

Firms and earnings growth gaps by education

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This Data Insight uses the Longitudinal Education Outcomes (LEO) dataset – England to compare the labour market trajectories of students who followed academic and vocational pathways after their GCSEs. The insights point to a substantial gap in earnings growth, with students who followed academic education routes experiencing higher earnings growth in their careers. The research highlights the role of firms in explaining and amplifying this difference.

Background

In the UK, nearly one in two students completing upper-secondary education do so by following a vocational pathway as opposed to an academic one. This is line with what we see in comparable European countries such as France or Germany (OECD). Despite the importance of curriculum tracking in secondary education across countries, and the policy attention it receives both in the UK and overseas, we know relatively little about its impact on young people's future outcomes and its contribution to social inequality.

In the English education system, curricular tracking occurs later than in other countries. Students typically study in comprehensive schools until they take their GCSEs at age 16. At that point they can either enrol in the academic A-Levels qualifications, which are the main gateway for university, or they can study towards vocational (or technical) qualifications, which are supposed to prepare students for a career. Historically, the vocational offer has been very fragmented, with myriad qualifications available across subjects and levels, stunting students' progression and contributing to limited recognition among students, families and employers.¹ This is now changing, with serious attempts at streamlining the offer: previous UK Governments introduced T-Levels, technical qualifications on par with A-Levels, while the latest Post-16 Education White Paper made plans for the introduction of V-levels, a new vocational qualification.

Whether students follow an academic or vocational path, and at what level they study, will depend on a host of reasons, starting with students' school performance, their individual ambition and inclinations, family and social background, as well as the role of teachers and institutions in providing guidance and support. The presence of all these factors makes it hard to ascertain the impact of post-16 education on future outcomes. Unsurprisingly, both national and international evidence on this topic is scarce. In England, some studies relied on survey data to compare the employment and wages of workers with different self-reported types and levels of qualifications.^{2,3,4,5} But without access to rich administrative data, it was harder for these studies to account for differences in academic performance and socio-economic background across groups.

A recent study⁶ used Longitudinal Education Outcomes (LEO) data to study the impact of studying in Sixth Form colleges (which specialise on academic provision) or Further Education colleges (offering a broader vocational-oriented range of qualifications) on earnings by age 30. They were able to use differences in the local availability of different types of providers as a source of variation in post-16 choices that is arguably independent of other factors, while also controlling for students' prior test scores and individual characteristics. They found a negative effect on earnings for FE students that would have otherwise enrolled in academic colleges. However, the study provided little evidence of how the labour market trajectories of the two groups of students differed, with no clear explanation for what might be driving their findings.

Summary

This Data Insight is based on the analysis of the [Longitudinal Education Outcomes dataset \(LEO\) for England](#), an ADR UK flagship dataset linking the de-identified education records of millions of individuals in England with their tax and benefit records. Thanks to LEO, we were able to observe the detailed education choices students make after their GCSEs and to classify them in two groups, reflecting the nature of the curriculum they follow: an '**Academic**' group mostly focusing on studying A-Levels, and a '**Vocational**' group focusing on career-oriented vocational qualification (e.g. BTECs).

We were then able to follow students' labour market trajectories as they complete education and start working. We found that a substantial earnings gap between academic and vocational students opens since their early years in the labour market, and expands rapidly. After 12 years of work, the academic group earns between £12 and £10 thousands more annually, depending on gender. In order to understand this gap, we explored how young workers' employment patterns across sectors and firms differ by education. We found that academic-educated students are both more likely to start working in higher-paying sectors when they finish their studies, and to move to firms with higher pay premia within the first few years of work.

This explains roughly 30% of the difference in earnings growth, but as workers settle into firms and job moves become rarer, job mobility becomes less relevant. What we found to make an increasing difference at this point is whether the firms young workers are employed with offer more opportunities for pay growth. In this respect, we found that academic-educated individuals are more likely to start and continue their careers in firms offering stronger pay growth. This explains 41% and 39% of the education earnings growth gap observed over the first 12 years of work experience (for males and females respectively). The remaining gap may have to do with how workers' earnings grow with experience *regardless* of the firm they are employed in. In other words, even after accounting for sorting patterns across firms, we still see that academic students' earnings grow faster. One potential explanation for this is that a more academic curriculum fosters young people's ability to learn on the job and grow more productive throughout their early careers. Whether this is the case or other factors are at play, including pre-existing differences in learning ability across education, remains an open question that future work will need to address.

However, our analysis highlights a potentially substantial role of firms in determining earnings inequality associated with post-16 education choices. In this respect, our analysis not only hopes to contribute to a better understanding of the structural inequalities linked with education, but can also offer important lesson for policymakers. If the higher returns to pursuing a more academic-oriented education partly depends on the type of firms it channels young people into, then an improved matching process between vocational graduates and 'good firms' could improve the earnings of non-academic students. This prospect rests on the assumption that jobs in higher-pay growth firms can always be equally available for academic and vocational students. The extent to which this is true of different sectors and areas of the country can tell us how far policy can go in reducing labour market inequalities stemming from post-16 education tracking.

What we did

Our analysis exploits the unique linkage of the individual-level education records available across the National Pupil Database (NPD), Individualised Learner Record (ILR) and the Higher Education Statistics Agency (HESA) data, with the earnings and employment information collected by HMRC for the 2004-2021 tax years, known as the [Longitudinal Education Outcomes \(LEO\) dataset](#). In the analysis we focus on the cohorts of students who completed their GCESs (Year 11) between academic years 2001/02 and 2004/05, as these are the individuals we can track for the longest time.

The primary interest of this project is how the *nature* of the upper-secondary curriculum (whether academic or vocational) shapes young workers' labour market trajectories. To answer this question, we decided to focus on students **who achieve at least one Level 3 qualification** (equivalent to one A-Level) to ensure we only compare groups that leave secondary education with the same *level* of education. This group covers around **64%** of a typical cohort.

Thanks to the rich information recorded in the NPD and ILR, we were able to observe all the post-GCSEs qualifications undertaken by students in schools or Further Education colleges and to classify students according to the nature of their curriculum they studied: students who **mostly achieved A-Levels** were classified as obtaining an ‘**academic**’ education whereas the rest were classified as obtaining a ‘**vocational**’ one. This overlooks the fact that often students combine academic and vocational qualifications, but it offers a neater analytical perspective. Future work will have to address this limitation and explore further subdivisions within these groups (i.e. based on subject).

Having classified students in these two education groups, we were able to use LEO to study the evolution of their earnings trajectories and variation in employment patterns across sectors and firms over their work experience. The latter was made possible as the HMRC linkage in LEO contains an (anonymised) identifier of the main firm workers are employed with within each tax year, which is the firm where most of their annual earnings were generated. This identifier is in turn linked with the IDBR, a directory of all UK businesses containing, among other things, information on their sector of activity.

In order to describe how employment patterns across firms relate to earnings growth, we decided to characterise firms not only based on their available observed characteristics, but also by looking directly at their contribution to workers’ *pay level* and *pay growth*. First, we estimated each firm’s **pay premium** (so-called AKM Fixed effects).⁷ Conceptually, this corresponds to the average pay in a firm, after taking into account the characteristics of its workers. For example, firm A may exhibit higher average pay than firm B, simply because it employs higher-educated workers (who may earn an equally high pay in firm B, if they were employed there). Under certain assumptions that can be verified,⁸ the statistical approach we used allows us to work around these compositional differences to derive a more accurate measure of a firm’s pay premium.

Second, we were interested in understanding which firms are associated with higher pay growth (as a separate feature from their contribution to the *level* of pay), inspired by existing approaches. Interestingly, when looking at how firms fare across these two measures, we found that, despite a positive correlation, firms with a higher pay premium are not necessarily the ones with a higher pay *growth* premium, which validates the importance of using this richer characterisation of firms’ contribution to their employees’ earnings.

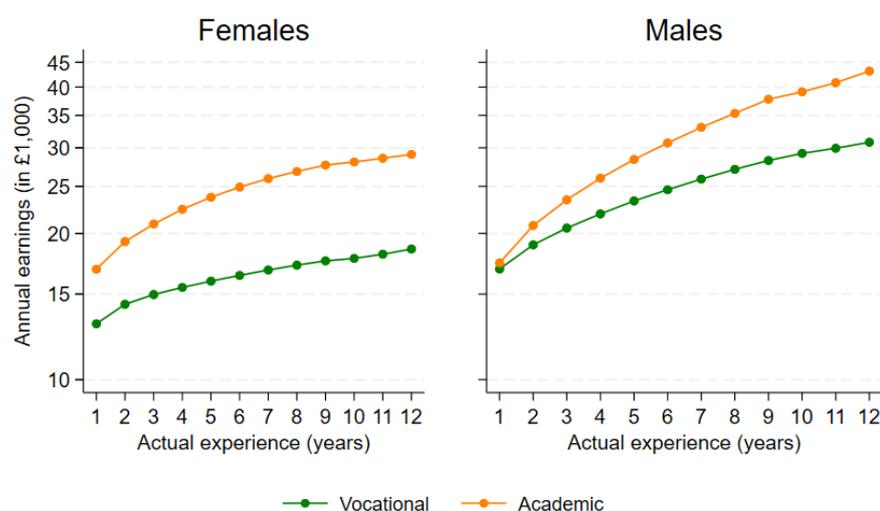
Having defined these two concepts, we proceeded to analyse how different types of education are associated with variation in employment patterns across different types of firms, and the role this plays in explaining earnings growth gaps by education.

What we found

Earnings trajectories by education

Figure 1 plots the evolution of average annual earnings of young workers who acquired academic or vocational education, as they accumulate years of experience in the labour market, separately by gender. In defining the starting line, this measure of experience considers when individuals completed their studies (often later for academic students who are more likely to progress to Higher Education) to avoid capturing students who were still in part-time student jobs. The figure reveals that academic-educated female workers benefit from higher earnings right from the start, with the gap increasing considerably as their earnings grow faster with experience than for vocational-educated females. For males, earnings are initially comparable between the two groups, but earnings growth of vocational-educated young workers is soon outpaced. After 12 years of work experience, academic-educated workers earn approximately 10 to 12 thousand pounds more than their vocational counterpart.

Figure 1: Average annual earnings by experience

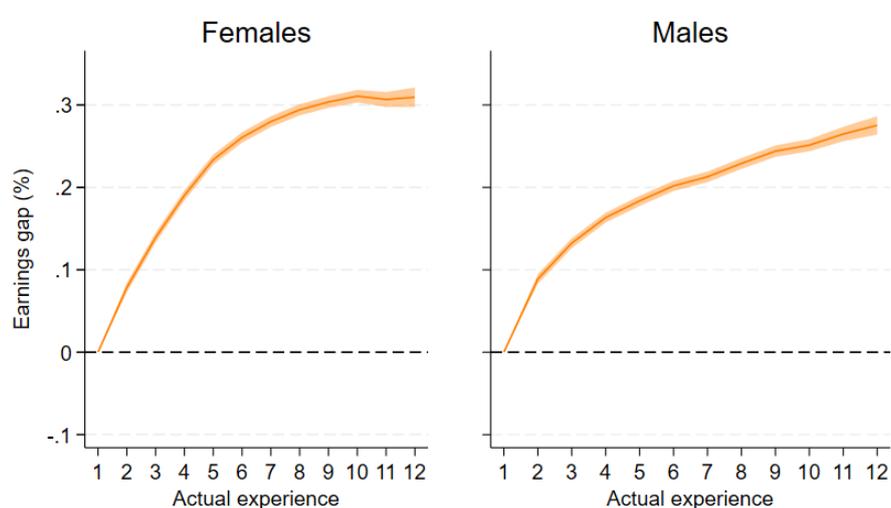


Notes: Gross annual earnings measured in 2021 prices shown in a logarithmic scale. Actual experience refers to years observed in employment (positive earnings). Source: LEO.

One limitation of this simple plot of average earnings is that it does not take into account two important aspects that could be misleading. First, to the extent that students doing A-levels and then going to university take longer until they enter work, they may enter at a better or worse time for the economy. Differences in earnings growth by education may therefore mask how fast wages are growing for *everyone* at different times. Second, the composition of workers with a specific level of labour market experience may change from year to year. This is because not everyone is continuously in employment for up to 12 years. This means part of the earnings growth we are looking at in **Figure 1** may simply come from comparing individuals who earn more on average with individuals earning less. Luckily, we can use regression analysis to address both these potential problems.

The analysis, reported in **Figure 2**, confirms that the earnings patterns described above still hold. For each experience point (horizontal axis), the figure shows by *how much more* the earnings of academic students have grown compared to vocational students with reference to the beginning of their careers (when they only had one year of experience). For example, looking at men (right panel), we can see that after two years of employment, their earnings have grown by nearly 10% more than for vocational students. This gap keeps growing steadily for men, and by the time individuals have spent 12 years working, it is nearly 30%. For women, we see a similar pattern, but the gap seems to stabilise after nine years, when the curve flattens. Overall, our findings point to substantial differences in earnings growth between academic- and vocational-educated students, which appear early on in young workers' careers.

Figure 2: Academic-Vocational gap in earnings growth by experience



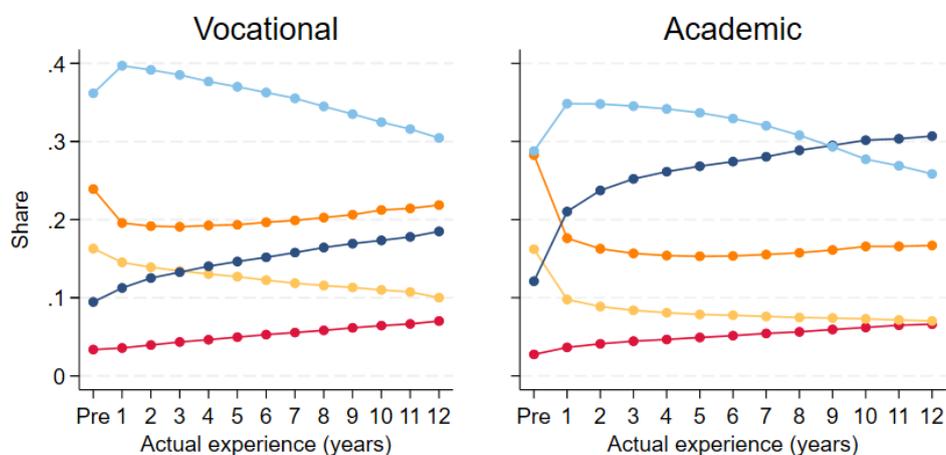
Notes: Percent difference in earnings growth between academic and vocational students (obtained from regression estimates including also individual and tax year fixed effects). Actual experience refers to years observed in employment (positive earnings). Source: LEO.

Firm sorting pattern by education

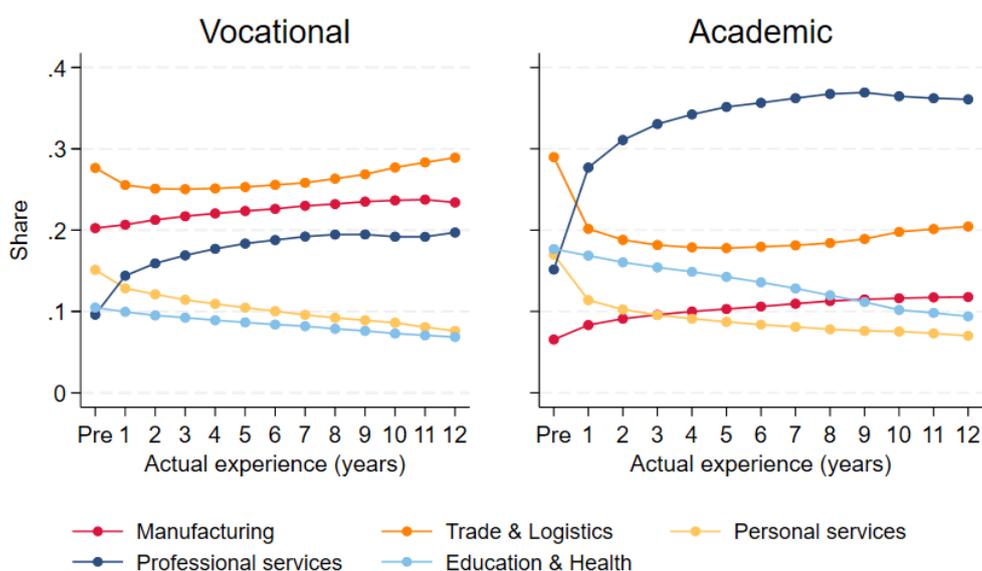
In the next part of the analysis, we studied the role played by firms in explaining the differences in earnings growth illustrated above. We start by plotting the probability of workers with different types of education being employed across different sectors. The most striking finding across genders is that academic-educated students are much more likely to be employed in 'Professional services' (**Figure 3**). They are both more likely to enter this sector as they complete their studies – more than 20% of women and nearly 30% of men are already working in professional service firms in their first year of post-education work experience – and to move later on. On the flipside, we can see that vocational-educated female workers are much more likely to be employed in 'Education and Healthcare' whereas male workers are more likely to be employed in 'Manufacturing' and 'Trade and Logistics'.

Figure 3: Probability of working in different sectors

A. Females



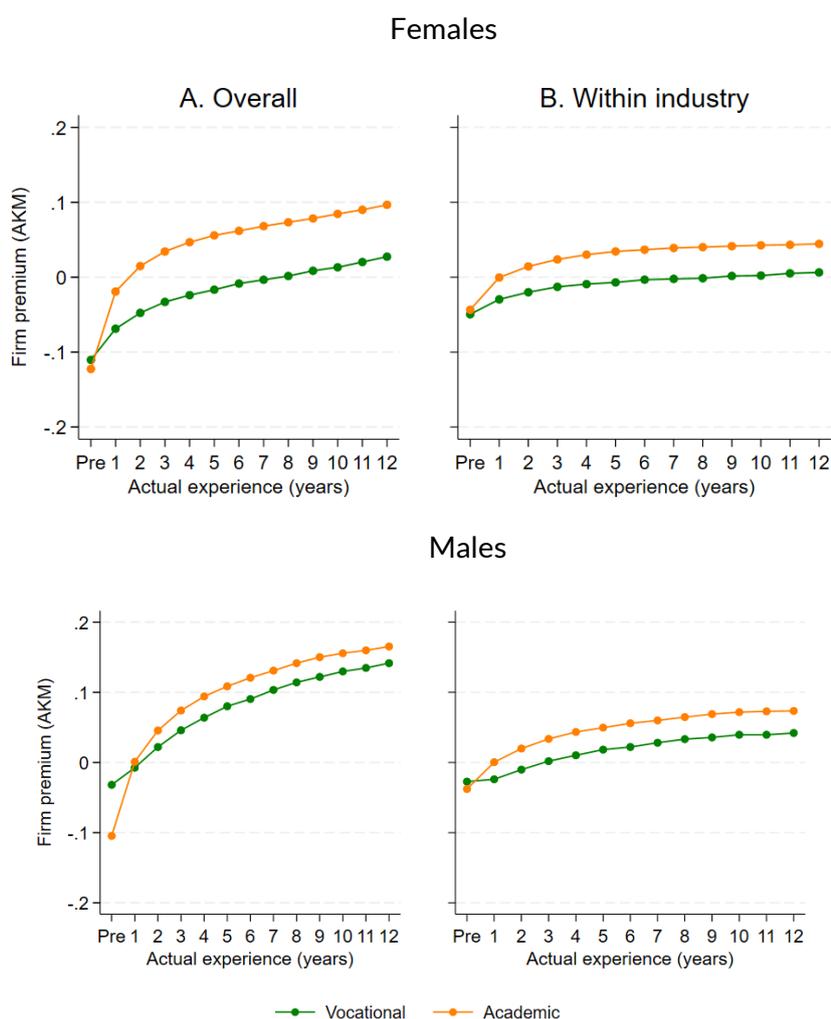
B. Males



Notes: Probability of being employed in different sectors (conditional on having positive earnings) by education group and gender. Actual experience refers to years observed in employment (positive earnings). The period labelled as 'Pre' pools together all the tax years in which an individual was older than 18 but still observed in some type of education. Source: LEO.

These differences in employment patterns across sectors could explain why the earnings of vocational-educated young workers grow more slowly. To better gauge this, we directly looked at the two groups' probability of being employed in firms with a higher pay premium (see definition above). **Figure 4 (left panel)** shows that, within the first few years of work experience, academic-educated workers are more likely to find employment in firms that pay better on average, with the gap being especially large for women. This pattern is consistent with the analysis of sector presented above, but holds even *within* industrial sector (right panel). In other words, when comparing workers who are employed in the same sector, we find that academic-educated ones are more likely to be employed in higher-paying firms within that sector – though the gap is smaller.

Figure 4: Average firm pay premium

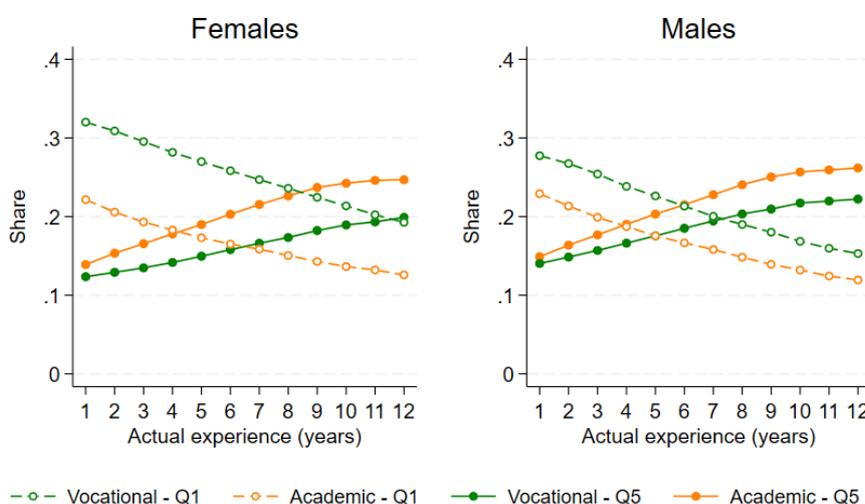


Notes: Plot of average firm pay premium workers are employed in. Firm premia are obtained from an AKM-style worker and firm fixed effects regression estimated in LEO (see text for detail and references). Actual experience refers to years observed in employment (positive earnings). The period labelled as 'Pre' pools together all the tax years in which an individual was older than 18 but still observed in some type of education. Source: LEO.

At the same time, the figure clearly shows that the gaps in the probability of working for higher-paying firms emerge very early in workers' careers, but otherwise remain stable over the next years of work experience. If it was just for this channel only, we therefore would not expect to the persistent divergence in earnings observed in **Figure 1** and **Figure 2**. Something else must be going on.

The rest of our analysis points to another factor that might explain more of the difference in earnings growth. What we observed is that academic-educated students are progressively more likely to find employment in firms where *pay growth* is higher. To visualise this, we divided firms in five groups based on the relative strength of pay growth. **Figure 5** below shows the probability that academic- or vocational-educated workers are employed in firms in the lowest (Q1) and highest (Q5) pay growth group. In general, as workers gain labour market experience, they progressively leave firms with lowest pay growth and move into firms with highest pay growth. But academic-educated workers do so at a much higher rate than their vocational counterpart. By the time they have 12 years of work experience, academic students are five and four percentage points more likely to be in the top group (for women and men respectively). Being employed in higher-growth firms would naturally result in workers benefiting from higher pay growth. We next turned to computing the importance of this channel in explaining overall differences in earnings growth by education.

Figure 5: Probability of employment in high- and low-growth firms



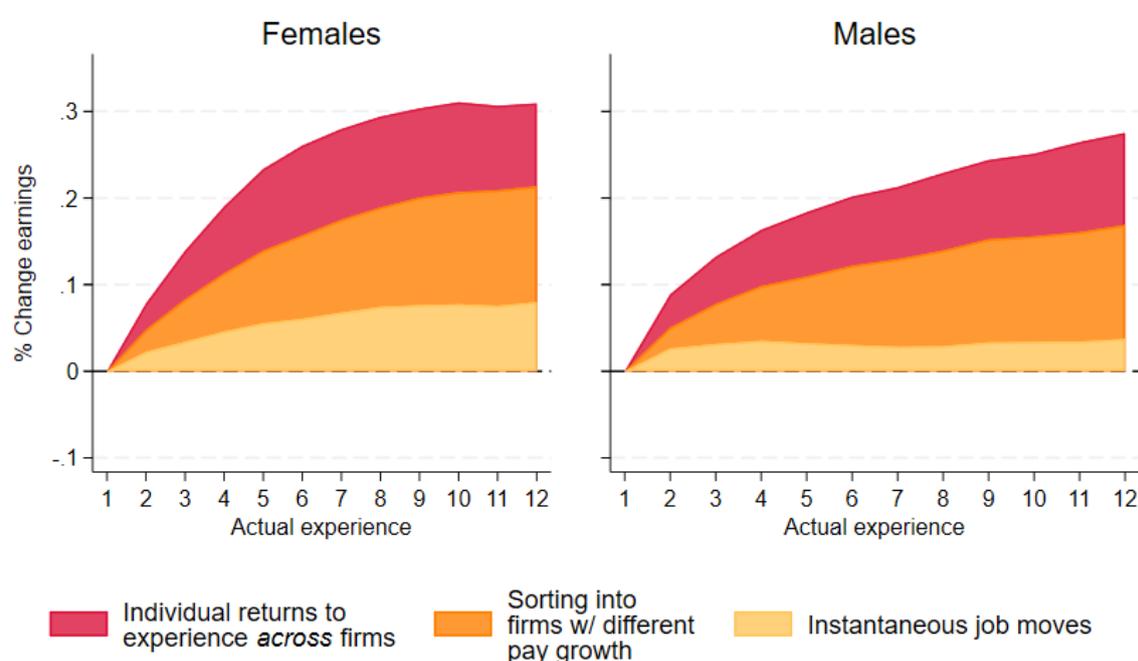
Notes: Share of workers employed in firms classified in the bottom (Q1) and top (Q5) quintiles of pay growth. Firms are classified in different quintiles based on the average residualised earnings growth of workers who are observed in the firm for two consecutive years. Actual experience refers to years observed in employment (positive earnings). Source: LEO.

Decomposition of earnings growth differences

In the last part of the analysis, we formally decomposed differences in earnings growth by education into three distinct dynamics.

1. Instantaneous job moves
2. Sorting into firms with different pay growth profiles
3. Differences in returns to experience *across* firms by education.

Figure 6: Decomposition of earnings growth differences by education



Notes: The figure shows how much of the difference in earnings growth by education is explained by each of three channels described above. Actual experience refers to years observed in employment (positive earnings). Source: LEO.

The yellow shaded area in **Figure 6** measures the relative importance of workers moving to jobs in higher-paying firms in explaining differences in earnings growth by education (with the total area corresponding to the total difference plotted in **Figure 2**). In line with the evidence presented in **Figure 4**, this component plays only a limited role confined to the first few years of experience. As workers spend time in the labour market, job changes become rarer and, even when changing job, academic-educated workers are no longer any more likely to move to higher-paying firms (if anything, the opposite). This is why overall this channel only explains 16% of the education-based differences in earnings growth for males, and not much more for females (25%).

The orange-shaded area highlights the role of workers' finding employment across firms offering stronger pay growth opportunities. As anticipated in **Figure 5**, this is an important channel and explains around 41% and 39% of the overall earnings growth difference by education in the first 12 years of experience (for females and males respectively). Combined, these two channels reflect the importance of firms in driving differences in earnings trajectories by education. What is left (43% and 37%) relates to differences in returns to experience by education that are *not* mediated by firms. In other words, regardless of the type of firm they are employed with, we still found that academic students benefit from stronger earnings growth than vocational ones. Why is that the case? One interesting hypothesis is that education may have a direct impact on workers' ability to develop new skills in their jobs, making them progressively more productive and thus contributing to higher wages.

Alternatively, education itself may have little or no impact on worker's learning ability, but it just happens that individuals that are better at learning *anyway* choose to follow a more academic curriculum. We don't think this could be entirely the case: after all, once we take into account differences in cognitive ability (loosely approximated by test scores in English, maths and science), differences in earnings growth across education groups shrink but remain substantial. More research will be needed to confirm whether this is the case.

Why it matters

These findings highlight how a substantial part of the earnings gap arising from different post-16 education paths can be explained by variation in opportunities across firms and differential access to them by education. Knowing this is important not only for developing a better understanding of how labour market inequalities emerge in the first place, but also for formulating policy alternatives. Over the last decades, policymakers in England have been very active in enacting reforms aimed at improving the economic prospects of vocational students. Many of these reforms remain well-intended, as they sought to address structural weaknesses of the Further Education sector in England that needed urgent tackling. However, the findings of this Data Insight offer a cautious reminder that, to a very large extent, reducing the gap in labour market outcomes between those who follow an academic path and those who follow a vocational one involves improving the latter's access to firms with better job opportunities.

Are there any policies that could help with that? Here is where our research cannot currently provide definite answers. After all, we still need to understand why workers with a given education background are more likely to find employment in certain firms. Is it explained by workers' preferences, dictated by firms' hiring necessities or, more plausibly, a combination of both? Policies aiming at improving the matching process in the labour market, whether through curriculum reform or targeted interventions, can likely help, up to a point. At the same time, variation in firm quality both *across* and *within* sectors remains an intrinsic feature of the economy. Insofar as firms have different production necessities, equal access to 'better firms' for workers with different education backgrounds is not something that can be wished at will. Having said that, a greater role for higher level technical and vocational education and better coordination between education, skill and industrial policy, promise to expand the opportunities available for young people coming out of the vocational pathway. To what extent these policies can work should be of great research interest in the future.

What next?

As we considered the implications of this research for the policy debate, it is clear that many questions remain to be answered. This will be the focus of future work, building on the current methodologies and findings. In order of priority, we should establish whether the observed gaps in earnings growth and the associated channels have an underlying causal relationship with education or not. In doing so, we should also shift away from simply comparing average academic and vocational students to instead focus on more 'marginal' students. These would be students whose education choices can be plausibly shifted by policy interventions, offering more direct insights of the effect of potential reforms. We should also move beyond the crude, if practical, distinction between academic and vocational curricula. A look at different subjects within these groups and at the specific role of apprenticeships would offer a richer and more nuanced view. Finally, much still needs to be said about what determines the observed sorting patterns across firms by education.

References

1. Hupkau, C., McNally, S., Ruiz-Valenzuela, J. and Ventura, G., 2017. Post-compulsory education in England: choices and implications. *National Institute Economic Review*, 240(1), pp.R42-R57.
2. Dearden, L., McIntosh, S., Myck, M. and Vignoles, A., 2002. The returns to academic and vocational qualifications in Britain. *Bulletin of economic research*, 54(3), pp.249-274.
3. Brunello, G. and Rocco, L., 2017. The labor market effects of academic and vocational education over the life cycle: Evidence based on a British cohort. *Journal of Human Capital*, 11(1), pp.106-166.
4. McIntosh, S., 2006. Further analysis of the returns to academic and vocational qualifications. *Oxford bulletin of economics and statistics*, 68(2), pp.225-251.
5. McIntosh, S. and Morris, D., 2021. Variation in the labour market rewards to vocational qualifications in the UK. *Scottish Journal of Political Economy*, 68(5), pp.535-552.
6. Matthewes, S.H. and Ventura, G., 2022. *On track to success?: Returns to vocational education against different alternatives*. Universität Potsdam.
7. Abowd, J.M., Kramarz, F. and Margolis, D.N., 1999. High wage workers and high wage firms. *Econometrica*, 67(2), pp.251-333.
8. Card, D., Heining, J. and Kline, P., 2013. Workplace heterogeneity and the rise of West German wage inequality. *The Quarterly journal of economics*, 128(3), pp.967-1015.

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