



How New Technologies are Transforming Work and How Leaders Need to Adapt

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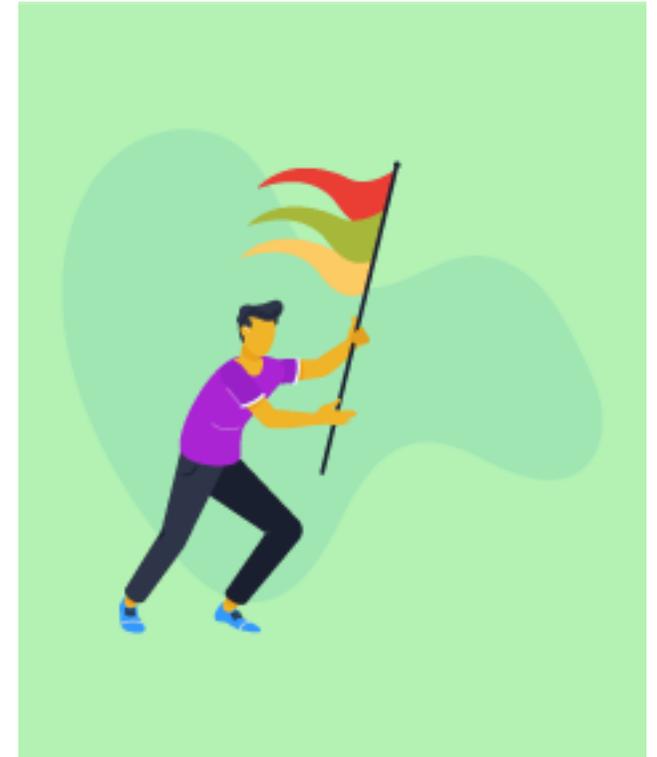
Business Roundtable

- On August 19, 2019, 200 CEOs overturned a 22-year-old statement that defined a corporation's purpose as maximizing shareholder return
- Statement on the Purpose of a Corporation
 - *Delivering value to our customers*
 - *Investing in our employees*
 - *Dealing fairly and ethically with our suppliers*
 - *Supporting the communities in which we work*
 - *Generating long-term value for shareholders*



Leadership is Adapting to a New Reality

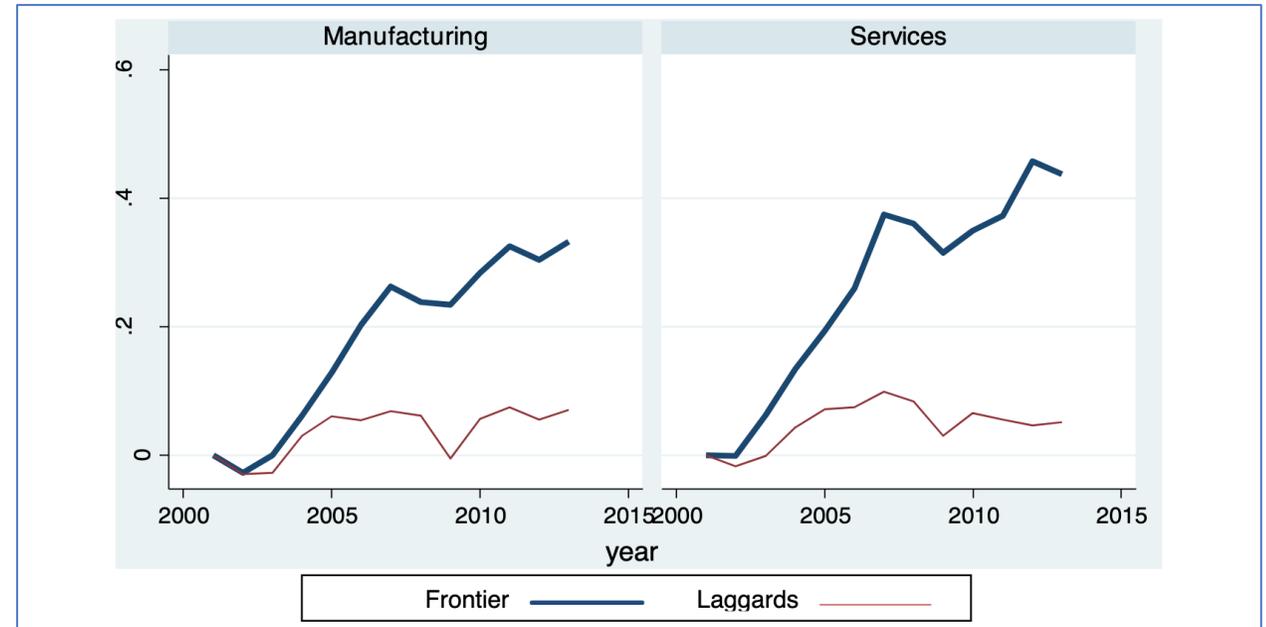
- In the long run, find creative approaches to achieve business objectives
- In the short run, create a highly involved and engaged team characterized by innovation and action
 - *Balance with need for short-term performance*
- Create a culture that brings together professionals with abundant but different talents
 - *Value personal mastery, competence, communication, adaptability, and ingenuity*
 - *Diversity of backgrounds, skills, experiences, and perspectives is important with the best possible joining and participating*
 - *Expect the team to take on the most difficult and most important problems*
 - *Skill development and continuous learning are a priority*



Frontier Firms and Competitive Advantage

- Harmonized data from 24 countries show frontier firms
- Management practices
 - *Replicate practices across lines of business*
- Talent and human resource management
 - *Establishing causality*
- Information and Communications Technology
 - *Europe versus US*
- Learning-by-Doing

**Labor Productivity
Value-Added per Worker
2001 - 2013**



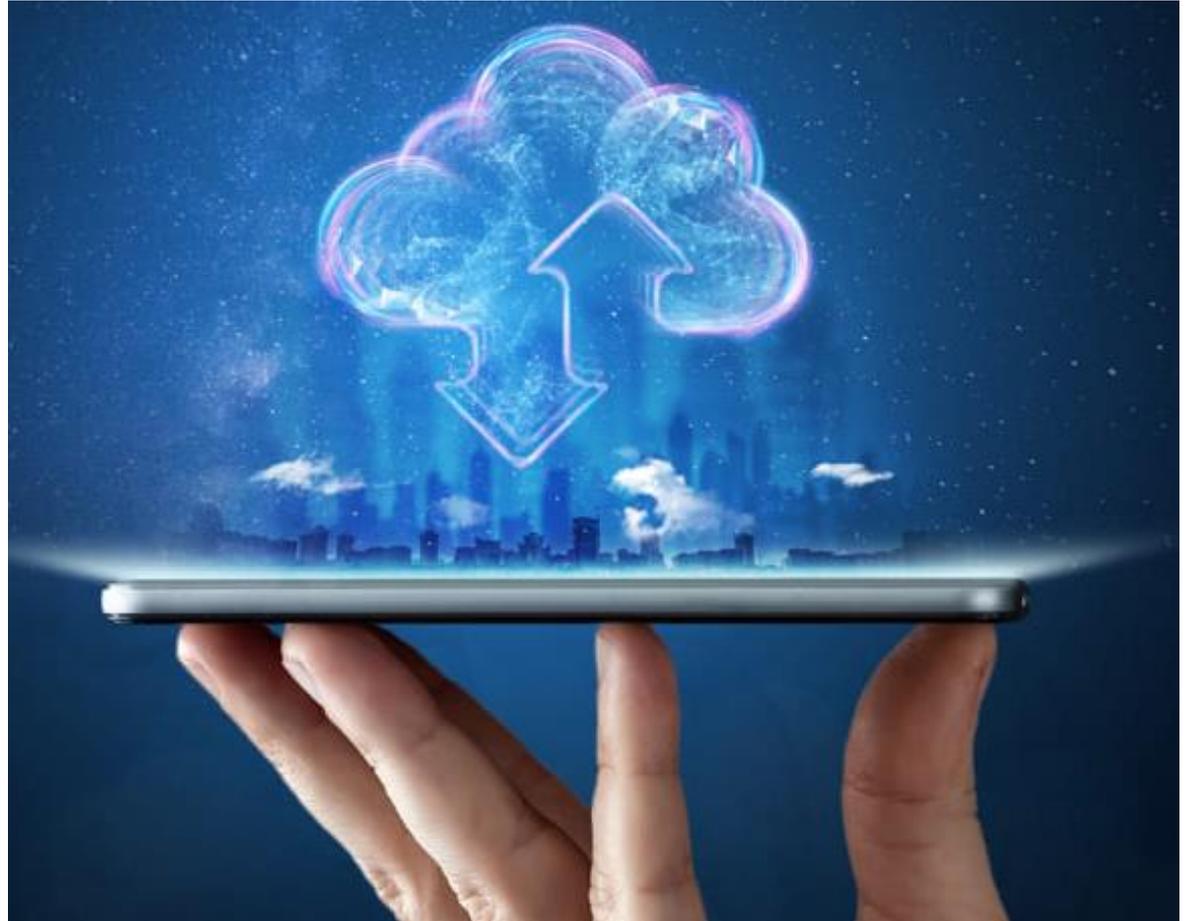
Source: Andrews, David, Criscuolo Chiara, and Gal Peter. N. 2016, "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", OECD Productivity Working Papers, 2016-05, OECD Publishing, Paris.

Persistent and sustained productivity differentials are the result of investments in intangible capital - the business know-how embodied in capabilities across the organization

The Challenges of AI and Cloud Computing

Many cloud migrations have failed:

- Double-bubble costs result from complex applications and nervous cutover
 - *Takes longer since both the cloud and data centers are running.*
- Hidden costs may arise when platforms, tooling, and services are not well understood
- System-integrator cost may continue into the third or fourth years
- Add-on services can be three or four times higher than necessary
- Financial-accounting rules and poor governance can exacerbate costs



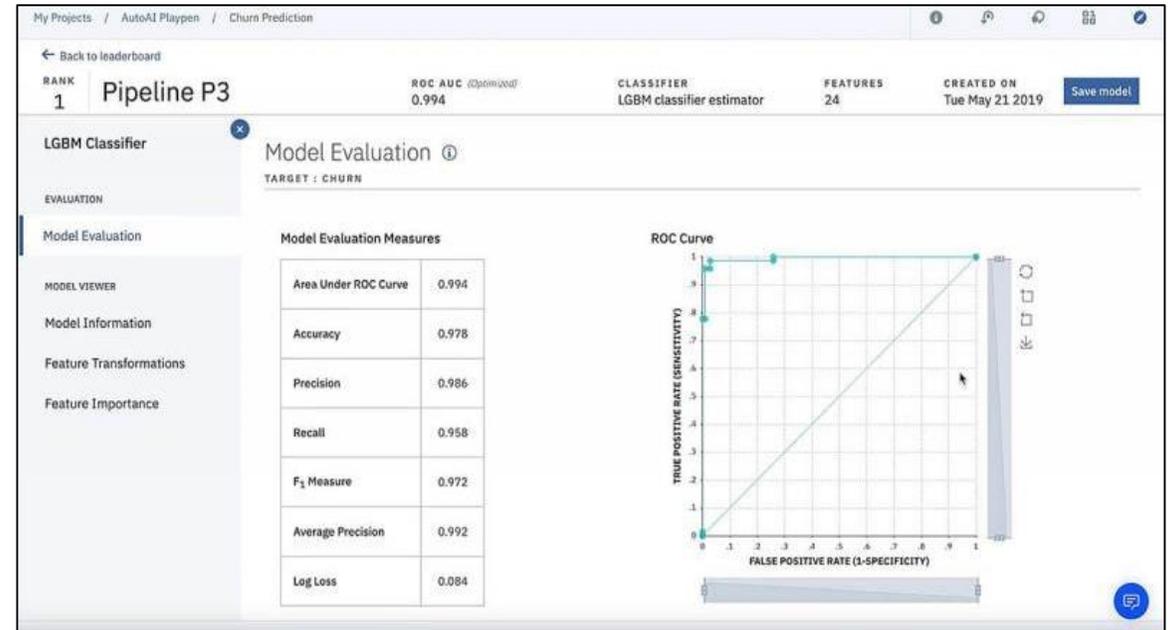
Building Entirely New Capabilities Is Needed

- Grocery stores typically carry 50,000 stock keeping units per store with 1,000 stores in a chain
- Sales forecasts are critical for inventory management, customer satisfaction, and financial performance
- Often MSE of store/SKU forecasts can be 20% - 30%
- With the advent of deep learning, neural network models MSE can be reduced below 10%
- The challenge is enormous cloud compute requirements are needed
- New data science, software and hardware skills are needed to deliver benefits at scale



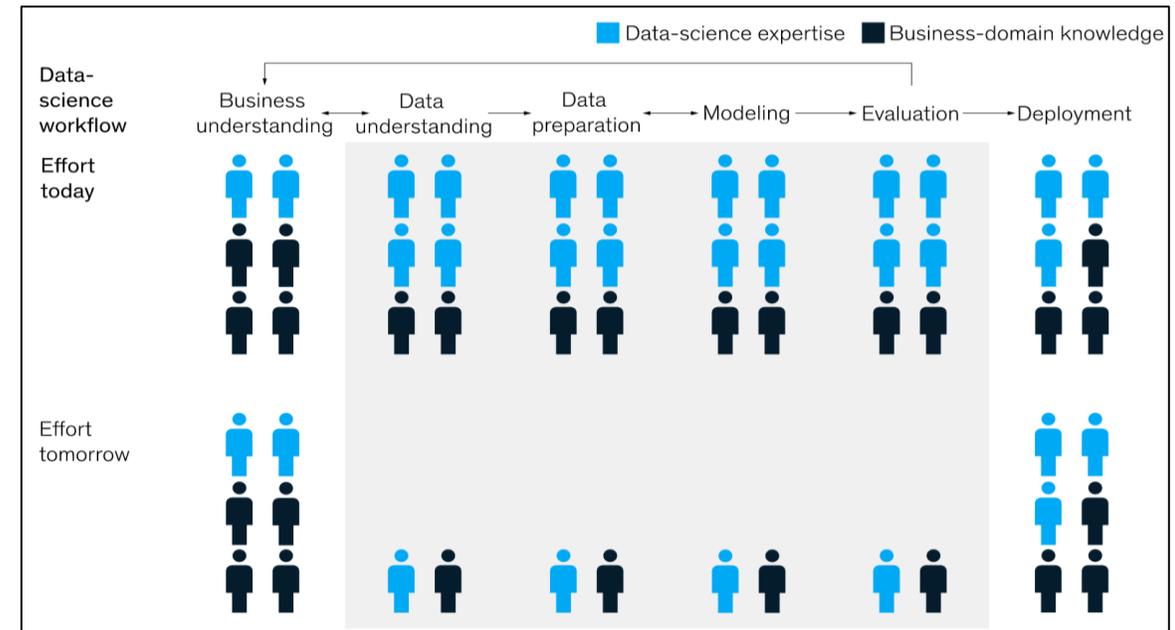
AutoAI Automates Model Lifecycle Management

- AutoAI automates: data preparation, model development, feature engineering, and hyper-parameter optimization
- Develop models by leveraging one or more available algorithms on open-source platforms
- Test and fine-tune models for performance and address risks, such as bias, fairness, and production readiness
- Deploy the models into production, embedding them into business and decision-making workflows, and monitoring their performance, making updates as needed



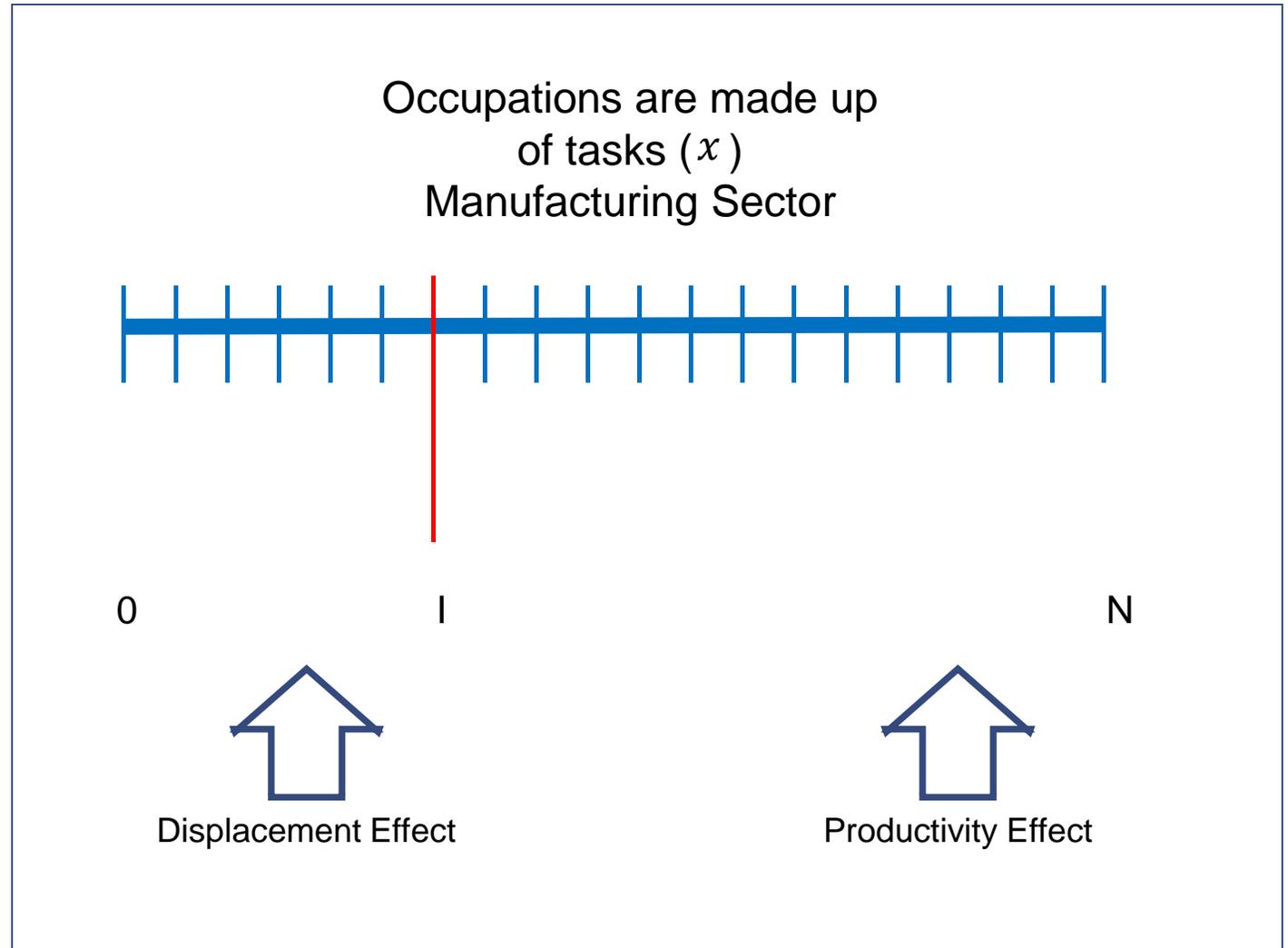
Business Process Transformation

- Transforming business processes is the key to productivity improvement
 - *With AI automated, time spent on transformation increases from 41% to 55% with less total time*
- Without automation, 60% to 80% of data scientists' time is spent preparing the data, once the initial model is built, 4% is spent testing and tuning code.
- Tuning model parameters has become a commodity, and performance is driven by data selection and preparation



All Jobs Will Change

- Technology-Task Mismatch Hypothesis
- Displacement is counteracted by improved productivity

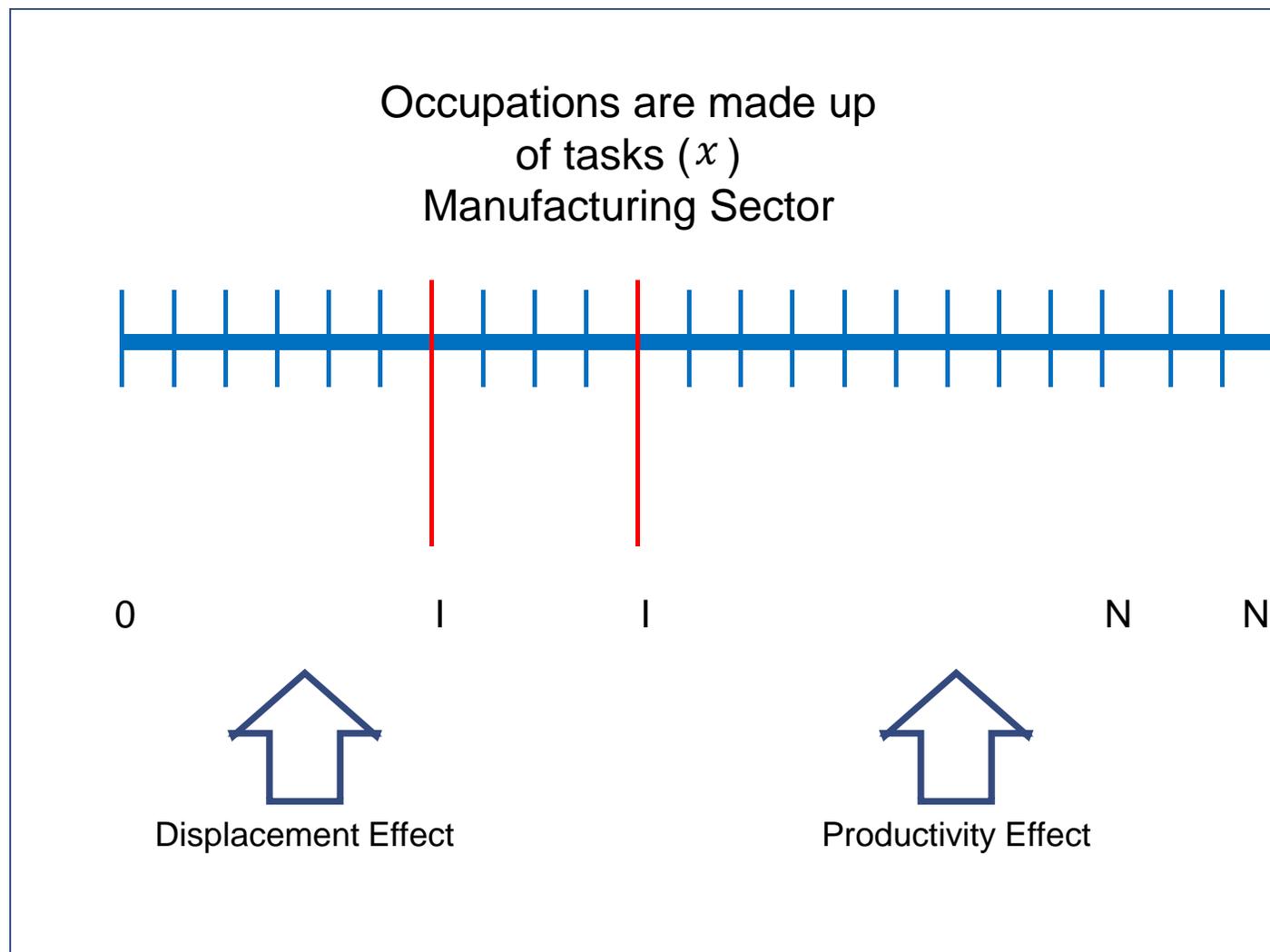


Source: Daron Acemoglu and Pascual Restrepo (2019. "Automation and New Tasks: How Technology Displaces and Reinstates Labor"; *Journal of Economic Perspectives*.

All Jobs Will Change

- Improved productivity results from business process transformation, new task creation, and occupation redefinition

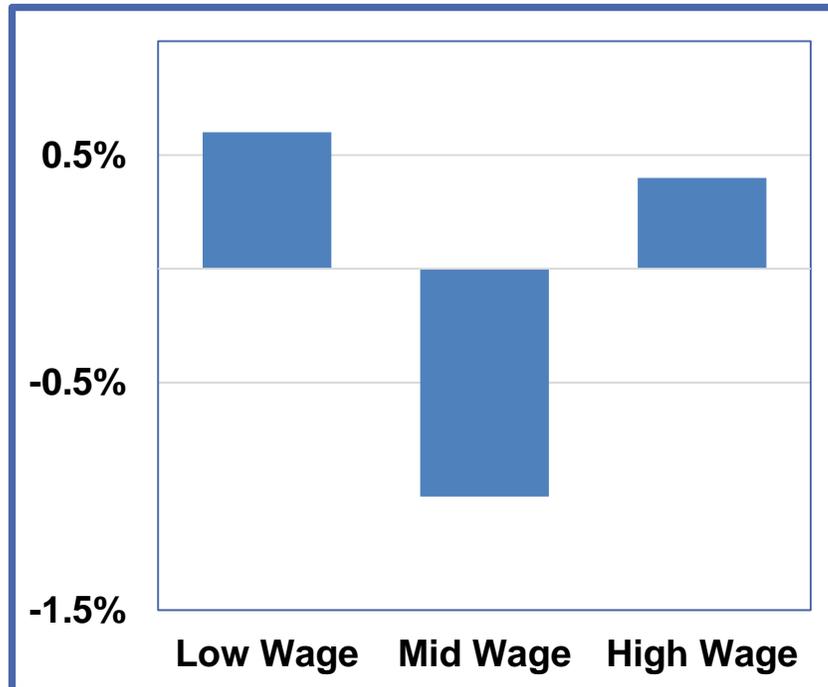
- Hypothesis: Slow adjustment
 - *Mismatch between the skill requirements of new technologies*
 - *Organizational resistance to change*



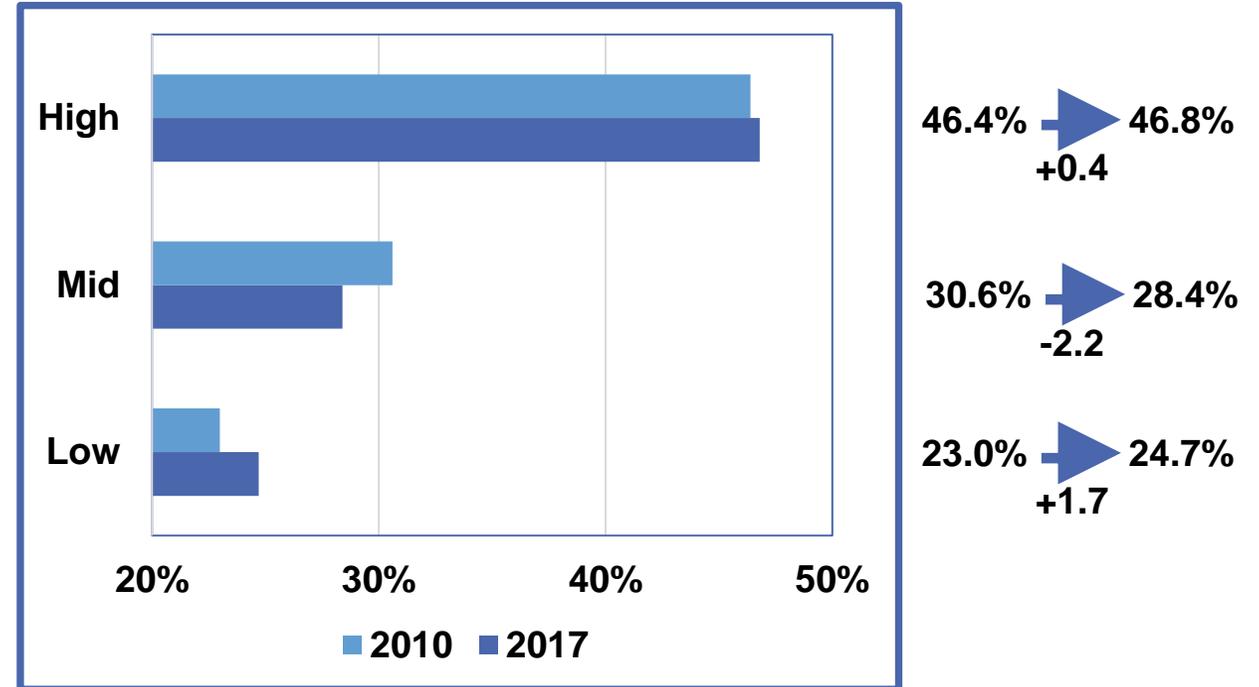
Source: Daron Acemoglu and Pascual Restrepo (2019). "Automation and New Tasks: How Technology Displaces and Reinstates Labor"; *Journal of Economic Perspectives*.

Few Occupations Disappear While Task Shifts are Frequent

Occupation Employment Share by Wage Tercile
Percentage Point Change
2010 -2017



Task Changes by Occupation Wage Tercile

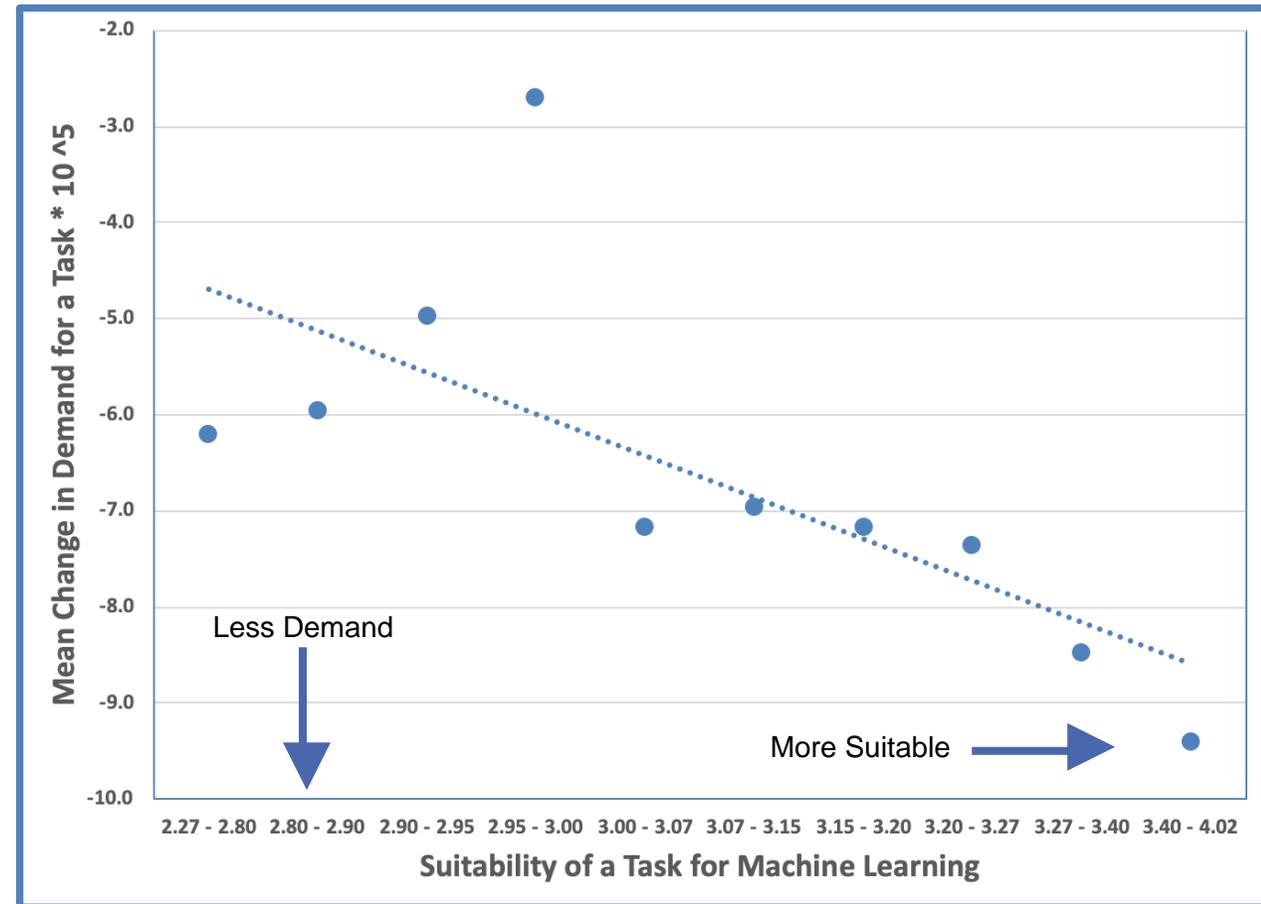


- The middle-class challenge is not disappearing jobs but but the need for skill ambidexterity for greater return to workers
- 88% of task content changes occur within rather than between job titles
- 100% of jobs will change

Work Is More Focused

- Across more than 18,500 tasks, workers were asked to perform 3.7 fewer tasks in 2017 than seven years earlier
- Among tasks that are *more* suitable for machine learning, workers were asked to perform 4.3 fewer tasks
- Conversely, among tasks that are *less* suitable for machine learning, workers were asked to perform 2.9 fewer tasks
- A 46% larger decline in demand for tasks more suitable for machine learning, compared to those less suitable

Change in Task Demand versus Suitability for Machine Learning *
2010 - 2017



*Source: Martin Fleming, Wyatt Clarke, Subhro Das, Phai Phongthientham, and Prabhat Reddy, *The Future of Work: How New Technologies Are Transforming Tasks*, MIT-IBM Watson AI Lab, October 24, 2019. For Suitability for Machine Learning, see: Brynjolfsson, Erik, Tom Mitchell, and Daniel Rock (2018) "What Can Machines Learn and What Does It Mean for Occupations and the Economy?", *American Economic Association Papers and Proceedings*, 108: 43–47

STEM Jobs Are Changing Rapidly

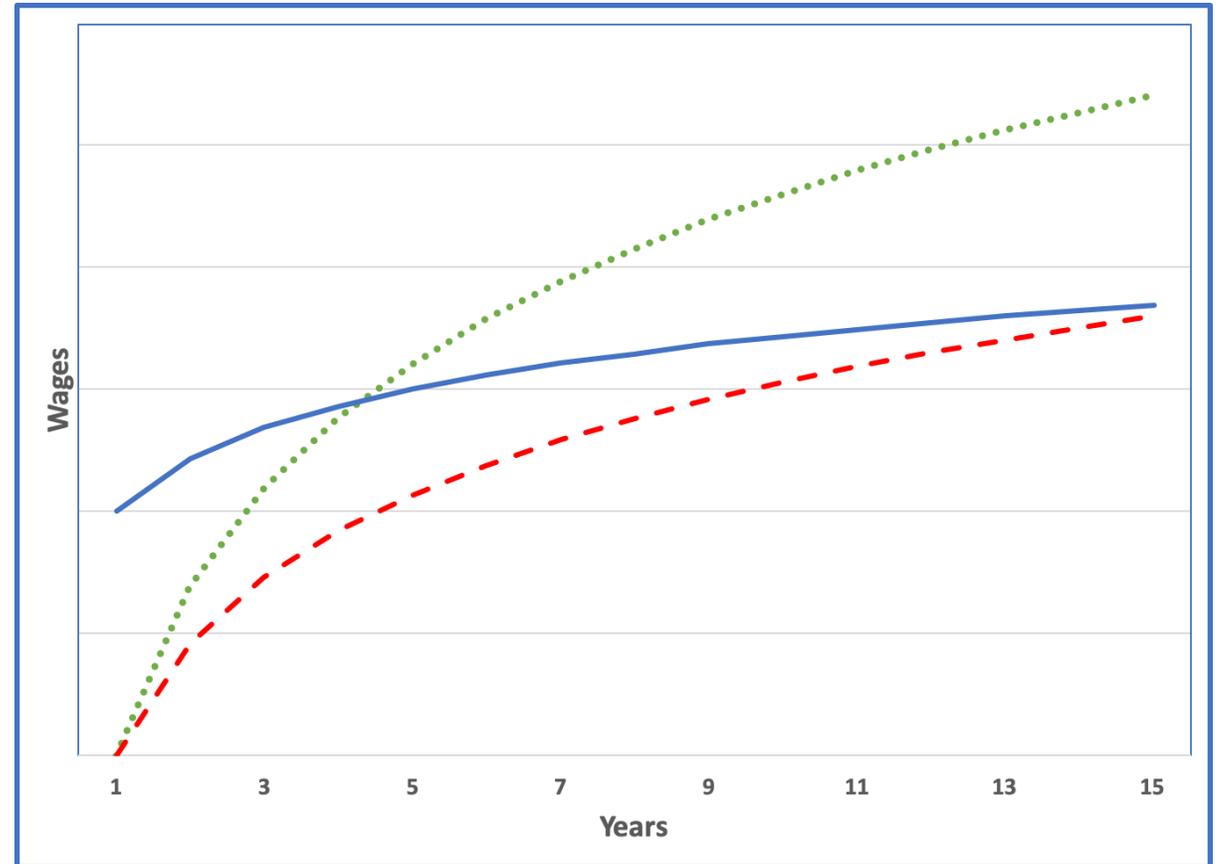
- Job skill requirements changed significantly between 2007 and 2017, and the rate of change was especially high for STEM occupations
- STEM jobs are more likely than others to require technical skills such as proficiency with specific software
- STEM jobs are much more likely than others to require experienced workers to learn new skills on the job that did not exist when they were in college



STEM Jobs Have Rapidly Changing Skill Requirements

- Jobs with high rates of change have higher starting wages and flatter age-earnings profiles
 - They disproportionately employ younger workers
- The earnings premium for STEM majors is highest at labor market entry and declines by more than 50% in the first decade of working life
- Flatter wage growth coincides with a relatively rapid exit of STEM majors from STEM occupations
- The *relative* return to ability is higher in careers that change less, because on-the-job learning gains accumulate

Worker Wage Profile



- High productivity and high task change
- Low initial productivity and low task change
- - - Low initial wage and limited task change

Source: David Deming and Kadeem L. Noray (2019), "STEM Careers and the Changing Skill Requirements of Work", *NBER Working Paper* No. 25065

AI Poses New Challenges For Leadership

- Leaders must continue to deliver financial performance
- At the same time, make significant investments in hiring, training and reskilling their workforce
- And all the while, leaders need to spend on new technologies and the transformation that support productivity and growth
- Competing business objectives can make for difficult, and often agonizing, leadership decisions