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THE LINK BETWEEN PRODUCTIVITY GROWTH AND JOBS

Productivity is the key driver of economic growth, but its link to more and better jobs is not always straightforward, and the emergence of new technologies has reinvigorated the debate. A vast literature has shown that productivity is ultimately the main driver of economic growth, accounting for more than half of the cross-country differences in GDP per capita. However, the effect of productivity growth on employment has been the subject of long-standing debates. Higher productivity increases the production capabilities of the private sector, expanding its surplus and allowing firms to expand production, employment, and wages. Nevertheless, higher productivity reduces the number of workers needed to produce a given amount of output, thereby possibly reducing labor demand. How productivity-enhancing investments translate into jobs depends on several factors that mediate these channels, and this link can be affected by new emerging technologies.

Recent work shows that productivity growth has been accompanied by net firm-level employment growth, as positive labor demand effects have outweighed the labor replacement effects of technology. The link between firm-level productivity growth and jobs is shaped by two opposite effects: (i) a negative direct labor-saving effect from higher efficiency, and (ii) a positive indirect effect. The indirect effect of productivity-enhancing technologies can emerge through new tasks for which labor has a competitive advantage. Further, productivity growth can increase final demand, which translates into an increased labor demand. In this sense, firms with higher productivity are able to expand and lower (quality-adjusted) prices, thereby increasing sales. Overall, the literature finds that the net employment effects have been positive in the past. However, it is worth noting that the net growth masks heterogeneous effects on the labor demand for different types of workers.

Demand effects and intersectoral linkages have also played an important role for the observed positive employment effects at the aggregate level. At the industry and country level, the positive

indirect effects of productivity growth on labor demand also appear to have outweighed the negative direct effects. Such effects may propagate across industries through direct or indirect linkages. In the direct case, productivity growth in supplying industries can stimulate labor demand further down the value chain and vice-versa, when linkages are strong. Similarly, increased wages or employment in one sector, as a result of productivity growth, may indirectly raise consumer demand for goods in other sectors, which themselves may not be experiencing productivity growth. Nevertheless, while aggregate effects across industries have been generally positive, within-industry employment effects can still be negative.

However, policy has a role in ensuring that productivity growth is followed by more and better jobs, especially as new technologies emerge, including AI, which is an important area for future research. In general, stronger competition appears to positively influence the effect of productivity growth on employment, potentially by ensuring that higher productivity leads to sales expansions. Further, reducing barriers to labor reallocation and supporting technology diffusion would allow for more positive effects of productivity growth. Lastly, the net employment effects of new technologies will also depend on the balance between labor displacement and “reinstatement” through new complementary tasks. Hence, various proposals have put forward to ensure “pro-worker” AI. These include tax reform, increasing and deploying government expertise related to AI, and increased funding for human complementary technology research. Further research will be critical in better understanding how policies can maximize the job creation potential of productivity growth and minimize any potential trade-offs.



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FEATURED STUDIES IN THIS DIGEST

Can We Have Pro-Worker AI? Choosing a Path of Machines in Service of Minds

Acemoglu et al. | Policy note | September 2023

The effect of generative AI on the future of work and inequality depends on societal choices, with the current trend favoring automation, labor displacement, and increased worker surveillance. However, an alternative “human-complementary” approach could

India’s Services Sector Growth: The Impact of Services Trade on Non-tradable Services

Avdiu et al. | Working Paper | July 2022

The paper investigates the influence of tradable services growth on non-tradable services in India. Using data from multiple rounds of the Indian Economic Censuses, the research concludes that an increase in tradable services

promote productivity and reduce economic inequality. Despite its potential benefits, the human-complementary approach faces challenges due to existing investments and corporate priorities. The authors propose policy measures to guide AI development in a more constructive direction.

employment positively affects non-tradable services employment and the number of non-tradable service firms. This impact is mainly driven by increased consumer demand for local non-tradable services, and the effects are more pronounced for female workers and small non-tradable service firms.

Is There a Trade-Off Between Productivity and Employment? A Cross-Country Micro-to-Macro Study

OECD | Report | August 2023

The report addresses the uncertain relationship between productivity and employment amid concerns about the impact of technological progress. It uses data from 13 countries spanning two decades to comprehensively analyze this relationship. The study finds a positive correlation between productivity growth and employment and wage growth, with various mechanisms at play among different groups of firms. The findings suggest that well-designed policies can help convert technological and organizational changes into higher employment and wage growth.

The Direct and Indirect Effects of Automation on Employment: A Survey of the Recent Literature

Aghion et al. | Working Paper | Forthcoming

This article surveys recent literature on the direct and indirect impacts of automation on employment. It contrasts two views: one predicting that automation reduces employment directly but creates new jobs indirectly, and the other emphasizing the positive direct effect of automation on employment due to increased productivity and demand. The authors provide empirical support for the latter view, and discuss the implications for taxing automation technologies like robots.

OTHER ESSENTIAL READINGS ON THE TOPIC

New Frontiers: The Origins and Content of New Work, 1940–2018

Author et al. | Working Paper | August 2022

The authors explore the role of emerging job categories, referred to as "new work," in mitigating the effects of automation on labor demand. Their study establishes a causal relationship between technological innovations that complement various occupations, the demand shocks that boost the need for certain occupations, and the impact of augmentation and automation innovations on the emergence of new work and labor demand within specific occupations.

Is Automation Labor-Displacing? Productivity Growth, Employment, and the Labor Share

Author & Salomons | Working Paper | February 2018

The study investigates the impact of automation on labor and its role in declining labor shares in developed countries. It explores different ways automation affects labor's share in output, analyzing data from 28 industries across 18 OECD countries spanning from 1970. The findings suggest that automation hasn't caused job losses but has reduced labor's share in the value of output. This reduction has become more pronounced over time,

particularly in the 2000s, signaling a trend toward labor-displacing automation.

The Wrong Kind of AI? Artificial Intelligence and the Future of Labour Demand

Acemoglu & Restrepo | Journal Article | March 2020

This study investigates the potential effects of artificial intelligence (AI) on various aspects of our lives, particularly the organization of production. AI can either automate tasks previously performed by humans or create new tasks where human labor can be productive. The prevailing trend toward automating tasks poses challenges like stagnating labor demand, declining labor share in income, increased inequality, and lower productivity growth. However, there is an opportunity to pursue a more balanced approach, fostering AI that generates new opportunities for human employment and better economic and social outcomes.

Tasks, Automation, and the Rise in US Wage Inequality

Acemoglu & Restrepo | Journal Article
October 2022

The study introduces a general theory that quantifies the impact of automation on wages and inequality. It reveals that automation is responsible for approximately 50% to 70% of the changes in the U.S. wage structure over the last four decades, resulting in reduced wages for workers specializing in routine tasks in rapidly automating industries. Those not displaced from their roles experienced wage gains, such as individuals with post-graduate degrees or women with college degrees.

The Adjustment of Labor Market to Robots

Dauth et al. | Journal Article | May 2021

Using detailed administrative data from Germany, the study investigates how local labor markets adapt to the introduction of industrial robots. It finds that robot exposure in manufacturing leads to job displacement effects, but these are compensated for by new job opportunities in the services sector. The effects are particularly felt by young workers entering the labor force, who adapt their educational choices, shifting away from vocational training toward higher education. Additionally, the study indicates that workers in occupations with complementary tasks, such as managers and technical scientists, have benefited from the presence of industrial robots.

The Innovation-Employment Nexus: A Critical Survey of Theory and Empirics

Calvino et al. | Journal Article
October 2016

This study explores the multifaceted relationship between technical change and employment, a central topic in policy discussions, especially during economic recessions. It delves into the theoretical aspects of various compensation mechanisms that affect employment following the introduction of innovations. Additionally, the essay reviews recent empirical evidence, highlighting methods and limitations, and attempts to outline key empirical patterns and facts concerning the connection between innovation and employment.

RECENT PAPERS ON THE BROADER JOBS' AGENDA

Technology and Jobs: A Systematic Literature Review

Hotte et al. | Journal Article
September 2023

The paper examines the impact of technological change on employment across the last four decades, categorizing it into five main technology types. It reveals that while technology can displace labor, compensating mechanisms often generate or restore employment, countering concerns of widespread technological unemployment. However, blue-collar workers have been negatively affected, emphasizing the importance of upskilling and reskilling strategies and targeted support systems in policymaking.

Closing the Gender Gap in Salary Increases: Evidence from a Field Experiment on Promoting Pay Equity

Alfitian et al. | Working Paper | June 2023

The authors conduct a natural field experiment involving 623 middle managers and 8,951 subordinate employees in a large technology firm to address pay equity issues. They identify a gender gap in both salary levels and salary increases. Through treatments involving gender-blind reallocation of salary increase budgets and decision guidance, they successfully eliminate the gender gap in salary increases while maintaining desired performance differentiation, demonstrating that simple adjustments to the salary review process can prevent gender gaps from widening in employees' careers.

Labor Market Regulation and Firm Adjustments in Skill Demand

Bottasso et al. | Working Paper | June 2023

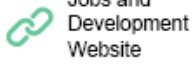
The authors examine the impact of labor market regulation changes on firm skill demand adjustments using comprehensive data from Italy. Specifically, they analyze the consequences of a reform that reduced firing costs for permanent employees and tightened regulations on temporary contracts to enhance job stability. The results suggest increased layoffs of unskilled permanent employees and reduced hiring of unskilled workers on temporary contracts, with no significant effect on skilled workers or permanent hires.

CONTRIBUTORS

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Want to share your recent publication or event for inclusion in our monthly newsletter? Email kpela@worldbank.org

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