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Rethinking education, work and 'employability'

Foundational problems of human capital theory

Simon Marginson

Centre for Global Higher Education/ UCL IOE

Contact details

Simon Marginson

UCL Institute of Education
University College London
20 Bedford Way
London WC1H 0AL
United Kingdom

Office phone: +44 (0) 207626341

Mobile: +44 (0) 7876323949

Email: s.marginson@ioe.ac.uk

Bio

Simon Marginson is Professor of International Higher Education at the UCL Institute of Education, University College London, UK, and Director of the ESRC/HEFCE Centre for Global Higher Education. He is Joint Editor-in-Chief of *Higher Education*.

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Abstract

Human capital theory assumes that education determines the marginal productivity of labour, and marginal productivity determines earnings. It is the dominant reading of relations between higher education and work. Assumptions that intellectual formation constitutes a mode of economic capital, and higher education is essentially preparation for work and careers, are commonplace. It is widely believed that higher education determines the position of graduates, rather than their social backgrounds, the demand for labour, or economic policy, suggesting remarkable optimism about the potency of higher education. This underpins the assumption that the quality and efficiency of higher education, and individual institutions, can be reversed engineered using comparative measures of graduate employability based on salaries or employment rates. However, the intellectual foundations of human capital theory (and hence comparative measures of employability) are fatally flawed. Human capital theory fails the test of realism because of weaknesses in its meta-method: theorisation using a single lens, closed system modeling of social relations, the application of mathematical tools to inappropriate materials, and the multivariate analysis of interdependent variables. These weaknesses lead to numerous lacunae. For example, human capital theory cannot explain status objectives, which are more important for some graduates, and in some countries, than others; or how education augments productivity; or why top-end salary inequality has increased dramatically in some countries. Unfortunately, the dominance of human capital theory and its narrative about the effects of higher education has blocked the development of more realistic and nuanced research and policy in relation to the interface between higher education and work. The limitations of human capital theory are discussed with reference to research on social stratification, work, earnings and education.

Keywords

human capital theory; higher education; education and work; education and earnings; social inequality

Introduction: Human capital theory

Since its founding at the beginning of the 1960s (Mincer, 1958; Schultz, 1959, 1960, 1961) and its fuller development in Becker's (1964) equations, human capital theory has constituted the primary social science narrative of relations between higher education and work. Human capital theory assumes that education determines the marginal productivity of labour, and that marginal productivity determines earnings. With some caveats, the value of individual and combined investment in education can be understood as a function of the lifetime earnings of educated labour. Human capital theory has underpinned many thousands of quantitative empirical studies in economics. The possibilities and limits of human capital theory affect policy-related thinking about education (Psacharopoulos, 1994; Keeley, 2007). In many countries institutions and programmes are held to account on the basis of graduate employment rates and/or earnings in the early years; and in some countries rates of return calculations affect tuition fee levels (Chapman, Higgins and Stiglitz, 2014). However, the impact of human capital theory is larger and more diffuse. Assumptions that intellectual formation constitutes a mode of economic capital (Hodgson, 2014), and that higher education is essentially preparation for work and careers, are now commonplace, reinforcing 'a pervasive belief in the power of degrees to both allocate individuals in the labour market and to serve as job requirements throughout the occupational structure' (Baker, 2011, p. 62). The premise that higher education determines the position of graduates—rather than, say, their social background or on-the-job learning, or the demand for labour, or state economic policy—can be traced directly to human capital theory. There are more nuanced policy-related arguments on human capital that treats social background and education as intertwined in their effects (OECD, 2014a). But it is the simple premise about education determining graduate outcomes that has become the abiding myth about education and work. It is remarkably optimistic about the social power of higher education.

Human capital theory is now ubiquitous but it was not always so and its historical conditions of emergence help to explain it. In his 1978-1979 lectures on liberal governmentality at the College de France, Foucault devoted 14 March 1979 to American neo-liberalism, Becker's extension of econometric methods to domains previously regarded as 'non-economic', human capital theory, and 'work as economic conduct' as a means of government (Foucault, 2008, pp. 215-237). Foucault remarks that human capital theory rests on the notion of the student in education not as a democratic rights-bearing citizen, but as *homo economicus*, the economic subject, central figure in an economic market.¹ In imagining education as a form of economic investment in the self-as-enterprise, human capital theory offered a new power to the student/graduate as *homo economicus* (p. 226) while deploying this productive economic subject as an instrument of rule. Rates of return calculations enabled both self-investment and governmental allocation to be precisely targeted. This is helpful in explaining the ubiquity of human capital theory. However, there is another point to be made about the conditions of emergence of human capital theory, one that casts light on its essential optimism about the potentials of higher education.

Human capital theory evolved amid the building of the first mass higher education system in the United States (US) at the same time as the 1960 Californian Master Plan for higher education (Kerr, 2001). The new theory rapidly became general to policy at the same time as another discourse, social rather than economic, that of equality of opportunity through education. Both narratives were, and are, meritocratic and utopian (Marginson, 2016). It was believed that when educated students acquired the embodied productivity

required by employers, the portable human capital, graduate earnings would more or less automatically follow—that education, work and earnings were joined in a linear continuum. Higher education triggered private enrichment, career success and collective economic growth. Human capital theory was a long way from, say, Bourdieu's (1984, 1988, 1993) notion of education embedded in a zero-sum competition for social position in which the prospects of each person are limited by the position and trajectory of each other. But as Piketty shows in *Capital in the twenty-first century* (2014), the 1960s/1970s in the US saw unusually high social mobility. Income from inherited capital was at historically low levels. Income from work was the main source of wealth, and amid high economic growth the size of the middle class was expanding rapidly. Amid excess demand for educated labour it was assumed that all graduates could obtain a good job. There was widespread optimism about the potential of higher education (Rothblatt, 2012) to create a society fairer and more efficient, in which educated merit and hard work determined individual success, rather than inherited wealth. Piketty remarks that Becker's mathematisation of human capital theory is permeated by the belief that all forms of capital other than human capital had lost their determining importance (Piketty, 2014, p. 385). High social mobility allowed Becker to imagine that human capital theory was not just necessary, it was sufficient to explain the relationship between education and work.

It is now apparent that not all graduates carrying human capital enter professional jobs. The power of other forms of capital is clear, and American social mobility is at a low ebb (Stiglitz, 2013). Nevertheless, the myth once installed has not been dislodged. Human capital theory retains its original economic and political efficiency for government, transferring responsibility for individual outcomes from government to universities and the graduates themselves. Merit as learned and portable ability also has a legitimating power. Human capital theory, floating free of other forms of capital, implies that those born with social advantages must have succeeded not because of their birth and connections, but because of their abilities and powers of application (Hennessy, 2014). In a 'hypermeritocratic' parody of the original human capital idea (Piketty, 2014, pp. 264-265), the exceptional salaries of American super-managers are legitimated by their prior selection into leading universities (Rivera, 2011) and within performance pay regimes, by alleged super-productivity in the workplace (Hanley, 2011). In this curious backhand way human capital theory has modernised or 'meritified' self-reproducing privilege, making human capital economists complicit in privilege, though their own normative commitment is often to equality of opportunity.

Human capital theory also makes a continuing claim as social science truth about higher education and work; and in doing so disrupts the possibility of other kinds of social science knowledge about the education/work assemblage. This also disrupts the possibility of other kinds of government of education. Human capital equations unify higher education and work at the cost of suppressing much that is distinctive about each. Work and higher education are different kinds of social site with distinctive histories, daily practices, subject-positions, requirements, rhythms and drivers. This does not mean work and higher education are unconnected. Graduation is associated with higher employability and earnings (OECD, 2014a, pp. 102-170), some higher education is positioned in direct continuum with work (for example selective programmes that train elite professionals), and many programmes, including those in which students spend part of the time in workplaces, have occupational contents. Students and graduates, educational institutions, professions and employers make often-strenuous efforts to bring education and work together. However, the transition

between the two sites is also fraught. Their alignment is partial and unclear. Relations are multiple, context-bound, fragmented, uneven and must be continually worked on.

Human capital theory's claim to truth is the topic of the present paper. It will be argued that human capital theory fails the test of realism, and that its limitations can be understood in terms of certain problems of meta-method in social science.

The paper

The next section of the paper outlines four problems of meta-method, all affecting human capital theory, which impair the capacity of social science to provide realistic explanations. These problems are: claims to universal theorisation based on a single lens, closed system modeling of social relations, the application of mathematical tools to inappropriate materials, and the use of multivariate analysis of social relations despite the fact the variables are interdependent. The section that follows, the main discussion, looks at these limitations specifically in relation to human capital theory. Issues include the problems generated when (1) applying closed analytical systems based on the premise of independent variables, in studies of higher education and earnings, (2) applying human capital ideas to education to work material that is non-homogeneous in space and time, (3) unifying education and work without regard for their heterogeneity, and (4) eliminating multiple other explanations of education/work relations. The critique suggests that to better explain education and work, it is necessary to set aside human capital theory. Forming an alternative is beyond the compass of the paper.

Some problems of method

The paper now briefly identifies four problems of meta-method in social science that affect human capital theory, drawing on critical realism and the heterodox 'Cambridge school' in political economy, associated with the *Cambridge Journal of Economics*.

Single and universal lens

In social science research on higher education (and research in many other topic domains) one common approach is to employ a fixed theoretical framework and linked methodology to a succession of studies in different sites. For example, the researcher may view the empirical material through the lens of resource dependency theory, or an institutionalist narrative of organisational isomorphism, or field/habitus/capital from Bourdieu, or Foucaultian governmentality, or human capital theory. The researcher repeatedly uses the same modes of observation, data analysis, synthesis and exposition. The theory is seen as applicable to all empirical sites, while the only kinds of phenomena readily recognised in observation are those nominated in the master template of the theory. It is almost as if the objective of each round of research is to affirm the theoretical components by identifying them in the process of observation. Rarely is the theory used in a reflexive manner, so that theory itself is open to evolution and refutation. The weight of successive papers seems 'prove' the master theory but it is a test of theory that guarantees its own result. The possibility that the master theory is more applicable to some sites than others (for example, that governmentality is more specific to education in the UK than China with its different

state tradition, that Bourdieu-ian wars of position are more salient in Paris than consensual Helsinki, that human capital investment applies more readily to MBAs than music degrees) is not considered. The succession of similar narratives has diminishing returns.

Two lacunae follow from the use of an exclusive lens. First, the reach of research falls short in sites where the single lens does not readily apply to the material. Second, other possible explanations, arising from the use of other lenses, are confined to oblivion. The use of the single exclusive lens rests on the dualistic proposition that there is only one possible truth about social phenomena and that truth has absolute authority (Dow, 2012, 1990). The claim for universality is normally implied rather than stated, but it is there. For example, while researchers using a single lens might point to limitations of their study, the capacity of the master theory to address any problem is unquestioned.

The alternative method is to acknowledge the partial character of the truth obtained through any one lens, and to open up 'the possibility of a range of approaches' (Dow, 2012, p. 82). This means accepting that theories 'can vary according to changed times and circumstances' (Carabelli and Cedrini, 2014, p. 44). If no single discipline, theory or methodology has universal reach, by the same token no one explanation excludes, cancels out or invalidates the potential of all other explanations. This is challenging, because for each research problem and site it calls up the need to identify the appropriate theoretical lens, or combine and match the appropriate lenses.

Closed system

For universal explanations to work they need closed systems with limiting premises. However, critical realism argues that social structures are always partly open, to other structures and agents, and to historical contingency (Sayer, 2000). In his critical realist reading of economics Lawson critiques mainstream economics on the grounds that it imagines the economy as a closed system operating on the basis of deductive logic. 'Deductivism' is 'the thesis that closed systems are essential to social scientific explanation (whether the event regularities, correlations, uniformities, laws, etc., are either a priori constructions or a posteriori observations)' (Lawson, 2014, pp. 1-2).

By deductivism I mean a type of explanation in which regularities of the form 'whenever event x than event y (or stochastic near equivalents) are a necessary condition. Such regularities are held to persist, and are often treated, in effect, as laws, allowing the deductive generation of consequences, or predictions, when accompanied with the specification of initial conditions. Systems in which such regularities occur are said to be *closed* ... If mathematical methods of the sort economists mostly fall back on are to be employed, closures are required (or presupposed). (Lawson, 2003, p. 5, emphasis in original).

If mathematical sets in economics are universally relevant, strict 'event regularities' must be ubiquitous in the real world. However the problem is that when deductivism is applied in real life research contexts, 'social event regularities of the requisite kind are hard to come by' (Lawson, 2003, p. 13). Thus it is with human capital theory.

The application of numbers

Not all intellectual problems are open to mathematisation. Nor, when they can be used, are mathematical methods alone sufficient to explain social relations. In critical realism Sayer (2000, p. 22) states: 'Statistical explanations are not explanations in terms of mechanisms at all, merely quantitative descriptions of formal (not substantial) associations'. Mathematical methods can be used as auxiliary tools for investigating and illustrating relationships and comparisons, and are effective in mapping proportions and changes in bounded sub-systems, but are not used to form a wholistic picture. Here there is again overlap between the sensibilities of critical realism and of post-Keynesian economics. In discussing the excessive application of mathematical methods, Lawson (2012) states that 'the fundamental problem of modern economics is that methods are repeatedly applied in conditions for which they are not appropriate' (p. 1).

The high standing of mathematical modeling in social science reflects a society-wide belief that mathematics is fundamental to science; a conviction (or ideology) that derives not so much from the elegance of mathematics, as the success of mathematical precision in many domains (Lawson, 2012, p.16). In economics mathematical methods have moved from one set of techniques among several, prior to World War II, to master status. In his 1990 Presidential Address to the American Economic Society, Debreu remarked uneasily that

... mathematics provides ... a language and a method that permit an effective study of economic systems of forbidding complexity; but it is a demanding master. It ceaselessly asks for weaker assumptions, for stronger conclusions, for greater generality. In taking a mathematical form, economic theory is driven to submit to those demands' (Debreu, 1991, p. 4).

Mathematics excels not only in universalisation but in self-universalisation.

Carabelli and Cedrini invoke John Maynard Keynes and his economics teacher Alfred Marshall to make the point that the subject matter of the 'social disciplines' is often inappropriate for mathematical treatment (2014, p. 31). Keynes noted that mathematical reasoning, while formally rigorous, was hostage to the quality of the initial assumptions (Keynes, 1936/1973, pp. 297–298). Marshall believed that as the complexity of the subject-matter increased, economics should become 'more biological in tone' (Marshall, 1898, p. 39) and the role of abstract reasoning and mathematics should diminish. The problem with much of the use of mathematics in economics, he argued, is that the econometrician 'takes no technical responsibility for the material, and is often unaware how inadequate the material is to bear the strains of his [sic] powerful machinery' (Marshall, 1920/1961, p. 781). Multivariate analysis is often extended beyond its capacity. Probabilistic methods are used to distinguish nominal 'degrees of causality' for each one of a set of variables that in reality are impossible to wholly separate. Statistical correlation or coincidence between two variables is held to constitute not a suggestive association between them, but 'proof' that they are causally related. It is remarkable how often statistically-based research papers conclude with a statement that equates correlation with causality, with weak if any qualification, and with little regard for the limits of contextual location and the conditions in which the data were generated.

Variables: Independent or interdependent?

In reflecting on the limits to statistical inference in his *Treatise on Probability* (1921), his principal statement of method, Keynes noted that statistical analysis depends on the

universal validity of assumptions, and could be valid only when the variables used in the analysis were wholly independent of each other (Keynes, 1921/1973, pp. 276–277; Carabelli and Cedrini, 2014, pp. 28-29; Lawson, 2012, pp. 1-2). These were difficult conditions to achieve. As Keynes remarked, in reality there was often a ‘lack of proportionality between causes and effects’ (1936/1973, p. 39); and ‘we are faced at every turn with the problem of organic unity, of discreteness, of discontinuity—the whole is not equal to the sum of the parts, comparison of quantity fails us, small changes produce large effects, the assumptions of a uniform and homogeneous continuum are not satisfied’ (Keynes, 1933/1972, p. 262; Carabelli and Cedrini, 2014, pp. 36-37).

The ‘atomic hypothesis’, which justifies inductive reasoning and mathematical calculus, cannot be applied to organic complex systems ... Keynes is critical of the attempt to blindly apply mathematics and statistics, with their assumptions of homogeneity, atomism and independence, to an economic material that is essentially vague and indeterminate, not homogeneous, not divisible in homogeneous independent parts, not finite, and is characterised by organic interdependence (Carabelli and Cedrini, 2014, pp. 29-30).

In the same vein, Bourdieu and Passeron remark on the interdependent character of the factors affecting education and social inequality:

It is the system of factors, acting as a system, which exerts the indivisible action of a structural causality on behaviour and attitudes ... so that it would be absurd to try to isolate the influence of any one factor, or, a fortiori, to credit it with a uniform, univocal influence at the different moments of the process or in the different structures of factors (Bourdieu and Passeron, 1990/1977, p. 87).

A multi-variate analysis of the relationship between higher education and work requires that all relevant variables are independent of each other, each separately interacts with the other variables, and all interactions are governed by a common law. Such methods can hold only in a closed system governed by a single universal logic.

Problems of human capital theory

These problems are now considered specifically in relation to human capital theory, with reference to recent research on social stratification, work, earnings and education.

Bounded statistical analysis and organic realities

The OECD sees human capital theory as necessary but not sufficient, noting that ‘a host of education-related and context-related factors’ other than learning itself ‘affect the returns to education’ (OECD, 2014a, p. 151). Arum and Roksa are more sceptical, arguing that ‘colleges have little control over wage outcomes’ (Arum and Roksa, 2014, p. 125). There is a long literature on factors that affect earnings, additional to higher education. Different research studies have found graduate earnings to vary with family income (Wolniak, Seifert, Reed and Pascarella, 2008, p. 131); by family life not mediated by education (Triventi, 2013, p. 45) including support for child development, such as whether children are read to at a young age

(Corak, 2012, p. 6); by measured intellectual ability; by type of secondary school attended; by social and family networks at the point of entry to higher education; by family/parental influence and social networks in the choice of, and the transition to, work (Bingley, Corak and Westergaard-Nielsen, 2011; Hallsten, 2014, p. 20; Borgen, 2015.); by social nesting and networks through the career (Arum and Roksa, 2014, p. 14); by level of qualification; by the differential status and resources of higher education institutions ('college quality' in the US literature); and by field of study. Earnings are affected by varying customs and hierarchies in professions and workplaces; by the prevailing system of wage determination, and the evolving industrial balance of power (Piketty, 2014, p. 305); and by the configurations and fluctuations of national and regional economies. Given this empirical setting, it must be said that it is delusional to measure or compare the quantity, quality or productivity of education programmes, institutions or systems, on the basis of the private rates of return to, or the rate of employment of, those graduates. Statistical methods design to eliminate the effects of all factors other than higher education flounder given the number of variables, the interdependency between them, and the impossibility of isolating each separate causal factor from all the others.

For example, Gerber and Cheung (2008), like many researchers, set out to trace the specific effects of 'college quality' on graduate earnings. Does attendance at a selective college boost earnings? If so, by how much? However:

Attendance at a higher-quality institution could be associated with higher earnings because exogenous variables like cognitive ability or social background both increase the probability of attending a high-quality institution and exert positive effects on earnings independently of institutional quality. To the extent that the earnings premium to institutional quality results from selection effects, the association between college quality and earnings is not causal because by implication graduates from high-quality institutions would have higher earnings even if they attended lower-quality institutions (Gerber and Cheung, 2008, p. 301).

It must be said that the problem of selection effects is a non problem, grounded in the assumption that causal elements can be separated on an atomistic basis. However, in research premised on the assumption of atomism the problem must be solved. Attempts to account for selection effects generate results that vary sharply between studies. Dale and Krueger (2011) identify moderate returns to college selectivity but acknowledge they are bedeviled by selection effects. In China, Hartog and colleagues compare top 100 universities and top 400-500 universities and find that college tier affects graduate wages (Hartog, Sun and Ding, 2010, p. 970, pp. 975-978). However, Li and colleagues note that while some researchers identify returns to college selectivity after selection effects are accounted for, others find that these returns disappear. In other words, much of the variation between studies, in findings, is due to arbitrary assumptions about the handling of selection effects, rather than variations in the real world relationships under observation. When Li and colleagues do their own calculation they find that for new graduates in China, gross returns to elite colleges of 26.4 per cent reduce to 10.7 per cent after accounting for ability, major, college location, graduate characteristics and family background (Li, Meng, Shi and Wu, 2012, pp. 78-79). But this assumes the variables are independent. Gerber and Cheung (2008) are sceptical about the effects of elite institutions, noting that 'recent studies that employ more sophisticated methods cast serious doubts on the argument that elite colleges yield a greater return than non-elite colleges'. These studies state that 'the apparent effect of elite college

attendance results largely or completely from the effects of a complex set of variables that influence whether or not one attends an elite college in the first place' (p. 303). Gerber and Cheung conclude the problem of 'college quality' and selection effects is unresolved. 'We need better data', they state (p. 313). What they have encountered is not a lack of data, but the limits of multivariate analysis.

Non-homogenous and non-linear material

Average graduate returns can be misleading. Borgen remarks in relation to studies of graduate outcomes, that while averages create order from diversity they do so 'by masking important heterogeneity across the wage distribution' (Borgen, 2015, p. 43). As student participation expands the dispersion in graduate outcomes increases. While early graduate returns are superficial, and long-term careers encompass the fuller effects of higher education, in the later years, factors other than education such as on-the-job learning and workplace networks have an ever-growing influence, and the effects of earlier education are more elusive. Social and educational stratification affect relations between higher education and the labour market at many points, via complex feedback processes. All of these effects are subject to changes over time that are non-homogeneous across graduate populations, institutional status and fields of study.

Wolniak and colleagues find that after graduation, education is associated with a growing impact on earnings, in non-linear fashion (Wolniak et al. 2008, p. 131). Bingley and colleagues researched the 'intergenerational transmission of employers' between fathers and sons. They find that in both Canada and Denmark, 30-40 per cent of young adults are at some point employed by a firm that has employed their fathers. In both countries the transmission of employers is positively associated with paternal earnings, 'rising distinctly and sharply at the very top of the father's earnings distribution' (Bingley et al. 2011, p. 3, p. 7 and p. 12.). Again at the top end of the income distribution, Hussain and colleagues find that the income effects of attending a selective institution seem to inflate, and at that level of income the returns associated with degrees are increasing (Hussain, McNally and Telhaj, 2009, p. 12). Borgen (2015) also identifies non-linear economic returns associated with higher education. 'Students who are most likely to attend a high-quality college benefit the most from attending such colleges, in line with the predictions of the positive selection hypotheses... but the findings support the positive selection hypotheses only at the upper half of the wage distribution' (p. 40). Family background effects are greatest at top end of wage distribution (p. 42). 'The returns to college quality are five times larger at the 90th quantile compared to the 10th quantile'. Likewise, research by Lemieux (2006), finds that in the US over thirty years, 'within-group inequality grew substantially among college-educated workers, but changed little for most other groups' (p. 195). 'The median, the tenth and the ninetieth percentiles are remarkably stable for up to 12 years of education'. However 'above 12 years of education... the return to education at the ninetieth percentile increases much more than the return to education at the tenth percentile, leading to a large increase in the 90-10 gap' (p. 196). Lemieux concludes that 'changes in wage inequality are increasingly concentrated in the very top end of the wage distribution...' [and] 'postsecondary education plays a crucial role in explaining this phenomenon' (p. 199). The empirical data are consistent with Bingley et al. (2011) and Borgen (2015), but Lemieux's interpretation is questionable. Is the measured concentration at the top end of incomes an effect of higher education, as Lemieux suggests, or due to something else?

These findings about non-linear returns at the top end of the income distribution are inconsistent with human capital theory but consistent with data from Piketty, Saez and others on the growth of American income inequality. Saez (2013) points out that in 2012 the income share of the top 10 per cent at 50 per cent of all US income was at its highest level since 1913, and the income share of the top 1 per cent at 22.5 per cent was the second highest since 1928 (pp. 7-9). Piketty (2014) notes that between 1980 and 2010 in the US the income share of the top 0.1 per cent rose from 2 to nearly 10 per cent. The broad consensus in the economic literature is that the blow-out in managerial salaries, particularly in the last two decades, is much more a price effect than an education effect (e.g. Blau and Kahn, 2001; Autor, Katz and Kearney, 2008, p. 317-318; Mouw and Kallenberg, 2010; Hanley, 2011; Wolff and Zacharias, 2013; Stiglitz, 2013; Bentele, 2013; OECD, 2014b), and is grounded in tax cuts for high income earners and work-related practices, including salary deregulation, de-unionisation and performance-pay regimes.

The rapid growth of income inequality in both the US and the UK has coincided with historic highs in educational participation. If education produces human capital, which determines marginal productivity and rates of return, then income inequality is driven by inequalities in individual skills and productivity. Piketty comments wryly that while 'US educational institutions... surely need to be improved and made more accessible', they 'probably do not deserve such extravagant blame' (Piketty, 2014, p. 330). Higher education is largely decoupled from the surge in top incomes (p. 315 and p. 330):

This very sharp discontinuity at the top income levels is a problem for the theory of marginal productivity: when we look at the changes in the skill levels of different groups in the income distribution, it is hard to see any discontinuity between 'the 9 percent' and 'the 1 percent', regardless of what criteria we use: years of education, selectivity of educational institution, or professional experience (Piketty, 2014, p. 314).

Human capital theory cannot explain substantial variations in graduate incomes over time, nor differences in patterns of income distribution, and top-end earnings, in countries with similar higher education. 'A major problem' facing 'marginal productivity theory' is that 'the explosion of very high salaries occurred in some developed countries but not others. This suggests that institutional differences between countries rather than general and a priori universal causes such as technological change played a central role' (Piketty, 2014, p. 315, also p. 304, p. 308, p. 321). Nevertheless, the non-linear earnings pattern is suggestive, implying that education affects American occupational outcomes less among high-income earners than at middle level. While this again undermines the universal claim of human capital theory it suggests a fruitful topic for research.

Heterogeneity of higher education and work

As noted, the human capital narrative implies that higher education and employment are in lock-step progression, that jobs and earnings follow automatically from education—and if it is not so, something is wrong with the education, or the graduate. The real world transition is often not lock-step, and job allocation lacks precision, especially in systems like the US with many generic degrees. Schneider and Stevenson (1999, pp. 79-85) find that only 44 per cent of students had 'aligned' educational ambitions, meaning that they planned to complete the amount of education required by their intended occupations (Arum and Roksa, 2011, p. 34). Many students keep vocational options open; and many enrol for more reasons than

vocational planning, studying subjects that they are good at, or that they enjoy, while hoping that the future will work out. It is a strategy that embodies uncertainty, but because all graduates have a positional advantage in the labor market vis a vis non graduates their confidence is not wholly misplaced. Robst (2007, p. 398) notes that 'the eventual match between degree field and occupation is uncertain when selecting a major'. He finds that 55 per cent of respondents report a close relation between their work and their field of study, 25 per cent state they are 'somewhat related', and 20 per cent that they are not related (p. 402). However, Robst has difficulty defining the work-relatedness of general degrees. Many first-degree graduates in the USA are not specialists (Roksa, 2005, p. 225). There is greater vocational specificity in some other countries, such as Germany, but in the USA:

Many educational credentials have no obvious matches in the labour market. This includes the majority of high school graduates in general and academic tracks and a large portion of college graduates majoring in liberal arts and sciences. Consequently, finding a job in one's field of study is not only an individual dilemma, it is a process that reflects the relationship (or lack thereof) between the educational system and the labor market (Roksa and Levey, 2010, p. 391).

This is not simply a problem of the lack of vocational specificity in degrees. Even among specifically trained graduates, many work outside their fields of training, a 'mismatch' that in the US often but not always generates income penalties (Melguizo and Wolniak, 2012, p. 383; Robst, 2007, pp. 403-404; van der Werfhorst, 2002, p. 301). Though it remains to be closely studied, it can be surmised that when graduates work outside their field of training, most do so not because of deliberate perversity. Rather, the lack of fit reflects the messy way that labour markets work. Graduates often take jobs providing the best pay and career prospects at moments of application and selection. Some graduates move away from their qualifications at this point, and of these a proportion will never return. Many jobs are general jobs, capable of being filled by graduates from any field, so that level of education may be more significant than field of study. More surprisingly, some specialised positions are filled by persons trained in a different field. For their part, employers select the 'best' person from the available pool. The specificity of training and qualifications is only one factor in play. Selection into jobs is influenced by time/place contingency and the other opportunities available to applicants. Studies of job selection and graduate networking indicate that attributes of potential employees that influence selection, additional to qualifications or academic performance, include institution attended, extra-curricular activities as students, subjective perceptions of 'fit' between graduate and workplace, and personal ties (e.g. Bingley, et al. 2011; Rivera, 2011, 2015; Tholen, Brown, Power and Allouch, 2013; Borgen, 2015). In Germany the passage from education to work is often smoother than in the US, but this is achieved not by market forces at education and work as Becker imagined, but by 'tight linkages between occupational groups, education and training practices, and certification boards'. German practice appears to conform 'nicely to human capital models' but 'these completely fail to capture the importance of the elaborate institutional framework that enables the German certification regime to operate as they predict' (Hansen, 2011, p. 32).

Human capital theory unifies higher education and work on the basis of a financial equation of the costs and benefits of education. Though the costs are clear-cut human capital theory cannot conclusively attribute the benefits to education or explain how they are derived at work. It lacks 'direct empirical evidence on how schooling enhances productivity' (Hansen, 2011, p. 43). One constraint is its methodological individualism (Lukes, 1973). It is

impossible to accurately attribute enhanced value to individuals working in a combined workplace, as are most employees (Piketty, 2014, pp. 330-331).

Multiple explanations

Many students fail at being *homo economicus*. Thomsen and colleagues report that at the point of enrolment some do not take forgone earnings into account (Thomsen, Munk, Eiberg-Madsen and Hansen, 2013, p. 471). Robst notes that often students know earnings only in their chosen occupation, not related fields (Robst, 2007, p. 399). Some students believe contacts and networking are more important than skills or credentials (Arum and Roksa, 2014, p. 14). Borgen states that many students, especially those from affluent backgrounds, do not 'self-select into colleges based on expected gain' (Borgen, 2015, p. 34). No doubt some others play the part that human capital theory has written for them, estimating the lifetime earnings for different choices and weighing them against the costs of study. Students have many interests in addition to securing credentials, future earnings and careers, including building social capital networks, accumulating cultural capital in Bourdieu's sense, immersing themselves in fields of knowledge, engaging in intellectual formation as an end in itself, and social or political activism. They mix their goals, practices and modes of reflexivity. There are many ways to self-formation (Marginson, 2014). But to admit even one other effect is to push the analytical frame of human capital theory to breaking point. It ceases to be the universal lens. It is no longer a closed system.

Thus the human capital project is confounded by another, mainstream, explanation for the same data. In screening or signaling theory, higher education is understood not as a site of self-investment in cognitive formation, that delivers economic returns, but a system for signaling position within a competitive framework, that delivers economic returns. There is evidence for the signaling function. Arum and Roksa (2014) note that American business graduates have strong early returns to the degree, despite relatively low cognitive formation. 'Some majors serve as better signals of employability than others, regardless of whether those degrees are underpinned by actual field-specific knowledge and skills' (Arum and Roksa, 2014, pp. 80-81). OECD data on earnings suggest that in some countries the returns to qualifications exceed the returns to measured skills, while in other countries the ratio is reversed (OECD, 2014a, p. 109). This also suggests that both human capital effects and signaling effects are at play. A pragmatic policy body such as the OECD can acknowledge this. In social science the custom of the universal lens is so well entrenched that researchers feel obliged to choose between the two (e.g. Wolniak et al., 2008, pp. 124-125; Hu and Vargas, 2015, p. 3; Baker, 2011, p. 8).

The signaling notion also points to the larger role of occupational and social status in education and work. Status is not captured by the earnings function. Arum and Roksa (2014, p. 57) emphasise: 'Rewards to occupations are related not just to income but also to occupational status and prestige. In social settings, individuals are typically asked about what they do, not how much money they earn'. Many studies identify status goals and effects, and variations in the respective roles of earnings and status outcomes, by gender, by field of study and 'college quality', between countries and over time (e.g. Arum and Roksa, 2014, pp. 80-81; Triventi, 2013, pp. 55-57; Zhao 2012; Thomsen et al., 2013, p. 471; Hu and Vargas, 2015; Hennessy, 2014, p. 47).

Investigating outcomes for 13-year out graduates, Roksa finds that for those with generic degrees working in the public and nonprofit sectors, a managerial role is more attractive than earnings. 'Graduates of female-dominated fields are disproportionately employed in public and non profit organizations which offer lower monetary rewards but facilitate access to professional and managerial positions' (Roksa, 2005, p. 207). The passage

of time can affect income and status outcomes in contrasting ways in the different fields of study. 'Occupationally specific degrees are beneficial at the point of entry into the labour market but have the lowest growth in occupational status over time' (Roksa and Levey, 2010, p. 389), though they do somewhat better in relation to earnings (p. 399). Triventi (2013) in four European countries and Hu and Vargas (2015) in China find that 'college quality' tends to enhance occupational status. Hu and Vargas (2015) note it is a signal of prestige to employers and correlates with the likelihood of assuming a managerial position (p. 19). Earnings are more influenced by field of study than 'college quality'. Goodman (2014) and Zhao (2012) emphasise that status is especially important in the context of China, opening the way to jobs and income; and also that status is closely associated with level of education, and separately, with political standing. This does not mean education in China is the sole 'cause' of social status, and hence jobs and income, any more than education 'causes' US or UK earnings.

However, while research can admit multiplicity on the empirical side, theoretical multiplicity is mostly still a bridge too far. Gerber and Cheung (2008, p. 301), wrestling with the association between 'college quality' and graduate earnings, canvass four alternate reasons for the higher earnings of graduates of elite institutions: elite institutions impart more valuable human capital, elite graduates send a signal of their position to employers, those who attend elite institutions garner more valuable social capital, those who attend elite institutions enjoy advantages (such as family affluence or ability) that lead to more favourable outcomes. The possibilities that all causes are in play, and that the mix might vary over time and between countries, is not considered. The drive for one universal explanation, that elusive talisman of social science, over-rides real-world complexity. Hansen (2011) argues that all of the principal theories of education/work relations, such as human capital, signaling, and 'credentialist theories of certification' are 'to some degree wanting' (p. 31). The obverse is also true. Most narratives of education and work can make a distinctive contribute to understanding.

Conclusions

The relationship between higher education and work differs from case to case. It varies by country, field of study, type of institution, arrangements for financing education, industry, employment site, and over time. It is not a relationship of identity or a linear continuum. How then might that relationship be imagined? Returning to Foucault and his lecture series in Paris, on 17 January 1979 he compared two kinds of dyadic relationship: a dyad of disparate qualities, that is joined by a 'strategic logic'; and an ultimately homogenous dyad in which the two parts are joined by a 'dialectical logic'. In a dialectic the contrary parts are ultimately resolved by synthesis.

A logic of strategy does not stress contradictory terms in a homogeneity that promises their resolution in a unity. The function of strategic logic is to establish possible connections between disparate terms which remain disparate (Foucault, 2008, p. 42).

Higher education and work are joined on a strategic rather than a dialectical basis. Higher education and work are not always contradictory. But they *are* separated and different. Their relations are never wholly resolved, and when resolution is attempted something can be lost, such as the generic or liberal component of intellectual formation.

In order to move beyond the limitations of universal theory and mathematised closure in re-theorising education and work, two moves are needed. First, simple generic theory should be replaced by a framework that incorporates differentiation and diversity within a common set. Second, like all semi-bounded systems, the strategic dyad of higher education and work is connected to other systems or 'fields' (Bourdieu, 1993; Fligstein and McAdam, 2015). For example, relations between education and work are affected by incomes and wealth, power and politics, labour markets, taxation, public spending and programmes, urban development and multiple global flows, to name only some elements. A new theorisation of the education and work dyad should incorporate connections between the 'inner' field and other fields.

Does statistically-based inquiry have a continuing role? Without question, providing that its universal claim is dethroned, and its resort to the conflation of correlation and causation is finally laid aside. While all truths are partial truths, and all research on the association between education and earnings, rates of employment and occupational status is necessarily incomplete, both quantitative and qualitative research can be suggestive, especially longitudinal and comparative patterns. Statistical studies can point towards new explanatory elements, and to potential further inquiry using a range of research methods. As illustrated by the research on 'returns' to top-end incomes, it is often where the linear patterns break down that the findings become more interesting.

Notes

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1 Foucault noted the heterogeneous notions of the citizen-in-society, and the graduate-in-economy as human capital were combined within the ensemble of liberal governmentality (Foucault, 2008, p. 296). The essence of politics lies in the interplay of the different and overlapping 'arts of government' (p. 313).