The Economist

Economics focus

Automatic reaction

IT spending has hollowed out labour markets, to the detriment of middle-income workers

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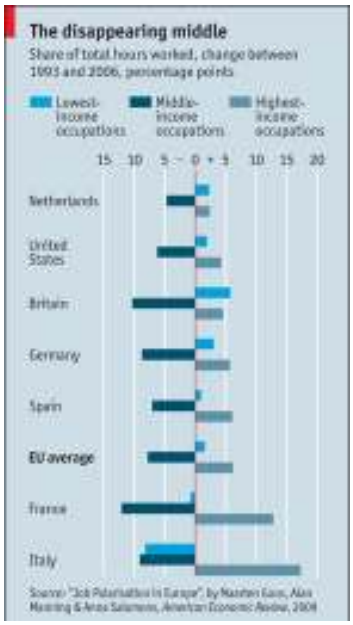
AN ODDLY entrancing YouTube video of a robot folding a pile of freshly laundered towels has been viewed over half a million times. Although it does this quotidian task better than any other robot, it is still much less adept than the average person. The difficulty of programming a towel-folding robot which can outdo humans may help to explain why the past couple of decades have been so unkind to middle-class workers in the rich world.



In the 1970s and 1980s employment in quintessentially middle-skilled, middle-income occupations—salespeople, bank clerks, secretaries, machine operators and factory supervisors—grew faster than that in lower-skilled jobs. But around the early 1990s, something changed. Labour markets across the rich countries shifted from a world where people's job and wage prospects were directly related to their skill levels. Instead, with only a few exceptions, employment in middle-class jobs began to decline as a share of the total while the share of both low- and high-skilled jobs rose (see chart). The pattern was similar in countries with very different levels of unionisation, prevalence of collective bargaining and welfare systems. This "polarisation" of employment almost certainly had a common cause.

The development of information technology (IT) is the leading candidate. Computers do not directly compete with the abstract, analytical tasks that many high-skilled workers do, but aid their productivity by speeding up the more routine bits of their jobs. But they do directly affect the need for people like assembly-line workers or those doing certain clerical tasks, whose jobs can be reduced to a set of instructions which a machine can easily follow (and which can consequently be mechanised). At the other end of the employment spectrum, as the example of the towel-folding robot neatly demonstrates, low-skilled jobs may not require much education but they are very hard to mechanise.

Clear evidence in favour of this hypothesis comes from a study by David Autor of the Massachusetts Institute of Technology and David Dorn of the Centre for Monetary and Financial Studies in Madrid, who used data from America's Department of Labour on the tasks involved in different occupations. By classifying these tasks as routine or non-routine, the authors were able to grade occupations as more or less vulnerable to automation. This method identified the jobs of secretaries, bank tellers and payroll clerks as among those most dominated by routine tasks. (Bus drivers and firefighters are among those at the opposite end of the spectrum.) The economists found that employment polarisation in America between 1980 and 2005 was indeed most marked where jobs vulnerable to automation initially predominated.

Although similar patterns of job polarisation have also been documented for Britain and other European countries, there was until recently no clear cross-country evidence about the importance of IT in explaining them. Filling this gap is a new study by Guy Michaels, Ashwini Natraj and John Van Reenen of the London School of Economics (LSE), which uses industry-level data from 11 countries—nine European ones, plus Japan and America—for the years between 1980 and 2004. Across the board, the economists find that industries that adopted IT at faster rates (as measured by their IT spending, as well as their spending on research and development) also saw the fastest growth in demand for the most educated workers, and the sharpest declines in demand for people with intermediate levels of education.

The authors also find that once the role of technology is accounted for, openness to trade has no effect on the extent of polarisation. However, the adoption of IT might itself be a function of globalisation. In a paper written with Nicholas Bloom of Stanford University and Mirko Draca of the LSE, Mr Van Reenen looks at rates of IT adoption within Europe. They conclude that industries

that faced more direct competition from Chinese imports after China entered the World Trade Organisation responded by innovating more in order to move up the value chain. Between 2000 and 2007, 15% of technology upgrading in Europe can be explained as a response to Chinese competition.

Polar exploration

This was good for European productivity but, given the effects of technology on employment, would also have contributed to the hollowing out of the labour market. Technology also enables some higher-end jobs to move to countries with large pools of highly educated workers. Mr Autor reckons that this is not yet a major factor explaining trends in American employment and wages. But it could become one over time, again altering the relationship between skills and job opportunities.

For now, though, the recession has exacerbated polarisation. In America blue- and white-collar occupations dominated by the middle-skilled shed jobs rapidly between 2007 and 2009. Employment in managerial and professional jobs and low-skilled ones in the service sector grew slightly or fell much less sharply. America's Bureau of Labour Statistics predicts that employment in low-skilled service occupations will increase by 4.1m, or 14%, between 2008 and 2018. The only major job category with greater projected growth is professional occupations, which are predicted to add 5.2m jobs, or 17%, over the same period.

For much of the 20th century, people's job prospects rose with each extra bit of education they got. Now the choices, like the labour market, have become more polarised. Policymakers still try to get more people to complete school. But that may not be enough. If a school education alone increasingly means declining job options, they now need to find a way to make sure young people go all the way through college, too.

Daron Acemoglu and David Autor, "Skills, Tasks and Technologies: Implications for Employment and Earnings", forthcoming in Handbook of Labor Economics Volume 4, Orley Ashenfelter and David E. Card (eds.), Amsterdam: Elsevier. (First paper here (http://econ-www.mit.edu/faculty/dautor/papers))

(http://econ-www.mit.edu/files/5554) David Autor, (http://econ-www.mit.edu/files/5554) The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings (http://econ-www.mit.edu/files/5554) (http://econ-www.mit.edu/files/5554) , Center for American Progress and The Hamilton Project, April 2010

Guy Michaels, Ashwini Natraj, and John Van Reenen, "Has ICT Polarized Skill Demand? Evidence from 11 Countries Over 25 Years", NBER Working Paper No. 16138, June 2010

Nicholas Bloom, Mirko Draca and John Van Reenen, "Trade induced technical change: The impact of Chinese imports on innovation and information technology (http://cep.lse.ac.uk/textonly/_new/staff/vanreenen/pdf/China_feb192009_v4.pdf) ", LSE Working Paper, June 2010

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