

# Did the Great Recession Increase Skill Requirements?

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What you need to know to get a job has changed drastically over time in the United States. Occupations that used to employ many mid-skill workers, such as assembly-line work or typing, now face falling employment shares.

Much of the disappearance in routine jobs like these is attributed to routine-biased technological change — that is, the introduction of technology that substitutes for some routine jobs and complements some more cognitive skills. Routine-biased technological change is related to skill-biased technological change, the scenario in which technology substitutes for unskilled labor. An example of routine-biased technological change is an ATM that can process a check for deposit. This ATM is a substitute for the worker who used to manually process checks, but it is complementary to the labor of a computer programmer who would be hired to program the machine.

While routine-biased technological change has been happening for decades in the United States, a recent *American Economic Review* article by Brad Hershbein of the W.E. Upjohn Institute for Employment Research and Lisa Kahn of the Yale School of Management found that the process was accelerated by the Great Recession of 2007-2009.

Kahn and Hershbein analyzed a novel dataset for their work: about 100 million online job postings in the United States, which included almost all of the online job postings from 2007 and 2010-2015. They calculated the proportion of postings that had requirements in four categories: education, experience, cognitive skills, and computer skills. They found that a job posting was more likely to post a requirement in each of the four categories after the recession than before the recession. From this, they inferred that after the recession, employers were more likely to require applicants to have high skills than before the recession. Such an increase in skill requirements for a job is known as “upskilling”; Kahn and Hershbein endeavored to find out what caused it with a new model.

The model they created explains various employment indicators in metropolitan statistical areas (MSAs) harder hit by the recession relative to MSAs that were less hard hit. They found that the shock of the recession raised the probability of posting skill requirements more in harder-hit MSAs than in less hard-hit ones and that this increase in skill requirements is seen within postings for a given occupation. This implies that firms in harder-hit

MSAs upskilled more than firms in less hard-hit MSAs.

Next, they explained investment in IT, a routine-biased technology, in firms in hard-hit MSAs relative to less hard-hit MSAs. They found that firms in harder-hit MSAs increased their IT investment more than firms in better-off MSAs. They also found that firms with more IT upskilled more than firms with less IT.

Finally, they ran the model to compare the upskilling in jobs denoted as routine-manual and as routine-cognitive. This distinction follows a 2010 National Bureau of Economic Research working paper by Daron Acemoglu and David Autor of MIT in which the authors labeled

“Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings.” Brad Hershbein and Lisa B. Kahn. *American Economic Review*, July 2018, vol. 108, no. 7, pp. 1737-1772.

jobs that involve routine physical tasks, such as installing a car door in a car factory, as routine-manual and jobs that involve routine mental tasks, such as receptionist work, as routine-cognitive. Kahn and Hershbein found that the upskilling was concentrated in

routine-cognitive jobs. They also found that routine-manual jobs declined in employment share and productivity while routine-cognitive jobs increased in employment share and wages. These findings offer an explanation for the known increase in the probability that college graduates will take a routine job. If routine-cognitive jobs are upskilling and increasing in wages, they will become more attractive to college graduates.

What does this mean for the story of routine-biased technological change? The authors conclude that the recession encouraged upskilling by increasing demand for routine-biased technology. This adoption of technology meant that employers demanded fewer routine-manual workers and demanded more skills from their routine-cognitive workers, accounting for the upskilling seen in the original data analysis. The authors find that these effects continued through 2015, after other employment indicators affected by the recession returned to pre-recession levels.

The authors don’t commit to one explanation for this phenomenon, but they favor the theory of Schumpeterian cleansing. Schumpeterian cleansing, advanced by Joseph Schumpeter of Harvard University in 1939, is an effect in which bad economic times force less-productive firms to shut down, while more productive and modern firms succeed. If this theory is the correct explanation, the recession forced the closure of unproductive firms that were not using routine-biased technology, while new or existing productive firms that were using routine-biased technology succeeded. EF