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The winners and losers of the robot revolution

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The age of automation promises growth in production but also heralds a widening of inequalities, with low and medium-skilled workers on one side and highly-skilled, increasingly well-paid workers on the other. Furthermore, the rise in capital stock that is inherent to automation is set to widen the inequality gap further, given that capital ownership is more unevenly distributed than labour income.

Technological progress sparks enthusiasm and apprehension in equal measure. **The debate around humans being replaced by machines** is centuries old. Today, however, it **is more acutely relevant than ever**, **with the boom in new robotic technologies and automation in general**.

A week does not go by without us learning about some new application of the robotic revolution and artificial intelligence. Automatons replacing cashiers, robots forcing out workers, autonomous cars replacing drivers, algorithms substituting for stock market traders, computers overtaking legal assistants, and the artificial intelligence software AlphaGo beating highly experienced players of Go are but a few examples.

Entire sectors of the economy are affected: industry obviously, but also finance, agriculture, transport, medicine, and so on.

We are just at the beginning of a revolution whose effects on employment and revenue distribution are still unclear.

On the consequences of this ongoing revolution, there are two opposing camps:

- The so-called **« techno-optimists »** see the rise in automation bringing productivity gains and thus an increase in wealth and prosperity for society. Notwithstanding temporary technological unemployment, the impact should be a general increase in living standards, leisure and wellbeing.

- Opposed to the techno-optimists, there are the **« techno-pessimists »** who emphasize the unprecedented widening of equalities that the robotic revolution entails.

Economic history has, thus far, proved the techno-optimists right; although the **major breakthrough innovations of the past** such as the steam engine or electricity did lead to substantial **job losses in the short term**, these were **offset by the creation of new, more productive jobs**, with increased income for workers, which went hand in hand with demand for new products and services, in turn fuelling growth in employment.

For the techno-optimists, however, **the robotic revolution is not like the major technological innovations of the past**. In the past, breakthrough technologies allowed for complementarity between labour and capital. But today, even though there are still complementary effects, the robot revolution, they argue, mainly brings a **substitution of labour by technologies (robots and other ICT-based systems)** – that is, capital.

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The robotic revolution is, by nature, a technological shift towards a more capital-intensive production model.

What happens when machines replace humans? At least three things:

- The **capital/income ratio** (i.e. the evolution of the distribution of income in favour of capital) **increases**.
- **Unit output increases** because machines enable productivity gains.
- **Wages fall** because robots increase the actual supply of labour (workers plus robots).

At this point, however, a crucial distinction must be made between:

- The **workers carrying out routine tasks, generally** (but not always) **low or medium-skilled** (located at the bottom or, more often, in the middle of the income distribution scale, i.e. workers from the middle and working classes), who **are perfect (or near perfect) substitutes for robots**, and
- The **workers performing non-routine tasks, generally** (but not necessarily) **highly-skilled**, who **are little exposed to automation** (technical progress biased in favour of skilled workers).

While **the first group**, hit full-on by the substitution of humans by robots, **see their jobs disappear and their wages stagnate, or even fall, the second group enjoy regular salary increases**, both because the demand for their services increases and because their productivity rises when they work with robots.

The rise of automation contributes to widening inequalities, not only by disproportionately favouring highly-skilled workers at the expense of low- and medium-skilled workers, but also by skewing the distribution of added value away from labour towards capital, whose ownership, highly concentrated, is much more unequally distributed than labour income.

Hence, the idea by Bill Gates, among others, to **tax the robots in order to redistribute the gains of automation between the winners and losers** (notably by financing training for out-of-work workers and by improving the education system).

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