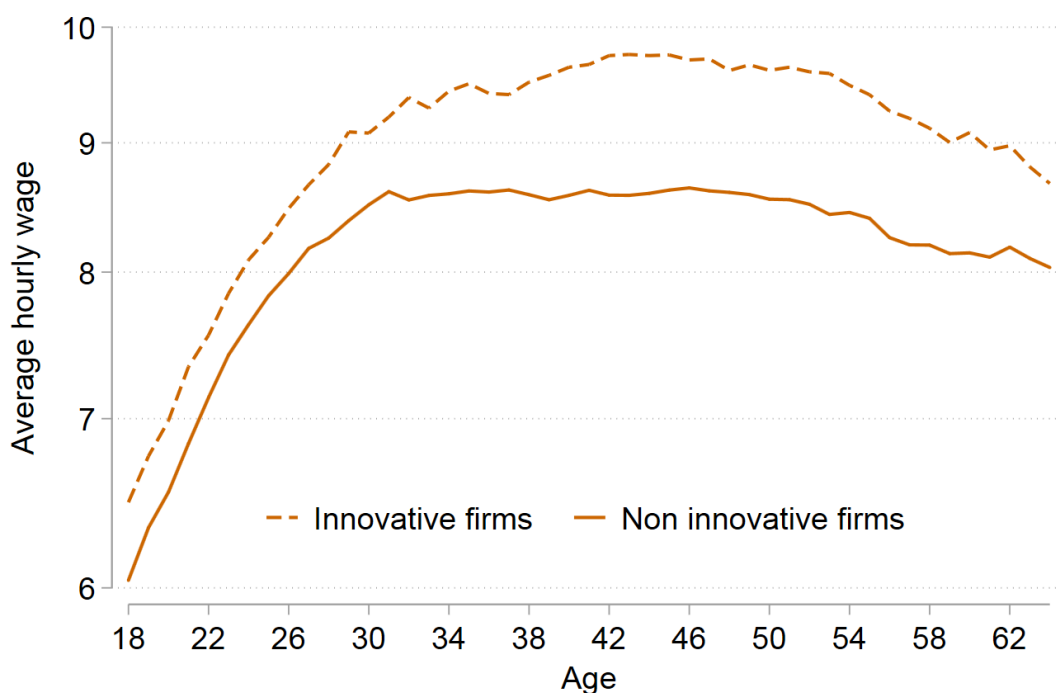


# The impact of innovation on the wages of low-skilled workers

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*Technical progress forces workers to adapt to new production methods. It thus favours the most highly skilled workers as they earn relatively higher wages than the least skilled. However some less qualified employees can also benefit from these technical changes provided, they have the skills sought after by innovative firms.*

**Chart 1: Average hourly wage by age and skill level for low-skilled occupation workers in innovative and non-innovative firms**



Source: [Aghion et al. \(2019\)](#).

*Note: Data for the United Kingdom taken from the Annual Survey of Hours and Earnings, matched to the Business Expenditure on Research and Development survey (2004-2016). Hourly wages in GBP on a logarithmic scale.*

## Skill-biased technological change

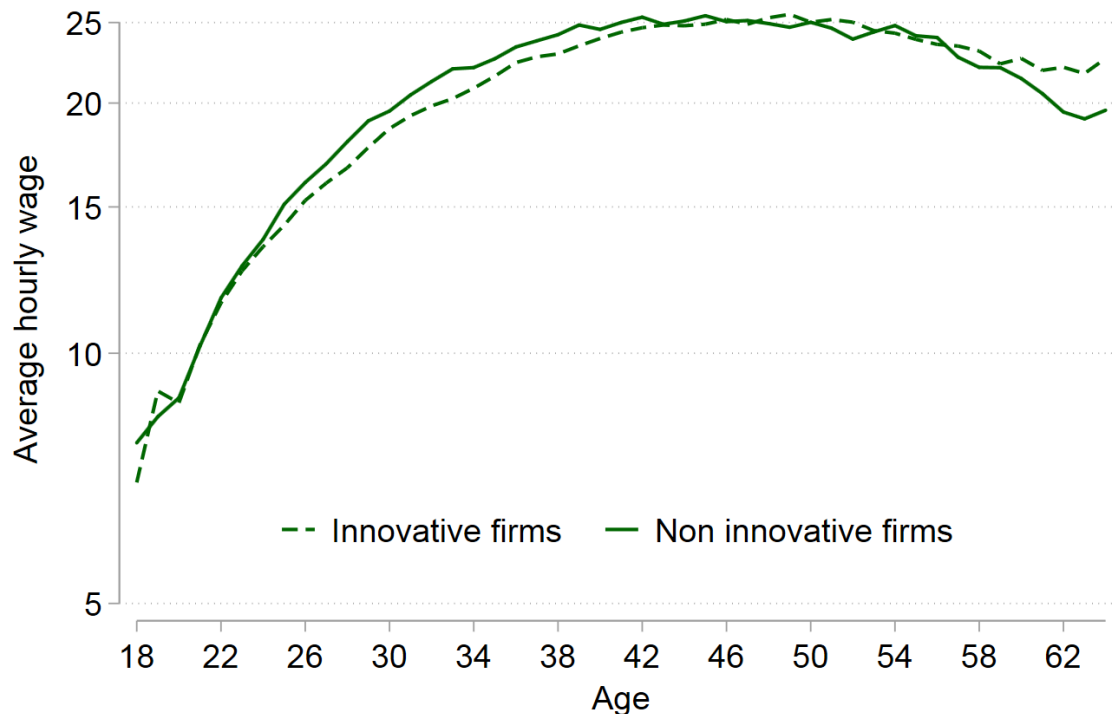
Over the past thirty years the technological revolution has transformed the wage and employment dynamics in developed economies. One of the most striking consequences of this transformation has been the widening wage bias of technical progress (or [skill-biased technological change](#)), which was notably analysed by the economists [Katz and Murphy](#) in the 1990s. Katz and Murphy found that in the United States between 1979 and 1987, the average weekly wage of young male college graduates increased by approximately 30% relative to workers of the same age without qualifications. The theory of skill-biased technological change states that technical changes have transformed firms' skills demand in favour of a small population of skilled workers able to adapt to new production methods. The introduction of computers in the workplace is the archetypal example of a technological change that led to gains in the productivity of the most highly skilled workers, [and thereby widened the wage gap](#).

However, as the economists [Gregg and Manning stated in 1997](#), it is unlikely that these trends will reverse on their own and we should expect to see a deterioration in the relative working conditions of the least qualified individuals. This somewhat pessimistic view of the effects of technology should nevertheless be tempered. First, the wage gap observed during the adoption phase of new technologies may subsequently narrow, under certain conditions. This is the type of dynamic observed in the construction sector in Europe since 1300, for example, by [Van Zanden in 2009](#). Second, low-skilled workers can benefit from technical progress, provided they have certain skills.

## Low skilled employees can also benefit from technological change

Using data from the United Kingdom, [Aghion et al. \(2019\)](#) demonstrate that following a technological change, there is an increase in demand for technical skills and therefore for skilled workers. But this effect benefits all skilled workers, irrespective of their occupation or the firm that employs them. Conversely, for less or low-skilled workers, whether they are employed by an innovative or non-innovative firm can make a significant difference. Chart 1 therefore compares the average hourly wages of firms that invest in R&D and those that do not, for occupations that require minimal formal education and Chart 2 for those that require advanced training or qualifications. For the former, there is a persistent wage gap throughout the working life with a premium for those employed in innovative firms, while no such difference appears to exist in the case of the latter.

*Chart 2: Average hourly wage by age and skill level for high-skilled occupation workers in innovative and non-innovative firms*



*Note: see Chart 1.*

Based on this finding, the study goes on to show that even in a highly advanced technological environment, the most innovative firms still value some low-skilled tasks and therefore pay higher wages than a less innovative firm would for those occupations.

The underlying idea is that all firms value (highly) qualified workers (typically managers, engineers, etc.) on the basis of their technical skills and reputation acquired during their career. To an extent, these characteristics are observable and verifiable, for example by reading a CV. A firm can therefore replace a skilled worker with another worker who theoretically has comparable skills with a relatively small risk of error.

Conversely, the most innovative and technologically advanced firms tend to value more than other firms certain skills of their less qualified employees.

These firms generally have a flatter organisational hierarchy than the average, which translates into increased complementarity between the different workers, particularly between those in low-skilled occupations and those (generally more qualified), who perform more complex and technical tasks. Therefore, in these types of structures, employing individuals who regularly make mistakes is extremely risky. These firms have therefore developed a critical need for the skills of their less qualified workers, such as initiative and reliability. These “soft-skills” are not normally recognised with a qualification and are

therefore difficult to observe and, potentially, difficult to replace. More innovative firms are thus willing to pay a wage premium to their employees and to invest more in training their workers. The study shows that, all else being equal, a low-skilled worker employed in an innovative firm earns 24% more than an employee with identical skills and experience but working in a non-innovative firm. Furthermore, on average that same employee will stay twice as long in the firm.

### **Do these findings contradict skill-biased technological change?**

How can these findings be compatible with the skill-biased technological change and the widening wage gap based on educational attainment described above? In reality, the phenomenon highlighted in the article by [Aghion et al. \(2019\)](#) only concerns a small number of low-skilled workers, as the most innovative firms have fewer and fewer jobs requiring little or no higher education (these account for only 20% of jobs in the most innovative firms but 64% of jobs in non-innovative firms). In practice, they prefer to outsource the majority of these tasks (particularly security and cleaning) in order to focus their attention and their resources on the few low-skilled occupations that they deem essential to their production process. These are the only occupations that will then benefit from a wage premium.

Ultimately, the most highly skilled workers do indeed benefit most from technological progress, and, unlike the least skilled workers, their labour market power is considerable irrespective of their employer. Nevertheless, these findings demonstrate that even in an increasingly technological environment in which technical abilities are more and more prized, certain skills that do not require a formal qualification continue to be in high demand.