

ECO200 (Microeconomic Theory)

Automation and the Future of the Economy: An Assessment

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Introduction

The development of artificial intelligence (AI) has “skyrocketed” across the globe over the last eighteen months (McKendrick, 2021). In many ways, COVID-19 has accelerated the growth of automated technologies as challenges related to data analytics and automated production pushed the realm of AI forward. Fifty-two percent of companies polled by PWC accelerated AI adoption in the pandemic’s wake (Greenstein & Rao, 2022).

If labour and capital are substitutes, switching to technological inputs can lead to short-run unemployment with workers becoming displaced and not yet reemployed. This could trouble short-run labour markets and possibly result in structural unemployment if workers with obsolete, non-transferable skills lose jobs. Pressure would fall on the public sector to re-educate. Though labour, an endogenous factor to output, might fall, an increase in total factor productivity or higher nominal capital levels are likely to balance out society’s production function.

If capital and labour are complements, more frequent automation will increase the demand for labour which if resolved could benefit the economy with higher employment and productivity.

Minimum Wage and Automation

On one hand, an rising minimum wage benefits low-skilled workers by raising the opportunity cost of not working and raising income for the impoverished. A \$15/hour minimum wage in the USA could move nine hundred thousand out of poverty by 2025 if implemented (Wolla & Burton, 2022). On the other hand, increasing minimum wage reduces job opportunities for unskilled workers as the steeper marginal rate of technical substitution makes capital relatively cheaper, incentivizing producers to substitute inputs. Notwithstanding the replaced workers, automation can provide job opportunities for high-skilled workers that know how to operate sophisticated

machinery. More physical capital in production processes would motivate future workers to acquire skills that complement technology, raising societal human capital.

An important clarification is that while increasing the minimum wage will accelerate displacement of workers (away from automatable markets), it won't necessarily result in increased unemployment in the long run. Low-skilled displaced workers will eventually flock toward other markets, such as ones with shortages of labour or where the opportunity cost of hiring capital is high. Another reason for this is that with time, workers may become closer complements to capital as opposed to substitutes; an example of this is perhaps the earliest automated device – the pressure cooker – and the cook that learned to work with it (Brozen, 1965). A consequence of employing more machinery could also be the opening of new complementary job opportunities, such as technicians.

Evidently, in the long run, the detriments of higher minimum wage aren't as severe.

Automation and Economies in the Production Process

Large companies are often able to dominate markets by undercutting their competition on costs. Because large producers produce (and hence buy inputs) in bulk, they pay less for each unit of output, leveraging lower long-run average total cost curves to perform economies of scale and sell with greater margins. As an example, an airline's first plane will be much more expensive than its one hundredth plane due to economies of scale. Technology particularly contributes to this process because machines can be bought in bulk as opposed to workers which cost the company based on their productivity (skill) rather than nominal amount employed. This means that a bulk purchase of machines resembles an up-front fixed cost for the company. While the amount paid as fixed cost might depend on the number of physical capital bought, it will never again have to be paid,

regardless of the desired quantity produced. Economies of scale also mean that smaller firms who wish to enter monopoly markets won't be able to buy inputs in bulk, facing higher prices per input and consequently restricting their productive capacity.

Large businesses with supreme research and development budgets also have more capacity to further innovate their production and enhance their cost advantage over smaller rivals. Computational resources are also predominantly more efficient than humans in tasks like communication or energy utilization; this allows capital-intensive businesses to minimize negative externalities in production.

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