

Economic Value of the Doctorates: Findings from a Systematic Literature Review

DENISE HAWKES¹

Institute of Education, UCL, London, UK

ALEKSANDRA GRIAZINA²

PhD candidate, Institute of Education, UCL, London, UK

Following human capital theory, the investment in education should result in wage gains over time and increased productivity. Thuswise, some governments became more active in stimulating citizens into pursuing advanced degrees by introducing loans and other support schemes. British policy makers went further by first launching graduate loans for students pursuing Master degrees followed by announcing the loan scheme for PhD students to start in 2018. Will keeping more young professionals away from joining the labour force and increasing their educational debt pay off in economic terms for those students? This systematic literature review is motivated by the possible contradiction in governmental objective to increase the number of doctoral students, while their ability to find the jobs which fit their qualifications and payment expectations might be questioned.

This review shows that systematic data on doctoral graduates and the labour market is quite limited, with employers outside academia mostly being unsatisfied with lack of 'commercial awareness', flexibility and adaptivity to new environments in young PhD degree holders. At the same time the role of the degree and expectations coming with it are changing and doctorate students are expected not only to produce a thesis, but to teach, publish papers and develop transferable skills.

Keywords: impact of PhDs, economic benefits of a degree, doctoral education

¹ Email: denise.hawkes@ucl.ac.uk

² Email: a.griazina.16@ucl.ac.uk

Introduction

In 2018 British government introduced PhD loans of up to 25 000 pounds. Authorities of Northern Ireland earlier proclaimed a double increase in the doctoral students in order to meet the need to maintain a competitive world class research system (Review of Postgraduate Education - Policy and Funding in Northern Ireland, 2009) . While there is still debate on whether this initiative will target applicants both on the basis of merit and need, the question of whether the increasing participation in the doctoral training is necessary and the government is not producing overskilled workers. It is hard to argue with the fact that PhD degree is meant to provide an advanced research training and is considered by many governments to be an important research investment. Leitch (2006) is among many to suggest that higher level skills, which PhD, MBA and postgraduate degree holders possess will provide significant returns to the employers and the economy overall, but there is a striking absence of systematic research into the multivariate impact of the doctorate.

Card (1999) and Ashenfelter et al. (2000) provide a review of the research on the estimates of the returns to education. Most of the studies focus on comparing either having the first degree or at least completed A levels with a non degree or non A levels completion or only focus on the economic returns to an additional year of studies. The purpose of this paper is to provide a systematic review of the literature on the economic benefits of receiving a PhD degree in the UK, linked to the introduction of the governmental PhD loan scheme in 2018.

The objective of this present study is twofold:

1. Estimate the effects the receiving a doctorate has on graduate earnings
2. Analyse the trend of the development of the discipline, identify gaps and pave some crucial directions for future research.

Since this literature review is part of a larger study on the wages premium of doctorate degree holders, we only focused on the studies, which included statistical analysis of the wages differentials of PhD and non PhD degree holders. The next stage of research will focus on

conducting a meta regression analysis on the available data to identify groups of graduates, who earn more after receiving a PhD degree in comparison to Master and Bachelor degree holders. This will enable not only to contribute to the existing literature, but generate recommendations to better inform governmental decision to support and drive more students into doctoral education programs.

Literature Search Methodology

Blaug (1967) when conducting his research on the rates of return of education in the UK back in the 70s mentioned that unlike the USA Great Britain does not collect data on incomes or earnings by age and education levels, thus limiting the opportunities for analysis and research. Not much has changed since then. The majority of research, which we were able to locate, investigate mostly the impact of the US and European doctorates. UK studies tend to provide less information on wages differentials and data driven economic outcomes, but rather make emphasis on skills, which doctorate students develop during their studies, personal impact and motivations vs outcomes after the conferral of the degree.

Broadly the identified research related to the impact of PhD graduates touched on the following topics:

- Earnings returns to lifelong learning in the UK/returns to adults' education (Dorsett et al., 2010; Field, 2006; Jenkins et al., 2003).
- Skills gained while conducting a PhD/personal impact and value of the PhD over a lifetime: (Millard, 2015; Mowbray and Halse, 2010; Harris, 1996)
- Exploring career paths of PhD graduates/satisfaction in long term career progression by PhDs: (Neumann and Tan, 2011; Raddon and Sung, 2009)
- Social and cultural impact of the PhDs: (Taysum, 2013).
- Impact of professional doctorates/PhDs vs professional doctorates: motivations, background, outcomes: (Costley and Armsby, 2007; Powell and Long, 2005; Bourner et al., 2001).

- Perceptions of the PhDs by employers/issue of overqualification/impact of PhD graduates in the workplace: (Jackson, 2007; Warry, 2006; Souter, 2005)
- Gender pay gap: (Schulze, 2015; Blackaby et al., 2005)
- Studies of wage premiums and returns to investment for doctoral students/ PhDs vs holders of other degrees: (Casey, 2009).

In the current literature review we focused on the last two themes.

The literature review was conducted from June to November 2017 in an attempt to understand prevailing trends and detect existing gaps in the literature addressing the returns to education of doctorate degree holders in the UK. The systematic literature review method was chosen to answer a specific research question 'What are the economic benefits of pursuing a doctorate degree in Great Britain?'. This type of review enables to focus on identifying relevant studies, assess their quality and summarize the available evidence (Petticrew and Roberts, 2008).

Step one: search strategy, inclusion/exclusion criteria

The literature review was conducted from June to November 2017 in an attempt to understand prevailing trends and detect existing gaps in the literature addressing the returns to education of doctorate degree holders in the UK. The systematic literature review method was chosen to answer a specific research question 'What are the economic benefits of pursuing a doctorate degree in Great Britain?'. This type of review enables to focus on identifying relevant studies, assess their quality and summarize the available evidence (Petticrew and Roberts, 2008). The literature review was conducted from June to November 2017 in an attempt to understand prevailing trends and detect existing gaps in the literature addressing the returns to education of doctorate degree holders in the UK. The systematic literature review method was chosen to answer a specific research question 'What are the economic benefits of pursuing a doctorate degree in Great Britain?'. This type of review enables to focus on identifying relevant studies, assess their quality and summarize the available evidence (Petticrew and Roberts, 2008)

The literature research was conducted using electronic database searching, hand searching of key journals, searching of specialist websites, and using general search engines on the internet such as 'Google' and 'Google scholar'. The databases included EBSCO, British Education Index, Jstor, Business Source Complete, ERIC and E-book collection. Some manual searches of a number of economic journals' archives were also conducted. 1267 papers were considered after abstracts and titles were read. Papers which focused on the countries other than the UK, provided no distinction among the higher education degrees, focused on the returns to education based on the number of the years of full time study, or provided no statistics on wages were excluded from the review. 448 manuscripts moved to the final stage, were fully read and considered for inclusion. At the latest stage the papers were assessed against the inclusion criteria as well as if they contributed to answering the research question of the current review.

More specific criteria for inclusion were:

- research conducted in the UK or using UK data;
- only papers using quantitative methodology were considered;
- publication dates: years 1992 – 2017;
- papers in English;
- papers, which provided wage differentials between PhD and non PhD holders.

The papers were excluded based on the following criteria:

- non quantitative methodology;
- research focusing on assessing other than economic impact of the doctorates;
- papers based on the surveys of employers of doctorate graduates;
- papers, focusing on the returns on investment per an additional year or studies, rather than by degrees or qualifications;
- research, which did not compare PhD holders with other qualifications;
- studies conducted in countries other than the UK;
- studies, which provided a distinction between undergraduate and postgraduate students only were excluded.

Table 1. Literature review search strategy and coding

	1	2	3	4	5	6					
A	Return on investment	AND	education	OR	doctoral	OR	PhD				
B	impact	AND	education	OR	qualifications	OR	doctoral	OR	PhD		
C	results	OR	effects	OR	outcomes	AND	doctoral	OR	PhD	OR	education
D	economic	AND	doctoral	OR	PhD						
E	return	AND	qualifications	OR	diploma	OR	degree	OR	doctoral (PhD)	OR	education

1. Stage 1 searches: A1; A1+A2; A1+A2+A3; A1 +A2+A3+A4;
2. Stage 2 searches: B1+B2; B1+B2+B3, B1+B2+B3+B4; B1+B2+B3+B5; B1+B2+B3+B4+B5;
3. Stage 3 searches: C1+C4; C1+C5; C1+C6; C2+C4; C2+C5; C2+C6; C3+C4; C3+C5; C3+C6; C1+C2+C3+C4+C5+C6;
4. Stage 4 searches: D1+D2; D1+D3;
5. Stage 5 searches: E1+E3; E1+E4; E1+E5; E1+E6; E1+E2.

Operators defining pay, such as wages differentials, salary, etc. were tested, but excluded, as they provided massive results, not related to the doctoral education.

Step 2: screening titles and abstracts

After the search keywords were applied the abstracts and titles of selected papers were reviewed. Papers, which covered areas beyond the scope of research or matched some of the exclusion criteria, which could be noticed from first sight (e.g. country of research, methodology) were removed from further review. 106 studies were screened, but excluded from the review because most of them did not include doctoral students in the research, while focusing on whether the respondents had received higher education, or less often comparing Bachelor and Master students. Other studies were devoted to countries others than the UK. We also excluded

non quantitative studies or studies addressing societal impact of the doctorates, as the next stage of research was to conduct a meta regression analysis of the available research.

Step 3: full texts and snowballing technique

At the final stage the papers were read in full and the final list of selected research was defined. 437 papers were excluded. Then the references of selected papers were cross checked and their references as well (i.e. snowballing technique) in order to locate additional research. Several authors of articles included in the review were contacted in an effort to locate additional literature (e.g. Casey, B. H, Dr. O'Leary, N.C.), but no reply was received after 2 months from the initial email. The selection protocol is summarized in PRISMA Diagram 1. 11 papers were selected for the review (see Table 2).

Diagram 1. Flow Diagram with the literature search strategy stages

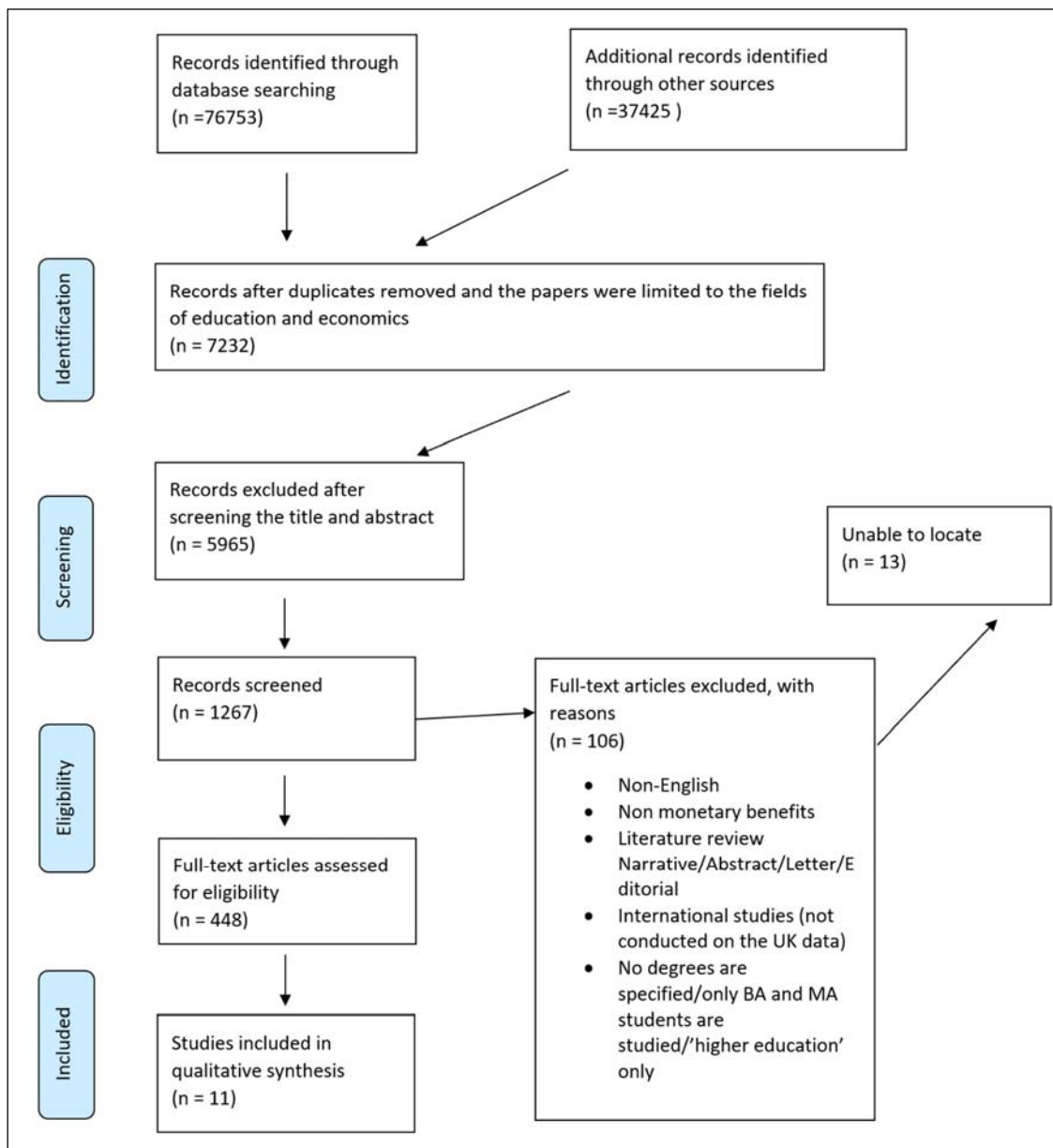


Table 2. Articles chosen for the literature review

No	Author	Year	Title	Purpose	Sample and Methods	Sample type
1	O'Leary, N.C., Sloane, P.J.	2005	The Return to a University Education in Great Britain	To estimate the rate of return to first degrees, Masters degrees and PhDs in Britain	Wage equation that captures variation in the hourly wages paid to workers with differing levels of educational achievement.	LFS
2	Rudd, E.	1990	The Early Careers of Social Science Graduates and the Value of a PhD	To provide information on the value of a PhD in the social sciences as a preparation for employment.	Survey of a sample of social science graduates who gained first- or upper second-class honours degrees at British universities between 1972 and 1977	2929 respondents from 21 universities in the UK
3	Rudd, E.	1986	The Value of a PhD in Science or Technology in Britain	To assess the value of a PhD in science and engineering	Matching samples of graduates with the PhD and of those without it from 8 British universities	A sample of 3312 graduates
4	Ziderman, A.	1973	Rates of Return on Investment in Education: Recent Results for Britain	To calculate for the first time private and social rates of return to education in Britain	Private and social rates of return were calculated in the conventional manner and compare benefits (net	A sample of 2651 professionals with various degrees (the 1966 Census follow up earning survey)

					of costs and subjected to various corrections) of a given educational qualification with those of a relevant preceding one.	
5	Blanden,J., Buscha, F., Sturgis, P.,Urwin, P.	201 2	Measuring the earnings returns to lifelong learning in the UK	This paper aims to examine the earnings returns to learning that takes place following the conventional 'school-to- work' stage of the life-course.	Panel data models estimate the returns to qualifications obtained in adulthood using the British Household Panel	British Household Panel (1991 - 2006)
6	Dearden, L., McIntosh, S., Myck, M.,Vignoles , A.	200 2	The Returns to Academic and Vocational Qualifications in Britain	To provide a comprehensiv e analysis of the labour market returns to academic and vocational qualifications	OLS of males' and females' wage premium using 2 datasets (NCDS, which controls for ability and family background and LFS, which does not)	Data from the 1991 sweep of the National Child Development Study (NCDS) and the 1998 Labour Force Survey (LFS)
7	Casey, B.H.	200 9	The Economic Contribution of PhDs	To show how two separate but interrelated questions 'What is a doctorate worth?' and 'Is there a	Earnings premia by type of level of degree, discipline and sex	Data from O'Leary and Sloane (2005)

				justification for society to subsidise the production of doctorates?’		
8	Dolton, P.J., Silles, M.A.	2008	The effects of over-education on earnings in the graduate labour market	To examine the determinants of over-education and its subsequent impact on labour market earnings.	Multiple measurements of over-education were collected to assess the effect of measurement error on the estimated pay penalty associated with over-education.	Survey of graduates from one large civil university in the UK
9	Schulze, U.	2015	The gender wage gap among PhDs in the UK	This article analyses the gender wage gap (GWG) among PhD graduates in the UK 42 months after their graduation in 2004–5.	Log regression based on annual wages for males and females outside and inside of academia.	This study makes use of unique and extensive data set provided by the Higher Education Statistics Agency (HESA), the Destination of Leavers from Higher Education (DLHE) survey. 2004–5 cohort.
10	Blackaby, D., Booth, A.L., Frank, J.	2005	Outside Offers And The Gender Pay Gap: Empirical Evidence From the UK Academic	To examine the gender pay gap, perceptions of discrimination and consider how the response to outside offers	Log regression based on annual wages for males, females, including ethnic background,	The data set for this project derives from a questionnaire undertaken by the Royal Economic Society Working Party

			Labour Market	may sustain the gender pay gap.	education level, etc.	on the Representation of Ethnic and Other Minorities in the Economics Profession.
11	Dolton, P., Vignoles, A.	2000	The incidence and effects of overeducation in the U.K. graduate labour market	To measure the incidence of overeducation in the U.K. graduate labour market, to estimate the effect of overeducation on graduate earnings and, finally, to consider whether overeducation can provide further evidence on the validity of human capital theory.	Overeducation and degree class— wage equations.	We use the 1980 National Survey of Graduates and Diplomates, a one in six random sample postal survey of U.K. graduates (1 in 4 sample of polytechnic graduates).

The distribution of papers by years of publication shows the growing interest to the topic around 2000s. This may have been the reaction to the governments' attempts to monitor and measure the quality and impact of the state funded research (Halse and Mowbray, 2011). It is interesting to note that there has not been much research done on the economic impact of the doctorates after 2015. Therefore, the governmental decision to introduce the loans might lack empirical data that supports the idea that PhD graduates will benefit from the scheme and earn sufficiently more than Master level students to be able to repay the loan back.

The scarcity of research on the economic impact of PhDs in the UK might be explained by the fact that pursuing a doctorate degree is still considered to be a preparation for an academic career, rather than a money making tool. Secondly, there is not sufficient data available on the destination of PhDs and their wages on the national level. Lastly, there is no definite metrics on the impact of the doctorate that would be comprehensive and transparent.

Classification of Papers

Papers chosen for this review were broadly referring to several themes. Schulze (2015) and Blackaby et al. (2005) focused on the gender wage gap among doctoral degree holders, people inside and outside of academia as well as tested the stability of the findings by adding other variables, such marital status, age, ethnic origin, quality of the degree, workplace characteristics, etc. Both researches' findings find evidence in the gender wage gap with men earning more inside academia (almost the same in the Schulze's research) and 14.1. log percentage points more outside one according to (Schulze, 2015).

Dolton and Silles (2008) and Dolton and Vignoles (2000) address the issue of overeducation. They test whether there are any differences between private and public sectors and whether the class of degree has any impact on the earnings. The results show that there are insignificant sectoral differences, but overeducated employees generally earn less than those in graduate jobs.

Rudd (1986), (1990) looked at the values of a PhD in Engineering and Economics in his first paper, followed by the Social Sciences in the second. The results of his research are discouraging as during the first several years after graduation doctoral students earn less than their colleagues with graduate degrees. Although by the age between 40 and 50 they catch up in their salaries, they hardly earn more than graduates with a Master degree or equivalent, who started working earlier.

Two of the identified papers focus on wages differentials. While Ziderman (1973) makes a very cautious assumption that 'low returns shown on social investment at the graduate level may suggest that part of the university sector has been overexpanded', O'Leary and Sloane (2005) find some substantial earnings premia for some disciplines at the postgraduate level in comparison to the undergraduate degrees. The results remain true for both Masters and PhD degrees and for both sexes.

One paper looking at the graduate earning through the prism of the life long learning concept by Blanden et al. (2012) provided a historical dimension of adult learning over the 16 years span. Despite the popularity of the life long learning narrative and emergence of MOOCs the author found weak and inconsistent evidence that adult qualifications provide any earnings benefits in the UK.

An interesting comparison of rates of return of academic and vocational qualifications is provided by Dearden et al. (2002) using the 1991 sweep of the National Child Development Study (NCDS) and the 1998 Labour Force Survey (LFS). Their results show that wage premium is usually higher for academic qualifications than for the vocational ones. This is true if the time variable (amount of time invested in training for obtaining a qualification) is disregarded. But once the time is taken into consideration, the returns per each year of study for vocational qualifications draw nearer to the academic ones.

Two papers were published in the Economics of Education Review journal, no preference to a single journal or publication source was found.

Thematical Analysis and Discussion

At the first stage of current work a systematic search and review of academic literature that addressed research questions and / or provided insights into assessing and measuring the impact of doctoral graduates in the UK was undertaken. During the literature analysis process over twenty overarching themes relating to the doctoral degree holders were identified. These have been grouped in Table 3. While their examination obviously requires a separate paper, below we are providing an overview of the themes, which focus on different aspects of the role and impact of the degree to contextualise our own research findings.

Table 3. Thematic analysis of the common themes emerging from the literature review

PhD candidate profile	Rethinking a doctoral degree	PhD holders and the labour market
a. The raise of professional doctorates	a. Definitions of the PhD	a. The gap between skills taught by employers and skills gained by the doctorate graduates
b. Quality of postgraduate research	b. Criticism of the traditional PhD model	b. PhD graduates and their career choices
c. Role of the PhD supervisors	c. Growing number of doctorates	c. Wage differences between PhD and other degree holders
d. The role of doctoral studies in developing skills and competencies		d. Effects of overeducation
e. PhD as an academic degree		e. Impact of the PhDs
f. Motivations to do a PhD		

Clearly, there are many various perspectives on the debate of the impact of doctoral study, be it personal, societal, economic or cultural as well as different agendas, issues and concerns proposed by varied stakeholders, involved in the topic directly or indirectly (PhD graduates, employers, communities, organisations, etc.).

The impact of the doctoral degree topic broadly sits on the number of important questions including:

1. Will keeping more young professionals away from joining the labour force and increasing their educational debt pay off in the economic terms for those students?
2. How are PhD graduates meeting the requirements and demands of the new knowledge economy?
3. Does obtaining a PhD result in higher wages over a postgraduate or undergraduate degree?
4. Are doctoral students happier in their jobs than other postgraduate or undergraduate students?
5. Are employers more satisfied with doctoral degree holders, rather than with students, who obtained other degrees?
6. Are PhD students producing 'more knowledge' or show substantially higher publication activity than postgraduate or undergraduate students?
7. How do doctoral graduates estimate the geographical area in which or extent to which the activities of their expert community have an effect?
8. Which research-based abilities had been important for the careers of the PhD graduates?
9. Where, how and for what purposes do doctorate degree holders use their research-based abilities?

Most of the identified papers were devoted to establishing an economic impact of the degree, either measuring the wage premium or calculating the return on investment of obtaining a degree. While the impact of doctoral degree holders stretches far beyond economic means, a

vast number of papers focused on a wider role of the PhDs to the employers and society, their contribution given their higher level of knowledge and advanced skillset.

Our research comes into agreement with the Synthesis Review Report (Raddon and Sung, 2009), which failed to identify a single study to 'tell us succinctly what the impact of PhD graduates is, be this in social, cultural or economic terms'. While some of the economic focused studies attempted to measure the economic value of obtaining a PhD, their outcomes are somewhat measurable and comparable. The wages are usually compared with postgraduate and undergraduate students, among genders, academic disciplines, effects of overeducation are estimated.

Some of the broader impact topics included emphasising the role of doctoral graduates in sustaining the UK skills and knowledge base. This is achieved by shifting the focus from research results to producing large numbers of highly educated people. The value doctoral degree holders bring to employers is stated to be skilled and creative human capital, access to innovative thinking and knowledge transfer. This is interesting because some of the studies, which operate in economic terms found some major penalties in wages due to the issues of overeducation (Dolton and Silles, 2008).

It can be argued that it is difficult to put a clear divide between market and non market benefits of obtaining an advanced degree. Yet it is important to acknowledge that higher education has numerous benefits for both individuals and society. Increased levels of tolerance, trust, social cohesion, civil participation, greater social mobility, reduced amount of crime are among the few benefits to derive from higher education. The Department of Business and Innovation Skills prepared a systematic review of research addressing the benefits of higher education participation for individuals and society (King and Ritchie, 2013).

Doctorate degree holders and their impact on the labour market are deeply intertwined with the perceptions of the degree by employers, skills required from graduates. The systematic data on doctoral graduates and the labour market is relatively limited, with quite scarce data on the PhD graduates as a whole (Green and Powell, 2005). Some of the identified research highlights

negative perceptions of doctoral graduates among employers who have not had direct experience of hiring individuals with a PhD (Diamond et al., 2014). Some employers believed that doctoral degree holders would have surprisingly high salary expectations (CIHE, 2010; Jackson, 2007; Souter, 2005), be too narrowly focused and would have difficulties adapting to the working environment (Diamond et al., 2014; CIHE, 2010; The Rugby Team, 2007; McCarthy and Simm, 2006; Purcell and Elias, 2005; Souter, 2005). The most commonly cited gap in young researchers' aiming to work outside academia is lack of 'commercial awareness', flexibility and ability to adapt fast enough to a new working environment.

In this debate UKCGE takes a protective stance, referring to the training on doctorates as an enhanced training for the "aspirant academic" rather than higher employability (UKCGE, 2002: 15). Gillon (1998 cited in Leonard, 2001) supports this idea claiming that nowadays there are too many requirements to the traditional PhD graduate, who not only has to produce a doctoral dissertation, but to be able to teach, have publications and develop a range of transferable skills for future employment. Scott et al (2004) as well emphasise that a doctoral degree aims to produce new knowledge rather than be directly applied beyond academia or being 'directly marketable' and that it plays a wider, societal role improving overall knowledge.

On the other hand, PhD graduates have different perceptions of their degree. Some felt that employers assumed they had short work experience, specialisation, which would limit them and high expectations (Diamond et al., 2014; Raddon and Sung, 2009; McCarthy and Simm, 2006; Souter, 2005). This led some of the doctoral degree holders hide their PhD in order to avoid being seen as overqualified (Diamond et al., 2014; Jackson, 2007). In contrast others reported that there was a sense of status associated with the PhD which could be an advantage (Diamond et al., 2014; Raddon and Sung, 2009).

Nevertheless, some researchers remain quite optimistic about the impact and role of the doctoral degree in the job market. Leitch (2006) believes that within the UK economy, there is a similar recognition of the value of higher-level skills and education. In his review he links Level 5 (now 8) qualifications to strong productivity and economic returns: 'One of the most powerful levers for

improving productivity will be higher level skills. Postgraduate, or Level 5 skills, such as MBAs and PhDs, can provide significant returns to organisations, individuals and to the economy as a whole. These higher level skills are key drivers of innovation, entrepreneurship, management, leadership and research and development' (Leitch, 2006).

Despite that fact that the number of doctoral students is booming in the UK, there are many aspects of the impact the graduates are making, which lack research. There are few studies on their career choices, ROI and economic benefits of obtaining an advanced degree, opportunities and challenges and longer term impact of doctoral degree holders. Little is written on the employers' perspective of the PhD graduates as employees, their perceived impact and overall demand for this qualification. While some of the research we were able to locate on the impact of the degree included professional PhD holders, there were none mentioning PhD by publications. The latter group might have shown different results in terms of the economic value of their degrees given that usually such 'students' are seasoned professionals, who need decided to pursue a degree to boost their career.

International Dimension

While the current research focuses on the doctoral degree outcomes in the UK, similar discussions on the value of the advanced research degrees remain open internationally. Several Australian researchers look at the employers' perceptions of the PhD degree holders. When studying the outcomes of the training program designed to support science-related PhD graduates, Manathunga et al. (2009) found that only 58% of PhD degree holders felt prepared to succeed in their employment. Her study is among the few that actually attempts to quantify the doctoral outcomes. Many other of her colleagues acknowledge the role university and academic supervisors play in the enhancement of graduate employability (Jackson and Michelson, 2015; Platow, 2012; Western et al., 2007).

USA seem to produce much disciplinary research on their doctoral graduates. One of the examples here can be the American Anthropological Association, that has been conducting a biennial survey of Anthropology PhD graduates since 1982. Sadrozinski et al. (2003) studied

almost 800 art history PhDs 10 to 15 years after degree completion in the country using factual data, a mix of open and closed questions.

A number of European studies have also focused on the issue of doctoral students' outcomes, more specifically on the employment destination. A number of French researchers analyzed the role of the PhD students being the main source of tomorrow's scientific production. (Mangematin, 2000) believes that most PhD students do not benefit from on-the-job training outside academia. Their survey on French doctoral students, studying life sciences shows that 70% of PhD students look for a position in academic research (Dany and Mangematin, 2000). A research conducted in Germany, a country, where a PhD degree historically had a high prestige within the society, found that doctoral degree holders not only have some advantages in job search and transition to work after the degree, but also in longer term perspective tend to get to high level positions more frequently than university graduates. There are no significant income differences, however (Enders, 2002).

A recent international systematic literature review on professional doctorates (Hawkes and Yerrabati, 2018) found that most of the existing research focuses on individual case studies of practice and that literature on the wider impact of professional doctorates remains limited.

Conclusion

The conventional understanding of the doctoral degree as a conduit to the academic career and that the overwhelming majority of PhD students are pursuing the degree in order to work in the HE sector later is vanishing. Neumann and Tan (2011) share their findings of Australian doctoral employment destinations, which show that only around half of the research students are working towards the PhD to remain in academia. The similar trend is seen in Germany (Enders, 2004; Enders, 2002), in the USA, where 47% of doctoral graduates stay in HE (Fechter & Gaddy, 1998), in France (Beltramo et al., 2001). In Canada the statistics is higher with 65% of Ontario graduates, who are planning to 'to become a university professor' after receiving the doctoral degree (Desjardins, 2012). Understanding of the career trajectories of Ph.D. holders, especially in English language is still quite limited across Europe.

The governments are trying to adapt to the changing realities that knowledge economy brings into the labour markets. Following this perspective, more highly qualified labour force is needed and thus stimulus to produce larger quantities of doctoral degree holders seems a logical step. But there is simply not enough evidence that producing more doctorate graduates is actually beneficial and relevant to the careers outside academia.

Conducting a systematic analysis on the outcomes of the PhD graduates 5 to 7 years out would enable to answer the question on whether the current system of PhD training and producing more doctoral graduates appears to be working effectively.

Further Research

This systematic review involved identification of all relevant papers and international journals, books, chapters in edited volumes, and published research reports devoted to the economic impact of the doctoral degree holders in the UK.

While we were able to identify eleven papers, which provide some quantitative evidence of the wages differentials or other measurable economic impact of obtaining a doctoral degree, current research provides a broader picture of a doctorate holders' career choices and destinations, required and expected skills a doctoral graduate should possess. The cultural and social dimensions of impact of studying for an advanced degree are harder to assess given that there is no transparent and measurable framework developed. Thus, few studies attempt to examine doctoral impact from these lenses.

Future research might look into the social returns of the PhD holders in the UK. This includes a systematic analysis of the costs the community incurred when preparing a doctorate and the impact the advanced degree holders have on national production and society overall.

Findings show that research on the economic impact of the doctoral degree holders remains limited in terms of its scope. One of the next steps to bridge the gap in the current literature would be to summarize the existing findings by conducting a meta analysis of the wages differentials among PhD and other degree holders to able to assess, whether investing in a

doctoral degree pays off in economic terms. Although outside the scope of the current study, further longitudinal in-depth interviews conducted with employers outside academic would be valuable in exploring the long-term impact and market preparedness of PhD graduates in an employment context.

References

- Adams, R., Smart, P., Huff, A., 2017. Shades of Grey: Guidelines for Working with the Grey Literature in Systematic Reviews for Management and Organizational Studies. *International Journal of Management Reviews*: 432–454. <https://doi.org/doi:10.1111/ijmr.12102>
- Ashenfelter, O., Harmon, C., Oosterbeek, H., 2000. A Review of Estimates of the Schooling/Earnings Relationship, with Tests for Publication Bias. National Bureau of Economic Research, Inc.
- Beltramo, J., Paul, J., Perret, C., 2001. The recruitment of researchers and the organisation of scientific activity in industry. *International Journal of Technology Management*, 22(7/8).
- Blackaby, D., Booth, A., Frank, J., 2005. Outside Offers And The Gender Pay Gap: Empirical Evidence From the UK Academic Labour Market.
- Blanden, J., Buscha, F., Sturgis, P., Urwin, P., 2012. Measuring the earnings returns to lifelong learning in the UK. *Economics of Education Review*, 31: 501–514. <https://doi.org/10.1016/j.econedurev.2011.12.009>
- Blaug, M., 1967. The Private and the Social Returns on Investment in Education: Some Results for Great Britain. *The Journal of Human Resources*, 2 (3): 330–346. DOI: 10.2307/144838
- Bourner, T., Bowden, R., Laing, S., 2001. Professional Doctorates in England. *Studies in Higher Education*, 26: 65–83. <https://doi.org/10.1080/03075070124819>
- Card, D., 1999. The causal effect of education on earnings, in: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*. Elsevier Science B.V.
- Casey, B.H., 2009. The economic contribution of PhDs. *Journal of Higher Education Policy and Management*, 31: 219–227. <https://doi.org/10.1080/13600800902974294>
- CIHE, 2010. Talent Fishing: What Businesses want from Postgraduates. Council for Industry and Higher Education.
- Costley, C., Armsby, P., 2007. Research Influences on a Professional Doctorate. *Research in Post-Compulsory Education*, 12: 343–355. <https://doi.org/10.1080/13596740701559803>
- Dany, F., Mangematin, V., 2000. Job mobility and incentives of highly qualified workers: paradoxes of human resources management in knowledge intensive organisations, organizational praxis. Presented at the EGOS annual conference, Helsinki School of Economics, Finland.
- Dearden, L., McIntosh, S., Myck, M., Vignoles, A., 2002. The Returns to Academic and Vocational Qualifications in Britain. *Bulletin of Economic Research*, 54: 249–274. <https://doi.org/https://doi.org/10.1111/1467-8586.00152>

Desjardins, L., 2012. Profile and Labour Market Outcomes of Doctoral Graduates from Ontario Universities. Statistics Canada.

Diamond, A., Ball, C., Vorley, T., Hughes, T., Moreton, R., Howe, P., Nathwani, T., 2014. CFE Research. The Impact of Doctoral Careers: Final Report, CFE Research and RCUK. (Final Report).

Dolton, P., Silles, M., 2008. The effects of over-education on earnings in the graduate labour market. *Economics of Education Review*, 27(2): 125–139.

Dolton, P., Vignoles, A., 2000. The incidence and effects of overeducation in the U.K. graduate labour market. *Economics of Education Review*, 19(2): 179–198.

Dorsett, R., Lui, Si., Weale, M., 2010. Economic Benefits of Lifelong Learning (No. 13). Centre for Learning and Life Chances in Knowledge Economies and Societies at: <http://www.llakes.org.uk>.

Enders, J., 2004. Research training and careers in transition: a European perspective on the many faces of the Ph.D. *Studies in Continuing Education*, 26(3): 419–429. <https://doi.org/10.1080/0158037042000265935>

Enders, J., 2002. Serving many masters: the PhD on the labour market, the everlasting need of inequality, and the premature death of Humboldt. *Higher Education*, 44(3/4): 497–517.

Field, J., 2006. Lifelong learning and the new educational order. *British Journal of Educational Technology*, 37(6): 973–990. https://doi.org/https://doi.org/10.1111/j.1467-8535.2006.00660_18.x

Green, H., Powell, S., 2005. Doctoral study in contemporary higher education. Buckingham: Open University Press.

Halse, C., Mowbray, S., 2011. The impact of the doctorate. *Studies in Higher Education*, 36(5): 513–525. <https://doi.org/10.1080/03075079.2011.594590>

Harris, M., 1996. The Harris Report: Review of Postgraduate Education. HEFCE.

Hawkes, D., Yerrabati, S., 2018. A systematic review of research on professional doctorates. *London Review of Education*, 16(1): 10–27. <https://doi.org/https://doi.org/10.18546/LRE.16.1.03>

Jackson, C., 2007. Recruiting PhDs: What works? Cambridge: UK GRAD Programme.

Jackson, D., Michelson, G., 2015. Factors influencing the employment of Australian PhD graduates. *Studies in Higher Education*, 40(9): 1660–1678. <https://doi.org/10.1080/03075079.2014.899344>

Jenkins, A., Vignoles, A., Wolf, A., Galindo-Rueda, F., 2003. The determinants and labour market effects of lifelong learning. *Applied Economics*, 35(16): 1711–1721. <https://doi.org/10.1080/0003684032000155445>

King, J., Ritchie, C., 2013. The Benefits of Higher Education Participation for Individuals and Society: key findings and reports “The Quadrants” (BIS RESEARCH PAPER No. 146). Department for Business, Innovation and Skills, London.

Leitch, S., 2006. Prosperity for all in the global economy - world class skills (Final Report). HMSO, London.

Manathunga, C., Pitt, R., Critchley, C., 2009. Graduate attribute development and employment outcomes: tracking PhD graduates. *Assessment and Evaluation in Higher Education*, 34(1): 91–103. <https://doi.org/10.1080/02602930801955945>

Mangematin, V., 2000. PhD job market: professional trajectories and incentives during the PhD. *Research Policy*, 29(6): 741–756. [https://doi.org/10.1016/S0048-7333\(99\)00047-5](https://doi.org/10.1016/S0048-7333(99)00047-5)

McCarthy, M., Simm, J., 2006. Survey of employer attitudes to postgraduate researchers, Sheffield: University of Sheffield, The Career Service

Millard, D., 2015. Societal impact in social science and humanities (SSH) PhD graduates in Europe. POCARIM policy report 5. University of Salford, Salford.

Morrison, A., Moulton, K., Clark, M., Polisena, J., Fiander, M., Mierzwinski-Urban, M., Mensinkai, S., Clifford, T., Hutton, B., 2009. English-Language Restriction When Conducting Systematic Review-based Meta-analyses: Systematic Review of Published Studies. Ottawa: Canadian Agency for Drugs and Technologies in Health.

Mowbray, S., Halse, C., 2010. The purpose of the PhD: theorising the skills acquired by students. *Higher Education Research and Development*, 29(6): 653–664. <https://doi.org/10.1080/07294360.2010.487199>

Neumann, R., Tan, K.K., 2011. From PhD to initial employment: the doctorate in a knowledge economy. *Studies in Higher Education*, 36(5): 601–614. <https://doi.org/10.1080/03075079.2011.594596>

O’Leary, N.C., Sloane, P.J., 2005. The Return to a University Education in Great Britain. *National Institute Economic Review*, 193: 75–89. <https://doi.org/10.1177/0027950105058559>

Petticrew, M., Roberts, H., 2008. Systematic reviews in the social sciences: A practical guide. John Wiley & Sons.

Platow, M.J., 2012. PhD experience and subsequent outcomes: a look at self-perceptions of acquired graduate attributes and supervisor support. *Studies in Higher Education*, 37(1): 103–118. <https://doi.org/10.1080/03075079.2010.501104>

Powell, S., Long, E., 2005. Professional Doctorate Awards in the UK, Lichfield: UK Council for Graduate Education.

Purcell, K., Elias, P., 2005. The employment of social science PhDs in academic and non-academic jobs: research skills and postgraduate training (A report prepared for the ESRC Training and Development Board).

Raddon, A., Sung, J., 2009. The Career Choices and Impact of PhD Graduates in the UK: A Synthesis Review (Synthesis Review). University of Leicester, Centre for Labour Market Studies (CLMS).

Review of Postgraduate Education - Policy and Funding in Northern Ireland, 2009. Department for Employment and Learning. URL: <http://www.delni.gov.uk/index/further-and-higher-education/higher-education/studentfinance/he-student-info-postgrad-finance/postgrads/review-postgraduate-policy-funding.htm> Accessed on 10/01/2018

Rudd, E., 1990. The Early Careers of Social Science Graduates and the Value of a PhD. *Journal of the Royal Statistical Society. Series A (Statistics in Society)*, 153(2): 203–232. <https://doi.org/10.2307/2982801>

Rudd, E., 1986. The Value of a Ph.D in Science or Technology in Britain. *European Journal of Education*, 21: 223–250.

Sadrozinski, R., Nerad, M., Cerny, J., 2003. PhDs in Art History - over a decade later. A national career path study on Art Historians. Center for Innovation and Research in Graduate Education (CIRGE).

Schulze, U., 2015. The gender wage gap among PhDs in the UK. *Cambridge Journal of Economics*, 39 (2), 599–629, <https://doi.org/10.1093/cje/bev001>

Souter, C., 2005. EMPRESS. Employers Perceptions of Recruiting Research Staff and Students. University of Leeds.

Taysum, A., 2013. Educational Leaders' Doctoral Research That Informed Strategies to Steer Their Organizations Towards Cultural Alignment. *Educational Management Administration & Leadership*. 44(2): 281–300. <https://doi.org/10.1177/1741143213496660>

Rugby Team, 2007. Employers' views of researchers' skills. A comprehensive review of the existing literature into employers' views of the skills of early career researchers, Cambridge, The Careers Research and Advisory Centre (CRAC) Limited.

Walker, I., Zhu, Y., 2005. The College Wage Premium, Overeducation, and the Expansion of Higher Education in the UK. IZA Discussion Papers 1627, Institute of Labor Economics (IZA).

Warry, P., 2006. Increasing the economic impact of Research Councils Advice to the Director General of Science and Innovation, DTI from the Research Council Economic Impact Group.

Western, M., Kubler, M., Western, J., Clague, D., Boreham, P., Laffan, W., Lawson, A., 2007. PhD Graduates 5 to 7 Years Out: Employment Outcomes, Job Attributes and the Quality of Research Training. University of Queensland.

Ziderman, A., 1973. Rates of Return on Investment in Education: Recent Results for Britain. *Journal of Human Resources*, 8(1): 85–97.