

School qualifications: a signal of ability to employers?

Does education increase productivity or just signal it to the labour market?

Damon Clark provides new evidence in an analysis of the 'signalling value' of a US high school diploma.

One of the most important questions in labour economics is the extent to which additional time spent in education increases one's earnings power in later life. This is partly because these private returns to education are often seen as a good guide to the social returns to education – the benefit side of the cost-benefit calculations that inform government decisions about investments in public education.

Studies typically find that an extra year of education is, on average, associated with a roughly 10% increase in earnings. If these estimates are accurate, they suggest that from the individual's perspective, investments in education can have large effects on earning power. They also suggest that from the government's perspective, public investments that allow people to acquire more education might be cost-effective.

There are, however, two reasons why the 10% estimates might overstate the social returns to education. First, these estimates typically measure the correlation between education and earnings, not necessarily the causal effect of education on earnings. The correlation will overstate the causal effect if it reflects, in part, underlying differences between the types of people that acquire different levels of education – for example, if more able people acquire more education.

Second, even if the private return to education is 10%, the social return will be lower if part of the private return is due to the 'signalling value' of education.

The first of these reasons – ability biases – is easily understood. The second – education-based signalling – is more subtle. The idea, associated with Spence (1973), is that firms are likely to have incomplete information about worker productivity, and hence will

base productivity expectations and thus wages on signals of productivity such as education. In other words, firms will pay higher wages to more educated workers because they think that education makes people more productive regardless of their underlying ability and because they assume that more educated people have higher underlying ability.

Both factors contribute to the private return to education. That is because people considering whether to acquire more education care only whether education raises earnings not why it raises earnings. But only the first factor – the productivity-enhancing effects of education – contributes to the social returns to education. That is because, from society's perspective, there is a zero-sum aspect to firms' ability perceptions: firms know that underlying ability is not affected by education investments, and hence they cannot revise up their opinion of one worker without revising down their opinion of another.

Having a US high school diploma sends only a weak signal of an individual's productivity to potential employers

In response to concerns about ability bias, recent studies have estimated the effects on earnings of education investments that are, effectively, forced on people – for example, education acquired because of changes in compulsory schooling. This idea is explained in more detail in the two previous articles. Based on such studies, Card (1999) concludes that the 10% estimate might, if anything, understate the true private return to schooling, a reading with which most labour economists would agree.

There is less agreement among labour economists as to whether education acts as a signal of underlying ability. This issue has been approached from many angles. One of the most popular approaches focuses on the signalling value of educational credentials (as opposed to the signalling value of other dimensions of education, such as years spent in school or type of school attended).

There are two reasons for the focus on credentials. First, it has long been thought

that a credential might send an especially strong productivity signal. That is because a credential is usually associated with meeting some standard (for example, passing exams), not just spending time in education.

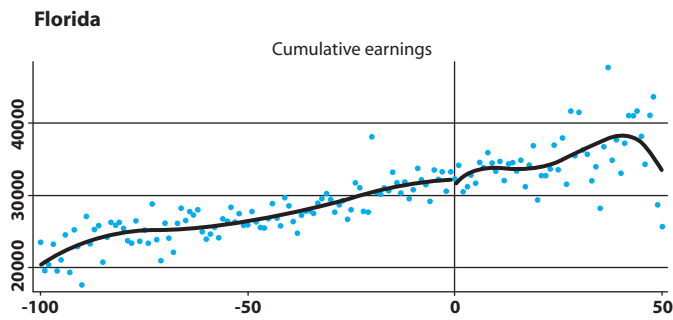
Second, because a credential is, ultimately, a piece of paper, it cannot have a direct impact on productivity. In principle then, one could estimate the signalling value of a credential by randomly assigning credentials among a small group of workers and then estimating the wage return to holding the credential. Since the random assignment should ensure that workers in the two groups are equally productive, the wage return should capture the signalling value of the credential.

In a recent study, Paco Martorell and I use this idea to estimate the signalling value of a US high school diploma. In some states, including Florida and Texas, the focus of our research, students receive a high school diploma if they remain in school until the end

of twelfth grade (roughly aged 18), acquire a certain number of course credits and pass 'high school exit exams' – standardised tests in maths, reading and (in Texas) writing.

We focus on this testing requirement and compare the earnings of students that narrowly passed the tests (and obtained a diploma) and students that narrowly failed the tests (and did not). Assuming that the two groups are, on average, equally productive, any earnings premium enjoyed by those that passed can be interpreted as the signalling value of the diploma.

Our main result is that this earnings premium is, at best, small. This implies that a US high school diploma sends only a weak productivity signal. The figure above illustrates the result, charting total earnings of students who take the exam at the end of twelfth grade in the six years after high school against the minimum score on these tests. We focus on these students, who have failed at least one administration of the



tests (which is taken for the first time in the spring of tenth grade) because, for them, the outcomes exert an especially strong influence on whether they obtain a high school diploma.

There are three features of the figure worth noting. First, earnings in this period are relatively low, less than \$10,000 per year in 2000 dollars. That is because many of these people are recorded as having zero earnings, in many cases because they are still in full-time education in college.

Second, there is a strong positive relationship between earnings and the minimum score. This is not surprising: we expect higher-scoring students to be more productive and to perform better in the labour market.

Third, there is no obvious jump in earnings as these scores move through the passing threshold (represented by the line at zero). This contrasts with what we would see if diploma receipt sent a strong productivity signal: a large jump in earnings at this threshold.

After using various methods to estimate the size of the jump, we conclude that it is around \$200 in both Florida and Texas. We rule out jumps bigger than \$3,000 in Florida and \$5,000 in Texas. Since the probability of earning a high school diploma does not jump from zero to one as the score moves through this threshold (because there are some exemptions for those that fail and because those that pass must meet other requirements), this is not our final estimate of the signalling value of a diploma.

Instead, we obtain our final estimate by scaling up these numbers by our estimate of the impact of passing the tests on the probability of obtaining a diploma (around 0.5) and then combining estimates from Florida and Texas (to increase the precision of our estimates). This final estimate, expressed as a percentage of the average earnings of this group is within 1% of zero; we can rule out effects bigger than around 7%.

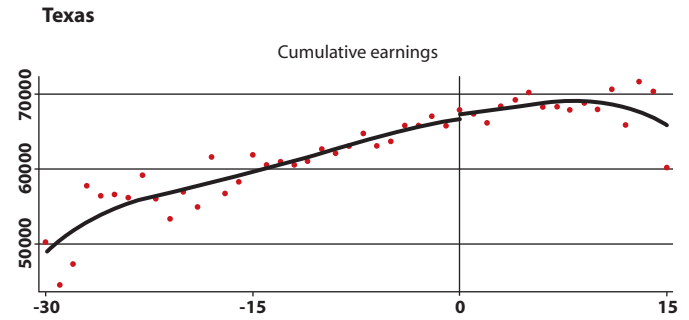
These estimates raise two questions. First, why might the signalling value of a diploma be so low? Second, why are our estimates so much smaller than those produced in previous research (which are in the range of 10-20%)?

We think our estimates are smaller because previous studies were not able to control fully for the productivity differences between workers with and without diplomas. In other words, previous estimates of the signalling value of a diploma conflated the true signalling value with some of the productivity differences between workers with and without a diploma seen in the figure.

Indeed, when we adopt the approach taken in the previous research literature and compare the earnings of workers with and without a diploma after controlling for worker characteristics such as sex and race, we also obtain estimates in this range.

It is harder to say why the diploma sends such a weak productivity signal. One possibility is that firms have many other sources of productivity information, so that they do not need education information to help predict productivity. Another is that workers misreport diploma status (they lie about their credentials) and that firms (sensibly) discount this information. A third is that firms observe the actual exit exam scores, so that diploma information (whether or not the score exceeded some threshold) is redundant.

We find the third explanation implausible. These scores are printed on high school transcripts, but the evidence suggests that firms rarely ask for them. Instead, we suspect that our results can be explained by a combination of the first two factors. It seems reasonable to suppose that firms have a lot of productivity information. At the point of hiring, this could be obtained from resumes, letters of recommendation and, especially, interviews and performance tests. What firms do not observe at the point of hiring, they may observe shortly afterwards.



It also seems reasonable to suppose that there is widespread misreporting of diploma status. This is partly because diploma receipt is hard to verify. A firm wishing to verify diploma receipt would have to contact a worker's school; and the school is under no legal obligation to respond.

Since similar considerations are likely to apply to other types of lower-level education, our findings suggest that among workers without a college degree, the signalling value of education may be lower than was previously thought. It is not clear whether our results apply to workers with a college degree. For them, indicators of educational attainment (such as class of degree) may be better predictors of productivity than the type of information revealed in job interviews. These types of education may also be easier to verify.

Ultimately though, it is exactly these lower levels of education that labour economists think generate the largest private returns to education (Card, 1999). Our research suggests that signalling factors are unlikely to drive a large wedge between these private returns and the social returns to this kind of education.

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Further reading

David Card (1999) 'The Causal Effect of Education on Earnings', in *Handbook of Labour Economics* Volume 3A edited by Orley Ashenfelter and David Card, Elsevier.

Paco Martorell and Damon Clark (2010) 'The Signaling Value of a High School Diploma', Princeton University Industrial Relations Section Working Paper No. 557 (<http://www.irs.princeton.edu/pubs/pdfs/557.pdf>).

Michael Spence (1973) 'Job Market Signaling', *Quarterly Journal of Economics* 83: 355-79.