Higher education and research have come to the forefront of international debates about economic growth. There has been a growing consensus among policy-makers that post-industrial society requires more highly-educated people with technical and professional skills in a knowledge-based economy (KBE). Doctoral education has become of paramount significance in a world where knowledge becomes the new ‘fuel’, the ultimate economic renewable to economic growth leading to a knowledge-based economy (Brinkley, 2006; Leadbeater, 1999). While there is still no consensus on the relationship between human capital and economic growth, doctorate holders who have accumulated substantial human capital though education have been identified as an important part of ‘knowledge workers’ (Usher, 2002).

From the individual perspective, investment in doctoral education is rather costly - in terms of paying fees, subsistence and foregone earnings - and lengthy. Considering that individuals might yield less returns to doctoral investment compared a Master's degree in some subjects (see o'Leary and Sloane, 2005) but also the increasing criticism that the doctorate has received by the media (FP, 2013; The Economist, 2010), it is important to identify and highlight benefits that doctoral experience entails beyond financial and career returns for the PhD graduates.

Limited information exists about the value of the PhD for the individuals beyond pecuniary terms. Raddon and Sung (2009) have remarked the deficiency of information on the personal value of the doctorate together with the social and cultural impact of studying at this level in order to highlight the impact of PhD graduates. In their synthesis review of career choices and impact of PhD graduates in the UK they wrote:

‘. . . we still lack in-depth examinations of some complex areas including: In-depth examination of the direct impact of PhD graduates in the workplace and the “value added” of employing these individuals; . . . Close study of the personal impact and value of the PhD, particularly over the long run’
(Raddon and Sung, 2009, p.iv)

Methodology and Theoretical framework
This issue will be investigated in this paper using data from a mixed methods' research (online survey and follow up interviews) which included Greek PhD
graduates in natural sciences and engineering who undertook their PhD studies in UK and Greek universities 2-7 years ago. Through the online survey, data was collected on the PhD experience and transition to the labour market. The survey reached 244 responses. Based on a preliminary analysis of the survey data and the availability of survey respondents for follow up interviews, 26 semi structured interviews with PhD graduates were conducted. In these interviews, participants were asked about their educational background, their PhD experiences, the benefits and impact of the PhD and their employment history after the PhD.

In terms of the theoretical framework used for this study, previous literature on benefits of learning and higher education have adopted a triangular analytical framework as introduced by Shuller et al. (2002). This triangular framework or three capitals framework is comprised of: human capital, social capital and identity capital. The authors in their research on the wider benefits of learning, developed this framework to 'offer a conceptual baseline for future work' (ibid, p.iii) based on researching individuals from different age groups and various educational levels. A recent study by Jamieson et al (2009) employed this framework to classify the benefits of higher education for part-time students from both undergraduate and postgraduate levels and two different universities. In this paper, the three capitals' framework provides a useful frame of reference in an initial effort to classify the individual benefits that a doctorate could entail. It is slightly modified in terms of its social capital dimension for the aim of this study.

Results

In less tangible terms, PhD holders identified further benefits of doctoral education beyond acquiring specialised knowledge and advancing academic, transferrable and personal skills and the implications that this had in their career development. Respondents believed that the advanced skills or attributes (different way of thinking, problem solving, and fresh ideas) or the PhD title provided a competitive advantage to its holder distinguishing them from less qualified personnel. The social impact of the PhD was demonstrated through the social status acquired and the subsequent recognition that the title of the PhD brought in personal, professional and social terms. The PhD experience provided not only access to highly esteemed networks and people that were 'milestones' in participants' life and but also enabled the development of social skills (communication, presentation) that were considered invaluable for life beyond the PhD. Moreover, personal development gains such as maturity and independence were highlighted by the participants. Personal satisfaction in their doctoral achievement, self-awareness and self-actualisation through meeting their professional aspirations and performing self-fulfilling employment roles were also reported as invaluable aspects of pursuing this qualification.

Even in labour markets where investment to doctoral education might not be justified in terms of meeting individuals’ career aspirations, there are other reasons that

1 Unfortunately, the authors do not distinguish between taught and research postgraduate education which would inform this study. The two universities that participated in this study were Birkbeck, University of London and Open University.
prospective PhD candidates might pursue the higher level of education. But they should be aware of this.