

The Economics of Higher Education

Why are economists interested in higher education? As far back as Adam Smith's day in the 18th century, economists acknowledged that productivity and growth depended not just on equipment and land, but on the knowledge and ability of the individuals in society.

But perhaps the true assimilation of education into economics came in the 1960s when Gary Becker (1964, 1976) began to study the link between individuals' education and their incomes, eventually developing what we now know as "human capital theory".

Human Capital Theory puts a monetary value on the knowledge, skills and competencies of individuals. Hence, just as firms can invest in machinery and tools to increase productivity, so individuals can invest in their own human capital – and hence their future earnings stream – through education. And like investment in physical capital, this should make them more productive throughout their lives. The link between education and productivity is key to Becker's model.

Becker professed that individuals will invest in education when the private benefits exceed the private costs. That is, when the additional wages they earn over their lifetimes exceed the tuition and other costs involved. As Hartog (2000, Volume 1) explains, in the simplest model of investment in schooling, economic returns to education are calculated by comparing the total lifetime income of an individual who chooses to study (less expenditures on tuition fees, books and other costs associated with education), with the total lifetime income of an individual who chooses not to study, but instead goes to work. Becker made the assumption that individuals would make this calculation themselves when deciding how much education to acquire. He described this model as "the economic approach to human behaviour".

If an individual's human capital can be thought of as the sum of his potential future earnings from education, then the total human capital of a country can be thought of as the sum of the total potential future earnings of everyone in employment. It is this direct association with economic growth that makes economists interested in human capital.

It also, at least partly, explains why most governments around the world offer compulsory schooling for free; human capital theory tells us that there will be a sufficient economic return to offset the costs involved in having a more educated population. Governments are willing to invest because they perceive a high return to investment.

However, when it comes to investment in higher education, governments are far more divided. Higher education is offered free or extremely cheaply to young people in much of Europe, whilst countries such as the UK and US, young people are expected to pay high amounts for their education. But Becker's theory is relevant here too; one interpretation is that the government's return on investment in higher education is sufficient to justify the costs of building universities, paying lecturers wages and offering HE for free. But another interpretation is also valid; that the private wage returns associated with a university education are so high that individuals themselves should bear at least some of the cost. This at least in part explains the relatively high tuition fees in place in the US and the UK (Barr, 2004 – Volume 4).

Becker himself highlighted research findings that one quarter of the rise in per-person incomes from 1929 to 1982 in America was because of increases in schooling. Much of the rest, he insisted, was a result of harder-to-measure gains in human capital such as on-the-job training and better health. Becker also pointed out that Asian economies such as South Korea and Taiwan were living proof of the value of investing in human capital through education systems, since these economies were highly productive but had few natural resources themselves.

However, as Becker's theory gained popularity so did alternative explanations of why individuals acquire education, and what the government should conclude about investment in the sector. In 1973, Michael Spence (1973, Volume 1) put forward the notion that education matters not because it makes workers more productive, but rather because it acts as a signal to employers – who are unable to tell from looking at a potential employee whether they are productive or not (due to the problem of asymmetric information, itself an important economic theory developed by Akerlof (1970) in his seminal paper “The market for lemons”). Instead, Spence theorised that this individual must be more productive because they were disciplined and able enough to obtain a university degree or the like. Thus, it is not the education itself that gives the worker their productivity; they were already productive but they have simply required a means to signal it. This paper won Spence the Nobel Prize for economics and while the theory of human capital is well-established there is still debate among economists about the contribution of signalling to wages. Indeed a number of studies (Clark and Martorelli, 2013; Feng and Graetz, 2013) have attempted to calculate the signalling value of degrees or other educational certificates, often studying groups of individuals who dropped out of college before receiving the all-important certificate they could use to signal their worth.

Both signalling and human capital theory have much in common. Both predict that those with an education will earn more, and both predict that individuals will obtain education early in life, since this will give them the longest horizon over which to realize the returns. Thus, to the individual it matters little which theory is correct. However, to government it matters a great deal. Under human capital theory, government investment in education will increase productivity and economic growth, hence their investment will be worthwhile. But under signalling theory there will be no productivity or other gains from education; only individuals will benefit. In this case, it makes less sense for governments to invest in HE.

These models are highly important in helping us to understand how individuals make education decisions, and how the demand for education may change with different incentives. However, a large part of the economics of higher education involves empirical research.

Surprisingly, however, the relationship between human capital and economic growth is not straightforward to test, empirically. As Aghion et al (2009, Volume 1) argue, “Despite the enormous interest in the relationship between education and growth, the evidence is fragile at best”. This issue is at the heart of research in labour economics (a broad term which the economics of education at all levels falls under), the so-called issue of “causality”. Causality is about questions of cause and effect, such as the effect of schooling on wages, or the effect tuition fees on university participation (both topics to which we will return). As Angrist and Pischke (2009) explain “a causal relationship is useful for making predictions about the causes and consequences of changing circumstances or policies; it tells us what would happen in alternative (or ‘counterfactual’) worlds.”

The most credible research designs – i.e. those which generate causal effects – are randomised control trials. In these, researchers randomly assign the programme (such as extra schooling) to one group of individuals and not the other. In this way, we can be sure that the results are not effected by “selection bias” – the situation in which those individuals who receive the programme are somehow different from those who do not receive it. A commonly cited example of selection bias in the economics of education occurs in the evaluation of subsidized training programmes, which are often used by governments to improve the earnings of workers. But the workers who receive these training programmes tend to be those with low earnings potential; hence naïve comparisons of workers receiving and not receiving the training show lower earnings for trained workers.

As Angrist and Pischke (2009) also point out, the search for causality is also what sets economists apart from statisticians, and what has led economists and econometricians to develop a unique set of statistical

tools to identify causal relationships. These tools – such as instrumental variables, regression discontinuity design and difference-in-difference – help economists out when an experiment is impractical or unaffordable, and are known as “quasi-experimental designs”. These designs mimic the qualities of experiments and as such are extremely popular among researchers in the economics of higher education. The majority of the papers included in this collection are applied papers, and for the most part their authors attempt to provide causal analysis through these means (e.g. Dearden et al, 2014-Volume 4; Dynarski, 2003 – Volume 4), though some papers (e.g. McGuigan et al, 2016 – Volume 3) are true experiments.

Aghion et al (2009) put forward several reasons why it is difficult to prove, causally, that education is a driver for economic growth. First, states that choose to invest more in education may do so because they can afford to, because they are richer. This is an issue of so-called reverse causality. It may appear that education is driving growth, but actually the opposite is true. Second, researchers must proxy education using average years of education – which may be a poor measure for the quality or level of education received (to see this, consider that under this assumption, the last year of primary school is of equal value to the last year of doctoral studies). Third, researchers often ignore intermediate variables (such as migration) when studying the relationship between education and growth, which can again provide misleading answers.

To solve these problems, Aghion et al (2009), use quasi-experimental methods to identify a causal relationship between education and growth, by studying situations where the amount a state spends on education increases arbitrarily (thus mimicking an experiment), rather than due to factors which could also impact its economic growth. The authors use political appointments as a basis for this. In the US Senate and House of Representatives, the Appropriations Committees control the allocation of federal funds to projects. An example of this is university research funding; members of the appropriations committee can propose that individual research projects be funded without regard to their merit. It is widely known that such projects are the main route by which congressmen deliver payback to their constituents, hence it is very common for members of the appropriations committee to raise spending on research universities. Aghion et al exploit the fact that when a vacancy arises on an committee that controls expenditure, the state that is "first in line" tends to get the seat, thus generating a near-random increase in higher education expenditure in that state. Other situations which cause arbitrary increases in four and two year college education, as well as primary and secondary spending are also exploited.

The study, one of the first to identify a causal link between higher education and growth, confirms the hypothesis that investment in education raises growth; though not all types of investment. The study finds positive growth effects from investment in four-year college education, but not in two-year college education, suggesting that the money spent in these forms of college could be equally well spent elsewhere. The study also finds that investments in research-type education (e.g. libraries) have positive growth, though the impact is mitigated by migration; individuals benefitting from research investment are attracted to states that are close to the technological frontier, so these states tend to benefit the most from this type of spending.

The issue of causality is also one that has central importance in studies of the effect of schooling on wages. As described, this is at the heart of Becker’s model, and proving the link between education consumption and wages is important for governments human capital accumulation strategies.

Card (1999 – Volume 1) surveys a number of papers in this area, in his 1999 paper “The Causal Effect of Education on Earnings.” As well as the issue of selection bias (do those with more education earn more because of their higher education, or do those with greater capacity for earning choose to acquire more schooling?), Card highlights the phenomena of ability bias (are those who go to college are smarter to begin with, and hence would have earned more money even if they didn’t go to college). Card’s

survey describes a number of papers which have attempted to deal with these estimation problems using quasi-experimental econometric techniques such as those described above. He documents that estimations of the returns to education are indeed biased upwards, but that the bias may be quite small – around 10%, depending on the estimation strategy used.

Indeed, the positive link between higher education and wages is now well established by these causal means (e.g. Blundell, Dearden and Sianesi, 2005). For example, for the UK, Walker and Zhu (2013) demonstrate a lifetime return of around £168,000 for men and £252,000 for females.

More recent research has now expanded beyond asking whether a college degree can increase one's earnings, to identifying how such returns might vary according to the type and quality of education received (Altonji et al, 2015). Understanding this variation is important given the increasing proportion of individuals pursuing HE across the developed and developing world, and again is relevant given the increasing degree of marketization in HE, requiring individuals to contribute to their degrees. If returns vary across institution and subject of study then governments may need to encourage individuals to study certain subjects, for example through subsidisation.

Studies in these areas are also plagued with problems of selection bias. What if attendance at a particular university, or study in a particular field, is driven by underlying factors which also affect future earnings? For example, more ambitious students may choose the most selective university or field of study, and may also do well in the labour market due at least in part to their ambition. Early studies of the relationship between college quality and wages tended to try and deal with these issues by controlling for these effects by conditioning on rich sets of variables, such as student ability measures and demographic characteristics (e.g. Brewer, Eide and Ehrenberg, 1999, Black and Smith (2009).

However, in more recent times, many methodological advances have been made, so that causal studies of wage returns by institution, field of study, and both, are more common.

Such studies (Dale and Kruger (2009, 2014 – Volume 1)) have revealed the existence of a link between college quality and wages - though this link tends to be weak, and only present for certain groups such as students from ethnic minority backgrounds, and those whose parents are poorly educated. This may be due to the lack of networks enjoyed by such students – an issue of inequality to which we will again return, and which is also discussed in work by Crawford et al (2016 – volume 3) and Blanden et al (2016 – volume 1).

It is now accepted in the literature that subject of study matters more for wages than institution attended. Kirkoboen, Leuven and Mogstad (2016, Volume 1) and Britton et al (2016 – Volume 1) both document the existence of a huge amount of variation across field of study, suggesting that the choice of subject is as important – in terms of wages – than the choice of whether to go to university. These studies, for example, reveal that individuals who choose to study science can earn almost three times as much as those who choose humanities. This is a particularly important type of heterogeneity in the UK since students specialize right at the outset of university enrolment, and transfers to different programs are extremely rare. The same is true in developing countries where students must often choose their area of specialization early on in their studies, with little chance of changing fields after this decision has been made.

It is important to note that studies of this nature require extremely large datasets in order to properly answer these questions. For example, Dale and Kruger use administrative earnings records from tax data, which allows them to have a far more reliable measure of earnings than survey data, which is generally self reported. Similarly Britton et al (2016 – volume 1) use tax and student loan administrative data to measure how the earnings of English graduates vary by institution and subject. And Kirkoboen et al exploit extremely rich administrative data from Norway which contains detailed data on the entire

population, tracking their applications, admissions and future wages. Such data is of fundamental value to economists working in higher education research, and there is growing availability across the world.

However, there is another important reason why governments may invest in the education of their populations. This is due to possible externalities, or social returns associated with education. A number of social benefits to education have been documented (see McMahon (2004) for a review). To name a few, however, whilst more educated societies have been shown to have higher levels of volunteering and voting (Dee, 2004), better health outcomes (Lleras-Muney (2005); Currie & Moretti, 2003 – Volume 1) and lower levels of crime (Lochner & Moretti, 2004; Machin et al, 2011).

Externalities are a ‘market failure’ – an issue that may require government intervention. This is because individuals may not take social returns into account when deciding whether to study or not, meaning they may under-consume education. The result may be that there is an inefficient amount of education being consumed, bearing in mind the social returns. This may justify government involvement to induce more individuals to take up education, for example by reducing the cost of education or providing student aid. Measuring social returns to education is extremely difficult due to endogeneity of educational attainment – i.e. individuals who lead a healthy lifestyle may also be more likely to consume more education, perhaps because they exhibit more “forward looking behaviour” than other individuals. If this is the case, there will be a spurious positive relationship between education and health.

A popular means to uncover a causal relationship between education and social returns involves exploiting changes in compulsory schooling laws. For example, in England and Wales, the compulsory schooling age increased from 15 to 16 in September 1972 (thus affecting the cohort of children finishing school in 1973). This quasi-experiment allows the researcher to study a group of young people whose education has been increased “at random” due to being born in a particular year. Studies including Lochner and Moretti (2004) have utilised law changes like this.

Another popular means of identification of externalities in education is to exploit college openings. Here, the argument is that individuals in areas with lots of colleges will consume more education simply because of the availability of education, rather for other endogenous reasons. Currie and Moretti (2003 – Volume 1) study the relationship between maternal education and child health (an important social benefit of education), revealing that more highly educated mothers have children with higher birth weights, and are less likely to give birth prematurely. More highly educated mothers are more likely to be married, more likely to use pre-natal care, and less likely to smoke – all potential explanations for why their children may enjoy these better health outcomes.

These studies have all demonstrated that estimates of the returns to education which focus only on increases in wages understate the total return; that education has other benefits that are not reflected in the wage of educated individuals. Again, this fuels debate about who should pay for HE.

A final reason why economists may care about education, and why governments choose to invest in it, is because of the potential of education to equalise the outcomes of individuals from different backgrounds. Consider for example West Germany (Rüegg, 2010) where a high number of university openings took place in the early 1970s. The key objectives here were not just to improve the productivity of society, but also to improve equality of opportunity and the modernisation and democratisation of society (Jäeger, 2014). Thus, universities were built in areas where individuals were less well educated, as an attempt to improve inequality of educational outcomes (Van Reenen and Valero, 2017).

However, the availability and expansion of higher education may actually increase inequality (Hartog, 2000 – Volume 1; Blanden and Machin, 2004, 2013 – Volume 2). As we have learned, there is a considerable wage benefit associated with HE attainment. So, if those who are best placed to take up additional places are those from richer backgrounds this will increase inequality. This has clear implications for intergenerational mobility; the degree of fluidity between the socio-economic status of

parents, and the socio-economic outcomes of their children as adults. As Blanden et al (2009 – Volume 2) explain, there is weak intergenerational mobility when someone's earnings as an adult are highly correlated with their parents' earnings. Education is seen as a key transmitter; it is widely known that children from richer backgrounds tend to obtain higher levels of education, in turn improving their labour market prospects.

It is easy to see that, if parental income increases educational attainment, and this in turn, increases labour market earnings, then education is clearly a key transmitter of intergenerational mobility. Economists are interested in this because, in societies where intergenerational mobility is weak this restricts the life chances of children, and means they do not realise their full economic potential. This is particularly pertinent in the UK, which in recent times has experienced a decline in intergenerational mobility.

For these reasons, understanding the extent of inequality, and the drivers of inequality has moved centre-stage among economists, particularly those studying education and higher education.

Again, the availability of data has been a key factor in allowing economists to study this area. Many studies use long-running cohort studies which follow individuals and their children throughout their lives, allowing the researcher to understand the degree of correlation between generations (such as the UK's BCS - which follows a cohort of individuals born in 1970, and the NCDS - which follows individuals born in 1958). Studies typically examine the correlation between parents' and children's income across time, looking for evidence of increasing strength in these correlations.

Using these techniques, studies from the UK have discovered evidence that higher education expansion in the UK actually acted to weaken intergenerational mobility. Blanden et al find evidence of that correlation between fathers' and sons' income increased substantially between the 1958 cohort and the 1970 cohort, with education, and in particular post 16 education a major factor in this decline in mobility. Similarly, Blanden and Machin (2004 – Volume 2) examined the period of mass HE expansion in the United Kingdom which occurred over the 1980s and 1990s, documenting a substantial socio-economic gap in degree attainment in the UK over this time period. More alarmingly, their analysis also showed that the socio-economic gap actually widened over the period when HE was expanding, suggesting that higher income students benefitted the most from the increase in university places that became available. Interestingly, part of the reason for the substantial gap in participation over the expansion period may have been that higher education was free at this point. Whilst this may sound counterintuitive, it is typically the case than in regimes where HE is free, governments are forced to cap university places because of the substantial taxpayer costs of funding places. In these instances, it tends to be those more advantaged students who manage to obtain the places, squeezing out those from poorer backgrounds (Murphy, Scott-Clayton and Wyness, 2017). Indeed, later analysis by Blanden and Machin (2013 – Volume 2) reveals that this surge in inequality appears to have levelled off in more recent years (for those of university going age in 2005, at which point students had to make a greater contribution to the cost of their degrees). Though, as many other studies have since revealed (Dearden et al, 2014 – Volume 4, Chowdry et al, 2013 – Volume 2) the participation gap still remains cause for concern in the UK.

Evidence from the US also documents increases in socio-economic inequality in access to HE. Bailey and Dynarski (2011 – Volume 2), present worrying evidence from the US, pointing to substantial differences in college entry among young people from different income backgrounds. Again, they document huge increases in inequality over time (in this case, between young people attending college in the 1980s and 2000) driven by growth in participation amongst the most advantaged. The college attainment gap between rich and poor stood at over 50 percentage points for the cohort aged 23 in 2000. Interestingly, Bailey and Dynarski point to gender differences as one of the key drivers of this trend; in

particular they show dramatic increases in the education of the daughters of high income parents as a key reason behind the widening gap in HE attainment.

However, it is interesting that whilst literature in the UK has been highly focused on the socio-economic gap in participation, studies focusing on inequality in the US are also heavily pre-occupied with ethnic differences in HE participation. Many studies for example examine the use of the controversial affirmative action practices in admissions in the US (Arcidiacono et al (2014 – Volume 2, Black et al, 2015), which are often used to increase the proportion of minority students in HE. Whilst such practises may indeed increase the attendance of minorities at selective colleges, opponents argue that they may also contribute to “mismatch” where students end up at a university to which they are not suited, damaging their chances of success. For example, less academically prepared candidates may be better suited to less selective institutions and vice versa. Arcidiacono et al’s study shows that graduation rates among minority students increased following Proposition 209 (which banned the use of racial preferences in admissions at public colleges in California). Their study finds evidence that the improved graduation rate can be explained mainly by the increased proportion of better students in the system (selection effects), though there is also a small role for matching, particularly at the lower end of the academic preparedness distribution. Though it also noted that much of the improved graduation rate cannot be explained.

What might explain these gaps in university participation between low and high SES students, and those from different ethnic backgrounds? Given the substantial returns to education that we have learned about so far in this introduction, it is important to understand why certain young people do not participate in HE, and from a policymakers perspective, how this might be improved.

One question that is often discussed in this area is the role of credit constraints. This can be thought of as another market failure. In settings where young people have to contribute to the cost of their higher education (e.g. the US, UK, Australia), many commentators point the finger at high tuition fees as a potential source of inequality in higher education. However, there is now a wealth of evidence showing that credit constraints may play a minimal role in access to higher education. Carneiro and Heckman (2002) for example, shows that, after controlling for cognitive ability, parental income at the time of college going plays only a very minor role in college participation in the US and that only a small fraction (at most 8 percent) of the families of adolescents in the United States are credit constrained in making college participation decisions.

This is much to do with the timing of when inequalities emerge, an important area of research for economists in this area. Cunha and Heckman (2007 – volume 2) study when in childhood gaps in cognitive ability may emerge, summarizing findings from key literature. Their review reveals that ability gaps between individuals from different socio-economic groups emerge at early ages. For example, levels of child skills are highly correlated with family background factors like parental education. They also reveal the existence of “sensitive periods” – that skills such as language are more easily acquired, or set, at an early age. Thus, early interventions (remedial education) are likely to be more effective than later ones (adult learning). Importantly they also present evidence on the existence of a skills multiplier – that early interventions will lose impact if they are not followed up. Evidence that gaps in ability emerge early has also been widely documented in the UK (e.g. Feinstein, 2003).

This early work has important implications for how we close the participation gap in HE, and of course, the role of higher education finance (a topic which we will turn to later in this introductory essay). If gaps in cognitive ability emerge early, relieving credit constraints at college going age – for example by providing free or heavily subsidised higher education – will be ineffective because it is too late by then to change the outcomes of young people. Instead, many economists (Carneiro and Heckman, 2002) argue that credit constraints must be alleviated far earlier in a young persons life (when they have a real impact on cognitive skills), to have any hope of improving their schooling outcomes, which will, in turn, determine whether they go to college or not. Again, economists in higher education have benefitted from advances in data availability. In particular, the availability of linked administrative data in UK research has been a substantial leap forward in this area, since it allows the authors to link attainment at school with higher education participation. This approach allows the researcher to track young people throughout their entire educational career, thus determining where socio-economic gaps emerge. Work by Chowdry et al (2013 – volume 3) was pivotal in this regard. The authors documented substantial gaps in HE participation according to the socio-economic position of their parents, but showed that these socio-economic gaps virtually disappeared once school attainment was taken into account. This led to the widespread acceptance in the UK that the reason poorer students don't attend college is because they don't have the necessary A-levels (in turn, because of performance earlier in school) not because of their poverty. Again this evidence highlights that attempting to alleviate credit constraints through college aid or tuition fee subsidies will have only a minor effect on participation gaps.

It is research in this area that has led to the emergence of early intervention programmes such as Sure Start in the UK, and initiatives such as the Early Intervention Foundation, devoted to understanding and tackling the root causes of social problems for children and young people.

The studies above were important advances in our understanding of the likely causes of the substantial gaps in HE participation in both the UK and US, and more recent research has moved on to examining these gaps in more detail. For example, a small body of work examines socio-economic gaps in participation among elite universities (Chowdry et al, 2013, Boliver, 2013 – Volume 3). This is relevant, given the (admittedly thin – see previous) evidence that elite universities provide higher returns, and hence disparities at this level may further damage equality. A small body of work (Black et al, 2015, Hoxby and Avery, 2012 – Volume 3, Smith et al, 2013) that documents college “undermatch” – where students attend colleges that are less selective than they could do based on their academic credentials – is also highly relevant here. Research shows that as many as 40% of US students may be undermatched (some not attending college at all, despite being qualified to do so), and that these students are far more likely to be from poor backgrounds. The availability of data on students' college applications has been extremely powerful in illuminating reasons for the disparity in attendance of more selective colleges in the US. This data has allowed researchers to demonstrate that the chief reason for undermatch is that low SES students simply do not apply to selective colleges (rather than that they do apply, but are not admitted). Such data is rarely available in the UK, despite a centralised applications process, so that very few studies can describe the application behaviour of students. Work by Boliver (2013) has been pivotal here, however, showing that even when they do apply to selective universities, high attaining students from ethnic minorities and state schools are less likely to be offered a place at an elite institution.

More recent research has also widened into understanding of the drivers of these gaps in both access, and access to more selective universities. Understanding these drivers is clearly of great importance to policymakers focused on closing these gaps.

One area that has received a great deal of attention concerns the availability of information to students. The hypothesis is that students from low socio-economic groups may simply not be aware of the wage (or other) benefits of attending college and hence choose not to attend. This is another so-called “market failure” which again justifies intervention by the government for both equity and efficiency reasons.

Early studies in the area tended to focus on the wage expectations of students hypothesising that students may be ill-informed of the returns to their degrees, and therefore may make poor choices about education. For example, Dominitz and Manski (1996 – Volume 2) and Betts (1996) elicited future wage expectations of university students. Although students do anticipate positive returns to education, there is considerable heterogeneity and it is common to overestimate returns. A study by Wiswall and Zafar (2011) also finds that even very high ability students (in this case enrolled at an elite US university) have biased beliefs about the distribution of earnings in the population, and that students revise these beliefs (and subsequent choices) in response to information.

These studies tend to use simple surveys of students beliefs. However, another group of studies in this area have used experimental approaches designed to increase the amount of information available to young people, testing whether this might induce them into higher education. The high use of experiments here is presumably because there are likely to be few instances where the amount of information a student has on the benefits of HE is rarely “near-random” – though see studies by McGuigan et al (2015 – Volume 3) and Anderberg et al. (2011) which use media activity as a source of quasi-experimental variation on information availability.

These more experimental studies typically find positive impacts of providing information on students enrolment intentions (e.g. McGuigan et al (2015 – Volume 3), Bettinger et al. (2009 – Volume 3), Boojij et al. (2012), Oreopoulos and Dunn (2009). Interestingly, whilst the majority of these studies are successful at improving the knowledge of students about the costs and benefits of HE, researchers have been far less successful in finding an effect on enrolments. It is notable that those interventions which have been more successful at “nudging” students into applying to college, tend to offer information that is highly customised to the individual student. Two key examples being Hoxby and Turner (2013), who provided students with a guidance pack in the mail, which contained personalised, tailored information on how to apply to colleges, what each college would cost (taking account of the likely discount a student would receive based on their household income), and relevant statistics on the quality of each college (including the graduation rate and instructional resources). Students were also provided with an easy, no-paperwork means to apply for fee waivers. A similar intervention was run by the UK’s Department for Education in conjunction with its Behavioural Insights Team (Sanders, M., Chande, R., Selley, E, 2016).

Further research has found that more “hands on” approaches to informing students can also be highly successful, including work by Bettinger (2009-Volume 3), which targeted families with members of college going age, going as far as completing the financial aid forms on their behalf, and Kane et al (2016 – Volume 3), which enlisted Harvard graduate students to mentor high school seniors in Boston public schools, in an effort to help the high school students navigate the college admission process.

Again, this research has been pioneering in enhancing our understanding of why some young people don’t go to college (or an elite college), and how we might remedy this. Evening out these gaps is clearly of importance for social mobility and equality.

The significant gap in the proportion of young people from different backgrounds attending HE, in conjunction with the high returns on offer from a degree education, has implications for how higher education should be financed. A key thinker in this area, Professor Nicholas Barr has argued (alongside many other economists) that given the high private returns to HE, individuals themselves should make at least some contribution to the costs (Barr, 2004 – Volume 4). Moreover, he argues, taxpayer funded HE is regressive; those who attend HE benefit through higher earnings, but in free college systems, all taxpayers must contribute. As Barr puts it “the degrees of mainly better-off people are paid for by people who are on average less well off”. However the nature of how they should pay is more complex. A free market system, where universities charged students for their degrees, and where students raise money to pay for them would be fraught with market failures, some of which have already been touched upon in this piece.

Credit market failures mean that students cannot easily borrow for their degrees on the free market (they have no collateral, and lenders cannot tell their potential to succeed, making them a high risk). Moreover, there is risk and uncertainty associated with degree education – students may fail, or fail to get a decent wage return (remember that there is considerable variation in return by degree subject). Some students – mainly from poor backgrounds – may be debt averse, or – again, as has been noted – may lack information about the benefits of a degree. The result would be an inefficient number of students in the system, presenting the need for government to intervene to increase both the number of able students in HE (efficiency reasons), and the number of able students from poor backgrounds (efficiency and equity reasons).

Government subsidized loans, which make education free at the point of entry, and which reduce debt aversion because of their subsidised nature (in the UK, for example, loans are only paid back once the borrower is earning over £25,000 per year) are an ideal solution to these issues (Barr, Chapman, Dearden, Dynarski, 2016). Action is also required to promote access through student aid; as previously discussed, poorer students are less well informed about the benefits of HE, and need extra action to encourage them to participate.

For the most part, these ideas were adopted in the UK over the last twenty years, leading to a high fee system coupled with a heavily subsidized income contingent loan system for both fees and maintenance. In the US, meanwhile, a different landscape is in place (Dynarski and Scott Clayton, 2013 – volume 4). While poor students in the US do receive grants (the Pell Grant), and loans are widely available, they are not income contingent, but instead are paid back “mortgage style” once students graduate. The lack of insurance on these loans can lead to default and dropout, as well as justified fears of debt aversion which may keep talented but poor students out of HE.

But does the type of student finance on offer impact who goes to HE? Can governments induce more young people into HE through subsidies and aid. Conversely, could increasing fees put young people off from entering HE, thus actually damaging the goals of government?

These questions have been pondered by many researchers, many of which are reviewed by Dynarski and Scott-Clayton (2013). To get around selection problems, researchers have tended to use quasi-experimental methods of the type described throughout this introduction. Studies by Kane (1995 – volume 4), Dynarski (2003 – volume 4), Seftor and Turner (2002 – volume 4) come mainly from the US, and typically show a small positive effect of student aid on participation, though there are an increasing number of studies from the UK and Europe (Dearden et al, 2014 – volume 4, Neilsen et al, 2010) have also uncovered a positive role for aid on participation. As has been stated earlier in this introduction, however, aid has a small role to play, given that inequality occurs far earlier in life.

But if our goal is to increase human capital, economic growth and social mobility, simply equalising access to higher education is not enough. As Bailey and Dynarski (2011) point out, “enrolment is not the same as attainment”. It is likely that employers place value on degree quality, as well as degree

attainment, and moreover it has been shown that years of education is an important indicator of economic growth. If students from lower classes perform badly once they are at university, then this is an important policy issue.

What determines how students perform once they are in university? An important economic concept, which has been studied in great detail at lower levels of education concerns the “education production function”. The education production function describes the relationship between quantity of inputs (e.g. teachers, books) used to make a good (e.g. maths knowledge) and the quantity of output of that good. The underlying goal of education production studies is to determine policies that are efficient – i.e. that will maximise outputs, given the quantity of inputs. Understanding the education production function provides vital information to policy makers about where the greatest returns from additional educational spending lie. The education production function originated with the Coleman Report (1966), which was a large-scale exercise involving data and statistics on schools and pupils in the US, including information on the resources of each school, and the performance of the pupils within these schools. Such rich data could be used to analyse which of the various inputs into the educational process were the most important in determining the achievement of students. But many studies have since attempted to untangle the effect of schools and the effects of pupil characteristics and family background using data on schools and pupils, and statistical techniques (most prominently, see work by Hanushek, 2008). Surprisingly, these studies have typically shown that the key inputs that governments can control – class size, teaching experience, funding, account for only a small element of the variation in pupil performance by SES. Rather, the pupils’ own background tends to far better predict how they will perform (Rasbash et al, 2010) – very much in line with the findings of Carneiro and Heckman previously discussed.

But what about university? Students are older than pupils, and are a more selective group. Which are the key inputs that help them succeed? Unfortunately there is very little data available to help researchers understand this. Apart from one study on the impact of university class size (Bandiera et al (2009), which finds limited evidence on the importance of class size in university (apart from at the extremes of size), the majority of studies of the university production function have examined college peer effects as a driver of students’ outcomes. The interest in this may reflect availability of random assignment of dorm rooms – which again mimics a randomised control trial, assigning students to different peers at random. Studies in this area (Sacerdotes, (2001 – volume 3), Carrell, Fullerton and West (2009), tend to find strong evidence for the existence of peer effects in college, in particular in positively influencing the college GPA of the student, though other outcomes are also studied such as future employment decisions. These papers suggest that inputs in college do have a role in the outcomes of students. However, it is clear that research in this area is some way behind that of schools research, and much is to be done. The availability of better data, on class size, resources, lecturer experience, linked to student outcomes is essential for this work, but this is still not widely available to researchers.

Nevertheless, work to date has shown that socio-economic gaps do not disappear once students enter the door of HE, and many students from poorer backgrounds in both the UK and US fail to complete their degrees, or complete with lower grades than their more advantaged counterparts (Bailey and Dynarski (2011 – Vol 2), Crawford (2016 – Volume 3), Smith and Naylor (2001). Whilst some of this can be attributed to the fact that students select into different universities, with different grading standards, we also know that outcomes of students vary, even when they are studying the same course at the same university. Bound and Turner (2011 – Volume 3) point out that the US is particularly poor at graduating students; among those who enter college, only about half leave with a degree – substantially less than in other countries including the UK. They point to a growing disparity in completion rates of enrolled students from different parental backgrounds, with a 32 percentage point completion gap between

college enrollees from the richest and poorest backgrounds. For the UK, the issue is less severe, though Crawford (2016) shows that even after controlling for detailed measures of prior attainment, demographics, institution and course of study, there still remains a significant gap in dropout (of 3.5 percentage points) and a similar sized gap for obtaining a first class or 2.1 degree.

What could be causing such disparities in attainment? A small number of studies have been able to shed light on this. Bound and Turner (2011 – Volume 1), Crawford et al (2016) point to lack of academic preparation for college as a significant factor. They also highlight the potential impacts of rising college costs, and increased working by students, though here they believe the evidence is less compelling.

Much research in this area has also highlighted the role of college quality and match. Like the Arcidiacono et al (2014?) study, evidence (Bound and Turner, 2011, Light and Strayer, 2000 – Volume 3) shows that match between student ability and college quality (usually measured by the academic ability of its intake) is a driver of graduation outcomes. Evidence shows that for low ability students, as college quality goes up, graduation prospects decline – so that these students could improve their prospects of graduation by attending less selective colleges. Among high ability students the relationship may be less straightforward.

A small amount of research indicates that student aid may have the potential to help here. Studies (Schudde and Scott-Clayton, 2014 – Volume 4, Bettinger, 2004 – Volume 4; Garibaldi et al – Volume 4) reveal that grant aid can prevent dropout or increase performance of students in college. Many of these studies are unable to separate the impact aid may have in changing the student body however (e.g. aid may tempt more marginal students into college, and these students may be more prone to dropout). A couple of exceptions (Murphy and Wyness, 2015 – Volume 4; Denning, 2016; Goldrick-Rab, 2016 – volume 4) do show that student aid may play a role in equalising outcomes at university.

These findings certainly suggest that higher education may not be the great leveller that perhaps was once hoped, and that wide disparities remain even after entry, which cannot be explained by the prior attainment of the student or the course they have chosen. But there is further, perhaps even more worrying evidence (Crawford et al, 2016 – Volume 4; Macmillan, Tyler and Vignoles, 2015) of the existence of socio-economic differences that last into the labour market, with students from poorer backgrounds ending up with lower wages than those from richer backgrounds, even accounting for prior academic attainment, institution and subject of study, and degree class. This is strong evidence that differences in labour market outcomes go well beyond differences in degree achievement.

These findings imply that policy action is needed at every stage of a students life-course, to ensure equality of opportunity and outcomes for those from different socio-economic backgrounds, even among the elite group of young people who make it to university.

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