-day Luddites undoubtedly get hurt because they lose their jobs, but JFK got it essentially right: most jobs benefit from new technology and the few that do not are replaced by others with no negative impact on the volume of overall employment.

Let me give some examples of the importance of new technology for jobs. In the United States in the decade before 1973, ‘total factor productivity’ or TFP – the measure of how efficiently inputs of capital and labour are used – was growing at about 1.9% a year. In the 20 years that followed, TFP growth dropped to an annual average rate of 0.8%. We estimate that this drop was responsible for virtually the entire rise in unemployment from about 5% to 6.8% of the labour force.

In a similar vein, in Europe, productivity growth dropped from nearly 4% to 1.8% a year while unemployment went up from 2.3% to 6.6% of the labour force. Our estimates show that just over three percentage points of this 4.3 percentage points rise were due to the productivity slowdown. This pattern is repeated throughout the last 30 years.

Figure 1 shows three series for unemployment in the United States: actual unemployment; the unemployment trend; and the series that would be generated if virtually all technology that has hit labour markets in the last 30 years is of the kind that is good both for productivity and jobs.
productivity growth were the only influence on unemployment. It is clear that our simulated series tracks the trend changes in unemployment quite well. It misses out the short-term fluctuations that are due to the business cycle and government policy, which is not surprising. But the influence of new technology on jobs seems to be sufficiently strong to track virtually all the underlying trends in unemployment.

This close correlation is not repeated in Europe, but new technology still matters and is still good for jobs. Figure 2 shows the unemployment rate in Europe versus our productivity-predicted rate. A lot more seems to be influencing the underlying trends in unemployment than new technology. The economics literature has explored the role of labour market policies and institutional rigidities and much has been written about them in Centrepiece (see page 23 of this issue) and elsewhere.

Productivity growth is still an important influence on jobs, but in Europe we have to face the fact that a recovery of productivity growth alone will not be able to create enough new employment to offset the rise in unemployment of the previous two decades. Institutional reform is also necessary.

Figure 2: Unemployment rates in the European Union 1965-98

![Unemployment rates chart](image)

On its own, a recovery of productivity growth in Europe will not create enough new employment to offset the rise in unemployment.

Christopher Pissarides is Professor of Economics at the London School of Economics and director of CEP's research programme on macroeconomics. More details on the research discussed here are in 'Productivity Growth and Employment: Theory and Panel Estimates', CEP Discussion Paper No. 663, by Christopher A Pissarides and Giovanna Vallanti (http://cep.lse.ac.uk/pubs/download/dp0663.pdf).