THE ECONOMICS OF HIGHER EDUCATION[1]

CRAIG HOLMES AND KEN MAYHEW

This paper describes the expansion of higher education (HE) in OECD countries and discusses its economic consequences. For most governments this expansion has been seen as the silver bullet that improves economic growth and helps tackle problems of inequality. However, in most countries increasing numbers of graduates are going into jobs that were once done by non-graduates, raising the concern that the true social returns to HE expansion are low. Because of this it is unsurprising that economists have found it difficult to establish firm links between higher education expansion and economic growth. At the same time, in some countries, HE expansion has exacerbated problems of economic and social inequality. The paper argues that governments need to take a more realistic view of the role of HE, consider alternative ways of preparing people for the labour market and at the same time explore more rigorously exactly how the sector is conducting itself.

JEL Classification: I22; I24; I26; I28

1. INTRODUCTION

Recent decades have seen a huge increase in the number of people going to university. As recently as in the 1970s few countries had a mass higher education (HE) system. By 1980, the USA and Canada led the way with almost 20% of the adult population holding a tertiary level degree, and Japan and Australia followed with around 15%, but for most European countries the equivalent figure was under 10% (Barro and Lee, 2010). Now more developed countries than not have a mass system and higher education has become a crucial area for policy makers. They have given it a central role in attempting to achieve a wide range of policy objectives, from improving social mobility and reducing economic and social inequalities to driving innovation, boosting economic growth and helping the balance of payments. For individuals, for firms and for the governments, the way the higher education system functions and the results it achieves are of high importance.

The transformation from a small elite system into a mass system has brought with it a whole series of questions for policy makers, stimulating a large body of economic research. Much of this research has been concerned with the relationship between HE and the labour market (the wage returns that graduates receive and the impact on

[1] We are grateful to Chris Adam, Abi Adams, Chris Allsopp, Dieter Helm, Cameron Hepburn, Colin Mayer and Alex Teytelboym for comments on an earlier draft.

inequality) and the relationship between HE and the macroeconomy (its contribution to growth). However the literature also covers a large array of other topics. These include: the manner and efficiency with which universities are run and academics are managed; competition between universities and the heterogeneity of the sector; the academic labour market; admissions policy and college choice; student attitudes, behavior and performance; the role of the private for-profit sector.

This article and this issue of the *Oxford Review of Economic Policy* reflect this burgeoning body of research, considering what we know and which questions remained only partially answered. Answers are particularly difficult in an environment of considerable structural change caused by both technological innovation and by globalization. This presents a major challenge for policy, for economic analysis and for the sector itself. What worked in the past may well not work in the future. Facing the uncertain future may necessitate considerable change within the sector as well as construction of alternative pathways into the labour market.

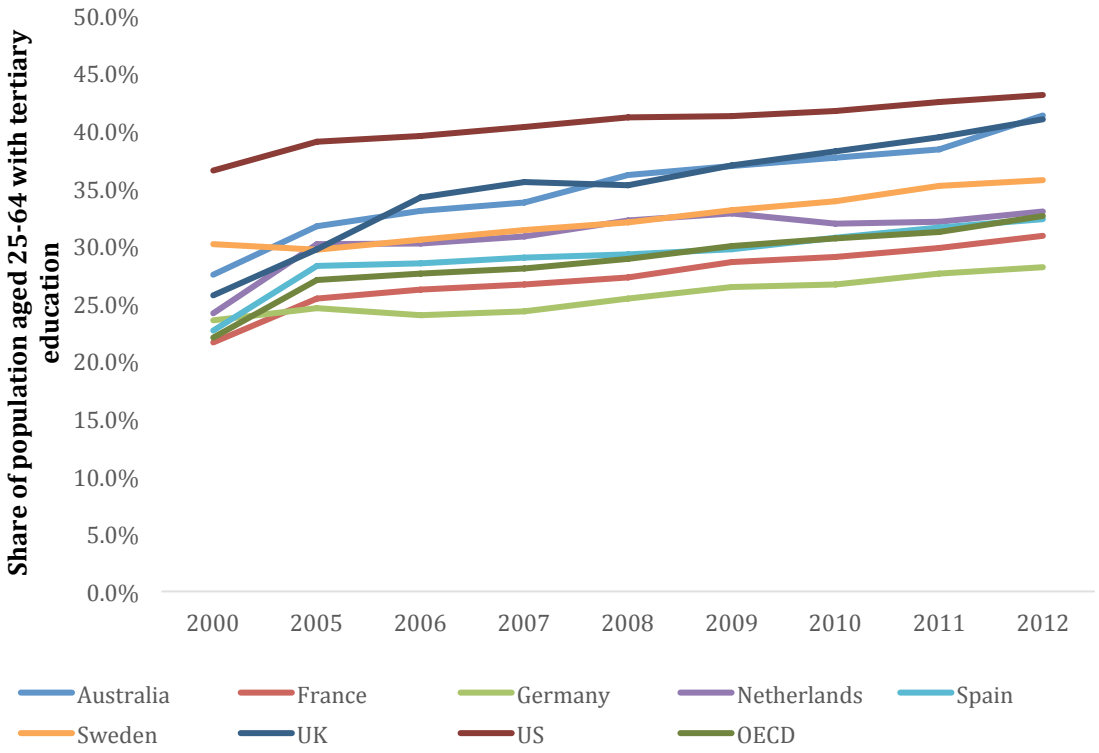
The next section describes the course of HE expansion in the developed world. Section 3 asks whether the sector is the right size. Section 4 asks who should pay for it. Section 5 considers the impact of HE expansion on inequality, whilst Section 6 explores the efficiency (or lack of it) of the system. Section 7 concludes. This article considers many of these issues from a largely UK perspective; other contributions to this Issue consider them in other national contexts.

2. A BRIEF HISTORY OF HIGHER EDUCATION EXPANSION

Higher education – a term we use interchangeably with tertiary education – comprises an array of different courses and qualifications. Many of them are delivered in universities and lead to a degree, but other forms of HE include advanced vocational education, occupationally specific qualifications and shorter sub-degree level programmes. In general a qualification which sits at or above level 5 in the 2011 revision of the International Standard Classification of Education is considered to be HE, whilst anything at or above level 6 is the equivalent of a bachelor's degree or higher.

At the time of the last *Oxford Review of Economic Policy* issue on education (Summer 2004), participation in HE in the developed world was higher than it had ever been. In the UK participation rates – measured by the age participation index - were below 10% in the 1960s, had risen to 19% by 1988, before jumping to 33% by the end of the 1990s. The proportion of people in employment who were university graduates had risen from 5.0% in 1980 to 17.2% in 2000 (Machin, 2003). This trend towards an increasingly graduate workforce was not unique to the UK. Barro and Lee (2010) estimated that the proportion of adults (aged over 15) in the OECD countries who had completed tertiary education in 1960 was 3.5% in 1960 and 15.4% in 2000.[2]

Figure 1: Tertiary graduate shares of adult employment, 2000-2012



Source: OECDStat

This trend has continued over the past decade. The proportion of the workforce that has completed degrees has risen in the UK and elsewhere as cohorts of highly educated new entrants replace cohorts of largely non-graduate retirees (see Figure 1).

[2] For the whole world, these figures were 1.1% in 1960 and 5.9% in 2000, with each sub region showing some growth, ranging from less than a percentage point change in Sub-Saharan Africa to a seven-fold increase in East Asia and the Pacific.

This has been particularly marked for women - if the female workforce in an OECD country was not more heavily graduatised than the male workforce by the end of the 1990s, then it almost certainly is today (see Table 1 – the exceptions are Austria, Germany and Switzerland).

Table 1: Share of adult population (15+) having completed tertiary education

	Female		Male	
	1998	2012	1998	2012
Austria	13.1%	20.2%	17.0%	22.1%
Belgium	37.8%	46.8%	29.6%	36.6%
Czech Republic	10.7%	23.8%	12.9%	21.2%
Denmark	26.6%	38.8%	24.4%	28.1%
Estonia	38.6%	49.6%	25.6%	30.9%
Finland	36.6%	47.2%	29.0%	34.8%
France	27.1%	40.1%	22.5%	33.5%
Germany	19.8%	27.8%	27.2%	30.8%
Greece	22.8%	38.0%	17.7%	30.2%
Hungary	19.8%	31.4%	15.6%	22.6%
Iceland	19.1%	37.7%	18.5%	27.4%
Ireland	27.3%	52.4%	20.5%	39.9%
Italy	14.3%	25.0%	10.6%	16.1%
Luxembourg	19.8%	44.6%	21.1%	43.3%
Netherlands	23.4%	34.7%	24.1%	32.9%
Norway	32.1%	44.7%	27.3%	33.7%
Poland	15.1%	39.4%	11.9%	24.4%
Portugal	12.2%	26.7%	7.4%	16.3%
Slovenia	19.3%	39.4%	14.2%	25.1%
Spain	32.2%	45.4%	23.2%	37.7%
Sweden	32.1%	43.7%	27.0%	30.5%
Switzerland	13.6%	31.4%	30.5%	41.8%
United Kingdom	25.9%	43.6%	26.3%	38.1%

Source: ILOStat

The continued expansion of the HE sector, in the UK at least, means that the members of each age cohort are more likely to have gone to university than the ones before them. The current participation rate of UK domiciled students is approaching the now-abandoned 50% target of the 1997-2010 Labour government – measured by the Higher Education Initial Participation Rate (HEIPR), participation stood at 46.6% in 2013/14, a 0.6 percentage point increase compared to 2010/11.[3] We see a similar pattern across the OECD. In 2000, the unweighted country average for tertiary

[3] The figures for 2011/12 and 2012/13 are distorted by students looking to avoid the new £9,000 per year fees. HEIPR increased to 49.3% in 2011/12, and fell to 42.2% in 2012/13 as many who might otherwise opted for delayed entry in 2012/13 decided against it.

graduation rates from long first degree programmes (ISCED97 5A) was 25.9% (OECD 2002). In 2013, the unweighted country average for bachelor's or equivalent programmes (ISCED2011 6) was 34.2% (OECD 2015)

Table 2: Entry and first time graduation rates, tertiary education 2012

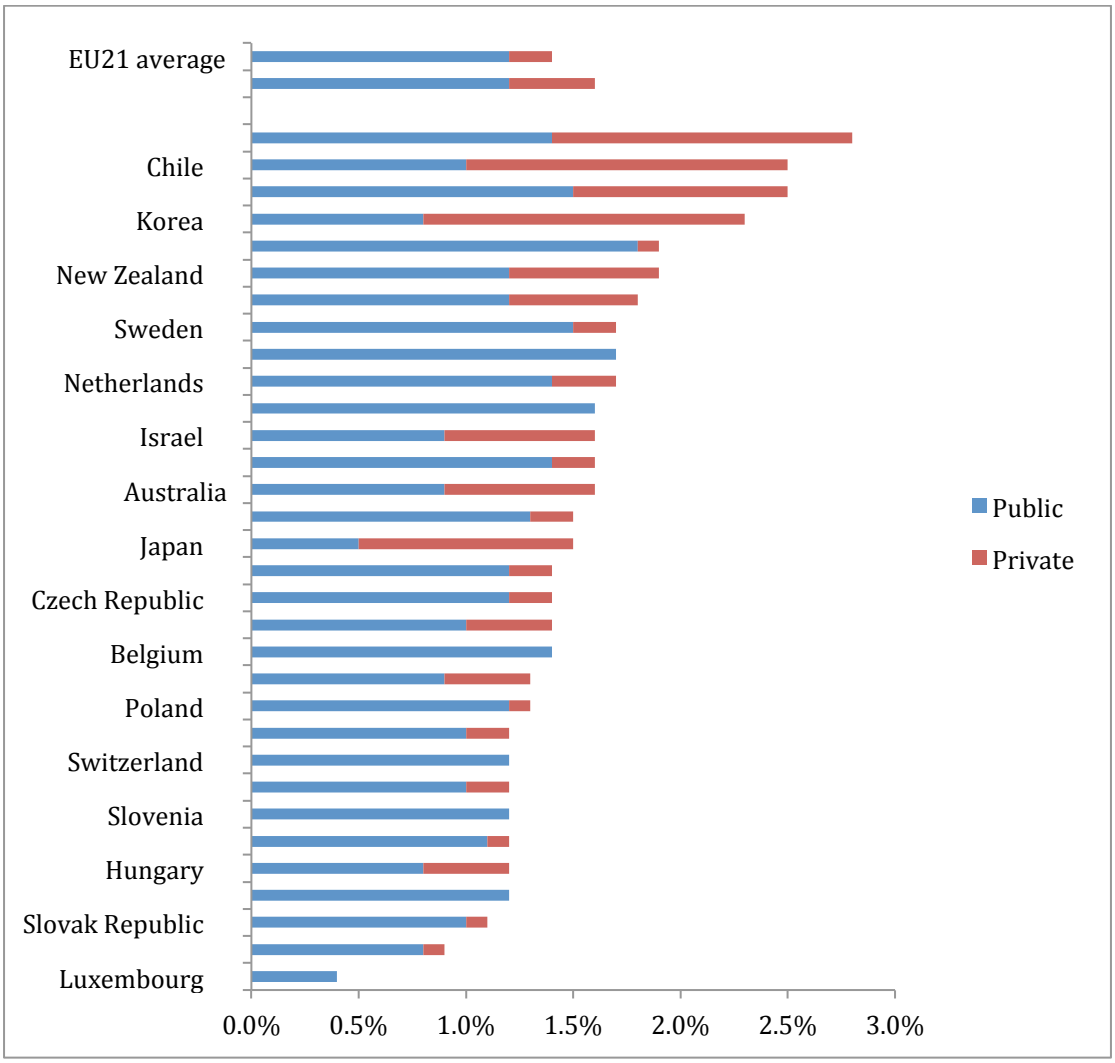
Country	Entry rates		First time graduation rates	
	Female	Male	Female	Male
Australia	90.8%	62.7%	53.0%	33.4%
Austria	38.5%	29.4%	25.8%	17.2%
Belgium	69.6%	54.6%	47.3%	31.4%
Canada			37.0%	23.5%
Chile	60.0%	55.2%		
Czech Republic	68.5%	47.4%	49.4%	27.2%
Denmark	74.9%	57.0%	57.9%	37.9%
Estonia	74.9%	57.7%		
Finland	59.4%	42.3%	53.7%	34.5%
Germany	44.1%	47.7%	26.6%	26.6%
Greece	73.1%	59.4%		
Hungary	42.0%	39.6%	25.7%	16.9%
Iceland	82.1%	55.2%		
Ireland	61.5%	52.0%		
Israel	64.6%	46.3%	47.7%	33.1%
Italy	41.4%	32.4%		
Japan	43.9%	52.8%	41.8%	48.6%
Korea	55.3%	55.0%		
Latvia	86.6%	67.7%		
Luxembourg	17.5%	16.1%	8.4%	6.0%
Mexico	34.6%	35.4%		
Netherlands	56.7%	50.5%	42.0%	31.8%
New Zealand	71.7%	44.9%	56.7%	31.9%
Norway	72.9%	48.2%	47.0%	26.0%
Poland	81.6%	63.9%		
Portugal	59.3%	43.9%	43.7%	28.1%
Slovak Republic	62.3%	46.4%	52.8%	29.1%
Slovenia	85.4%	68.7%	47.1%	26.2%
Spain	51.8%	40.0%	21.1%	14.1%
Sweden	56.3%	34.4%	35.4%	14.9%
Switzerland	59.0%	60.4%	42.4%	43.7%
Turkey	34.4%	32.9%	26.2%	26.9%
United Kingdom	55.3%	41.5%	44.3%	32.4%
United States			43.2%	30.4%

Source: OECDStat

As Table 2 shows, entry rates into higher education are typically more than 50% for both men and women (and can be as high as 90% for women), meaning that a majority of young people today in rich countries go to university. Moreover, whilst in some countries there is a significant drop out rate before completion, many countries

have similar graduation rates to the UK, with only a few like Germany, Austria, Sweden, Spain and Hungary exhibiting markedly lower levels.

Figure 2: Expenditure on tertiary education as % of GDP, 2012

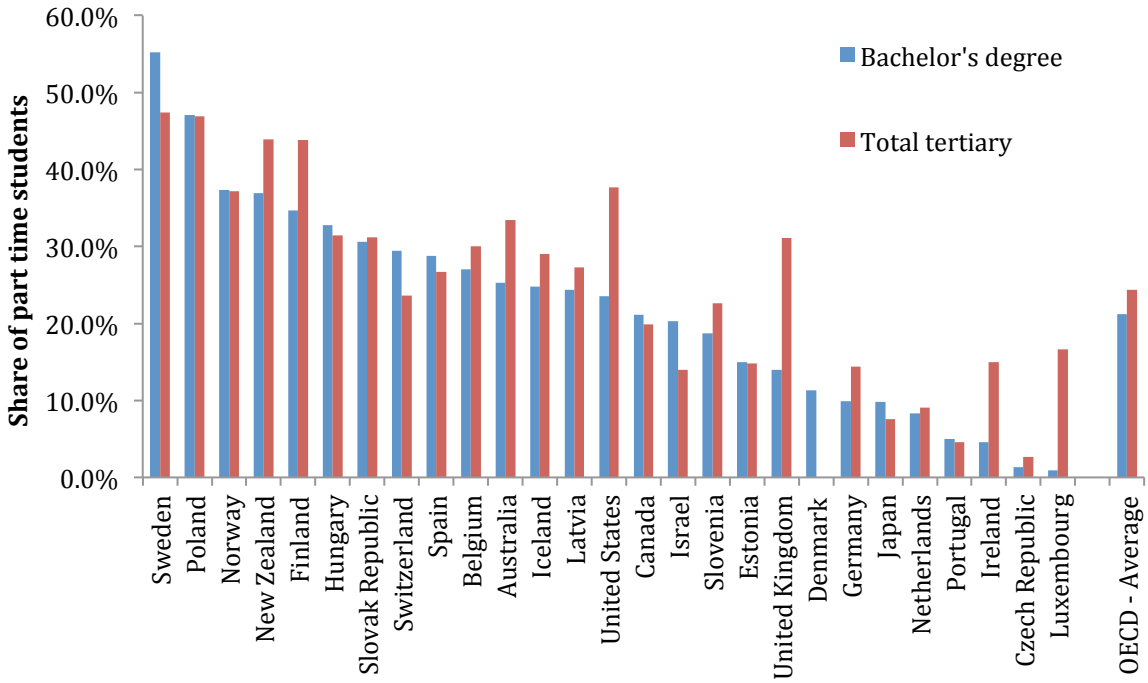


Source: OECDstat

This expansion has been largely publicly funded. Unweighted average expenditure on tertiary education in OECD countries accounted for 1.3% of GDP in 2000, rising to 1.5% of GDP in 2011. Figure 2 shows that this expenditure came mainly from public sources, especially in Europe. However, as Jongbloed and Vossensteyn discuss in this Issue, the share of private funding has been increasing over the past decade, whilst public funding has been increasingly tied to performance.

Figure 3 shows that the majority of students in most OECD countries are full-time, although there are a few countries where full time and part time students are evenly distributed – for example in Scandinavia and New Zealand – particularly when considering all tertiary education and not just courses leading to a bachelor's degree. There is little evidence that the expansion of higher education has accompanied changes in the mode of study – comparing data from the early 2000s, we see in most countries very similar proportions of part time students as in the most recent data shown in Figure 3, with both modes increasing roughly in proportion.

Figure 3: Importance of part time study, 2013



Source: OECD Stat

In a few countries, the HE sector is an important "export industry". For example, in the UK, "exports" of higher education earn almost £11bn[4] – around 15% of undergraduates and nearly 50% of postgraduates and doctoral students in the UK are from overseas. Table 3 shows that, while these percentages are higher in Australia, Luxembourg and New Zealand, most countries do not accept international students to the same extent, particularly for undergraduate courses. However, the share of foreign-born students has been growing, albeit often from very low levels, in almost

[4] http://www.universitiesuk.ac.uk/facts-and-stats/Pages/higher-education-data.aspx

all countries. The unweighted OECD country average share of international students was 5.8% in 1998, and had risen to 8.0% by 2010.

Table 3: Share of international students by level of programme, 2013

Country	Bachelor's or equivalent level (ISCED2011 level 6)	Master's or equivalent level (ISCED2011 level 7)	Doctoral or equivalent level (ISCED2011 level 8)
Australia	30.1%	56.5%	36.4%
Luxembourg	20.6%	71.2%	81.3%
New Zealand	17.9%	28.7%	46.3%
United Kingdom	15.2%	49.4%	43.7%
Austria	13.6%	17.7%	29.1%
Netherlands	10.0%		40.3%
Canada	8.6%	16.5%	15.6%
Denmark	7.8%	18.4%	31.0%
Czech Republic	7.4%	9.7%	12.6%
Switzerland	6.8%	22.7%	51.5%
Belgium	6.5%	26.1%	45.8%
Finland	5.3%	9.0%	20.6%
Slovak Republic	4.2%	3.8%	6.4%
Hungary	3.5%	4.2%	6.9%
Germany	3.2%	10.5%	15.3%
United States	3.2%	11.3%	27.2%
Israel	2.8%	3.5%	2.9%
Sweden	2.6%	24.8%	31.7%
Norway	2.4%	10.9%	30.0%
Japan	2.3%	9.1%	19.1%
Portugal	1.6%	4.6%	11.0%
Slovenia	1.5%	2.3%	3.8%
Spain	0.7%	5.5%	
Turkey	0.6%	2.3%	2.8%

Source: OECD Stat

3. IS THE SECTOR THE RIGHT SIZE?

Given the resources from both the state and from individuals that are put into higher education, it is important to question whether all such investments are worthwhile or, conversely, whether the current system is, in some way, still failing to attract enough students. Obviously, there are many elements involved in the decision to invest in higher education, but a major one will be consideration of the labour market that graduates will enter – this is increasingly important when students themselves take on some of the cost of studying as it forces them to bear financial risk. From this perspective, a number of questions emerge in order to judge whether the sector is the right size.

1. Are the skills possessed by graduates after they finish their education demanded and used in the labour market?

2. If so, were these skills produced through study at a higher education institution?

3. If so, is higher education the only way to produce these skills, or are there alternative pathways?

4. If so, are the costs of higher education as compared to alternative pathways justified?

5. If so, are there barriers preventing further expansion? Is there more that higher education institutions could conceivably provide that is not being provided at present?

In approaching these questions the dominant paradigm amongst economists and policy makers is human capital theory, From that standpoint skills developed by education and training increase worker productivity and generate higher wages and better employment prospects because there is an implicit assumption that "organisations would smoothly adjust their employment systems to utilise all new potential productivity on the labour market." (Rubery, 2006).

However, there are reasons to think that this assumption is too strong. Concern about overeducation amongst graduates, while not new (see Freeman, 1977), has received a

great deal of recent attention in both the academic literature and the media. Examination of the available data at the European level suggests that it is a particular problem in the UK. Holmes and Mayhew (2015) found that 58% of UK graduates in the European Social Survey reported themselves as being in jobs requiring less than 4-5 years of post-compulsory education in 2010 (the most recent year for that survey), which was far higher than most other countries, including all of the major Western European countries and high participation countries in Scandinavia. This picture is supported by self-reports of skill utilisation in the European Working Conditions Survey. While the disparity between the UK and its neighbours is less striking on this measure, incidence of underutilisation amongst graduates was still higher – around 40% of graduates, as compared to closer to 30% in, for example, Belgium, Denmark, Germany, Italy, Netherlands and Sweden. Are self-reported assessments of this kind reliable? It is unlikely that they are entirely so; although to the extent that they are biased, differences between country are potentially more informative if it is supposed that similar subjectivity biases exist in all countries. More objective indicators should also be considered.

For many economists the key indicator of the balance between supply and demand of graduate skills is the wage premium for possessing a degree – sometimes called the "graduate premium" or "college premium" or, more incorrectly, "the rate of return".[5] From a human capital standpoint higher wages imply higher productivity. In this Issue, van der Velden and Bijlsma examine cross-country data on earnings. They show that across the OECD, the average graduate premium is around 28%, with significant cross-country variation. Moreover, they show that this is largely explained by the higher levels of measurable skill graduates possess and, more importantly, by the fact they are more likely to be able to use those skills in their work than are their non-graduate counterparts. After controlling for these differences between graduates and non-graduates in matching skills to job requirements, the premium falls to 11% - which from a human capital perspective implies that when comparing both types of

[5] Wage premia capture the average percentage increase in wages associated with one level of education compared to another, whist holding everything else constant. When educational differences are captured by years of education, it is common to see this referred to as a rate of return. However, calling it this is only correct under certain restrictive assumptions (see Heckman et al, 2006). Moreover, if education attainment levels or qualifications are used, the wage premia estimated cannot be interpreted as rates of return even if these assumptions were to hold – although this does not prevent the terms being used interchangeably.

worker in jobs where they are similarly matched (given their respective skill levels), those graduate skills correspond on average to a smaller, but still significant difference in productivity. Having made these corrections, there are still those who are well matched to their job and those who are not. The latter group includes workers who are lacking the skills needed for their work and those who have more skills than required. The question then becomes whether the mismatched proportion is large and growing as more graduates enter the labour market.

Examining estimates of wage premia over time could be helpful here - if the demand for the skills graduates possess was not increasing as fast their supply, the premium would fall. Although there is some concern about low returns at the tail end of the distribution, the consensus is that these premia have remained fairly constant. Using the UK as an illustration, Table 4 shows a number of estimates of the graduate wage premium from the 1980s onwards:

Table 3.2: Wage premia and rates of return to higher education in the UK

Study	Earnings data	Wage premia
Harkness and Machin (1999)	General Household Survey, 1974-1995	14.2 – 23.0% (male) 20.5 – 26.7% (female)
Blundell et al (2000)	National Child Development Study, 1991	20.8% (male) 39.1% (female) †
and Sloane (2005)	UK Labour Force Survey, 1994-2002	20.2% (male) 35.5% (female)
Bratti, et al (2008)	British Cohort Study, 2000	14.6% (male) 17.8% (female) ††
Walker and Zhu (2008)	UK Labour Force Survey, 1994-2006	18.2% (male) 27.9% (female) †††
Conlon and Patrignani (2011)	UK Labour Force Survey, 1996-2009	21.1% (male) 26.2% (female)
Walker and Zhu (2013)	UK Labour Force Survey, 1993-2010	20.5% (male) 26.8% (female)

Notes: † - For comparability with the rest of the table, the raw estimate without ability, test score or family background controls is given. Controls reduce the male premium to 17.1 and 36.8% respectively. †† - The authors only report premia controlling for ability and family background, although they state that dropping ability measures has no effect on the premia. ††† - Authors test for changes in the premia for pre- and post- expansion cohorts and find zero change for men but a 4% increase in the wage premium for women.

However, a human capital/marginal productivity interpretation of the above is not the only possibility. A constant graduate premium is also entirely consistent with job competition models of the labour market (see, for example, Thurow, 1976) – that is, where education itself does not necessarily produce scarce skills, but helps in the process of matching workers to jobs. The employers who create these jobs are the ones who shape the extent to which skills are demanded, many of which may be gained after recruitment through specific training and learning-by-doing. For example, if degrees are simply being used by employers to screen applicants for the stock of currently available jobs, then those with the relevant signal – in this case a degree – have better access to the higher paying jobs. If more people obtain the signal and employers continue to use it to screen even for jobs previously going to non-graduates, then those with degrees end up taking a wider variety of work, pushing down the average graduate wage. However, at the same time, those without degrees now find it harder to get the highest paying jobs that graduates used not to take, so that their average pay falls as well. Both groups see pay fall on average, with the possibility of a constant graduate premium accompanying increasing levels of under-utilisation. Hence, wage premia and similar measures of labour market outcomes are not informative unless you know more about the sort of labour market in which these things are happening.

An alternative approach is to examine the work of graduates *directly*, using objective measures of the tasks performed. Recently several authors have attempted to assess whether different occupations require graduate level skills (see Elias and Purcell 2013, Green and Henseke, 2014 and this Issue). For Elias and Purcell, each occupation is assessed in terms of the three areas of knowledge which they argue higher education is fundamental in producing: expertise, orchestration and communication. Graduate jobs are those that score highly – over 5 out of 10 – for at least one of the three areas of knowledge. Graduate jobs are then categorised by the type of knowledge that is most important. Green and Henseke produce an index of skill requirements as predicted by measured aspects of job skill requirements such as generic skill intensity, required training and computer use, where occupations above their threshold are classified as graduate.

In both typologies, essentially all occupations except the professional, managerial, associate professional or technical ones are classed as non-graduate. Both sets of authors describe all professional occupations and, with some exceptions, most managerial occupations as graduate occupations. Green and Henseke include more associate professional (for example, paralegals, financial analysts, market researchers, health and safety officers and counsellors) and technicians in the graduate category than Elias and Purcell do – less than half of these occupations are graduate level in the latter's analysis.

By such measures, the proportion of graduates in non-graduate occupations is rising in the UK. According to the Labour Force Survey, in 2002 14.7 % of UK graduates were not in professional, managerial or technician jobs. By 2010 the figure was 18.1% and by 2014 it was 20.6%. Moreover there are a number of these so-called higher-level occupations, which recruit significant numbers of new graduates, that one or both of these typologies would describe, as non-graduate (for example, police officers, fitness instructors, managers in retail and property and estate managers). Two questions can be raised here. Firstly, it is important to know what happens when people with degrees enter non-graduate jobs - it is possible that graduates find ways to use their particular skillsets even in a less demanding work environment – this is what Mason (2002) labels 'individual upgrading'. Mason's own case study evidence suggests this happens infrequently, while quantitative comparisons of graduates and non-graduates in traditionally non-graduate occupations do not reveal much difference in terms of discretion and autonomy (Holmes and Mayhew, forthcoming 2016) or wage (as a proxy for productivity, see O'Leary and Sloane, 2014).

Secondly, for occupations labeled as graduate, there are questions as to whether a degree route into these higher skilled areas of work is a uniquely suitable way of producing the required skills. Excluding the professions, most of these occupations have not historically recruited many graduates and so we still see many non-graduates working in them. We might expect to observe these jobs being up-graded as graduates move in and to see a difference in the performance of the two groups. This does not appear to be the case. O'Leary and Sloane (2014) find an increasing number of occupations where there is no significant difference in the earnings of graduates and non-graduates. Comparing measures of aspects of the job such as discretion or

autonomy in the fastest graduatising occupations, there are often small and diminishing differences between the two groups (Holmes and Mayhew, forthcoming 2016). For example, in many managerial jobs in manufacturing, production and construction, graduates typically have *less* discretion than their non-graduate counterparts.

To give another example, both typologies label nursing as a graduate job. Around one in five nurses in the UK was a graduate in 2004. Today the figure is in excess of 50%. What is not clear is whether the work has changed so much that it requires degree level studies. Alternative models clearly perform well in other countries. In Austria, the Netherlands and France nurses are typically trained below degree level. Moreover, even if some aspects of work in the so-called graduate occupations are changing, it should not be assumed that only graduates are able to cope with the new complexities caused by technology or other systemic developments; and at least one sector has bucked the graduatising trend. Chartered accountancy firms actively recruit straight from school and appear to offer similar career prospects to these recruits as they do to those they hire from university.

Another area of research looks instead at the macroeconomic consequences of changes in participation in higher education. If additional years of education lead to higher individual productivity and wages, then this should be observed at the national level.

The limited amount of work that focuses specifically on higher education tends to examine changes in national income – economic growth – rather than levels, which reduces biases caused by country fixed effects. Holmes (2013) discusses how HE relates to economic growth in different theoretical models and empirical specifications. For example, a neoclassical growth model would suggest that economic growth depends on increases in the factors of production (here taken to be physical and human capital). Correspondingly, Table 4 presents the results of a simple OLS regression of annualised per capita GDP growth rates between 1966 and

2006 on changes in the workforce's average years of education at different levels and the growth rate of capital over that same time period.[6]

Table 4: Cross country regression estimates of education and investment on economic growth rates

	All		All		High income		High and middle income	
Change in years of primary	0.0036		-0.0001		0.0007		0.0000	
	(0.10)		*(0.95)*		*(0.80)*		*(1.00)*	
Change in years of secondary	0.0097	***	0.0059	***	0.0020		0.0044	**
	(0.00)		*(0.00)*		*(0.16)*		*(0.04)*	
Change in years of tertiary	0.0147		0.0117	*	-0.0007		0.0044	
	(0.12)		*(0.06)*		*(0.86)*		*(0.51)*	
Growth rate of capital			0.0029	***	0.0028	***	0.0026	***
			(0.00)		*(0.00)*		*(0.00)*	
n	60		60		16		37	
R^2	0.309		0.718		0.896		0.743	

Source: Holmes (2013), own calculations. *, **, and *** used to indicate significance at the 10%, 5% and 1% levels respectively.

The results show a stronger relationship between secondary education and economic growth than between tertiary education and growth – in the full model with all available countries included, a one-year increase in average years of secondary education corresponds to a 0.6 percentage point higher growth rate.[7] The effect of year of higher education is less statistically significant, and cannot be found when looking just at richer countries (where the expansion of higher education has largely occurred). Increasing physical capital, by contrast, has a clear and statistically significant relationship with economic growth.

One problem with the above is that by focusing on one growth rate per country starting in the 1960s, the sample size is small when examining the higher income OECD countries where the expansion of HE has been a key policy goal – in Table 4 complete data are available for only 16 of these countries. If, instead, a panel is

[6] Educational attainment uses Barro and Lee (2010), while GDP and investment data is taken from the World Bank national accounts data. See Holmes (2013) for full details. There are, of course, always issues about the quality of macroeconomic data across different countries even from the most reputable of sources.

[7] The overall size of the effect is also larger because increases in secondary education attainment are far bigger than increases in tertiary education. In the OECD countries, the average increase of the former was around 2.4years while the latter was 0.5 years.

created using four ten-year growth periods, then the sample size of high income countries can be increased, while panel data techniques may help deal with unobservable heterogeneity in growth rates.[8] Table 5 shows the results. As well as using years of education at secondary and tertiary levels, the analysis also uses, as an alternative measure, data on the share of the workforce who have completed each level of education. In all of these models, the estimate of the effect of expanding tertiary education is negative, and is significant (at the 10% level) in most cases. This would suggest that a 0.1 year increase in the average years of tertiary education completed by the workforce over a ten year period corresponds to a 0.2-0.3 percentage point fall in yearly economic growth rates in that period, while a 5 percentage point increase in the share of workers holding a degree corresponds to a 0.5 percentage point fall in growth rates.

Table 5: Panel regression estimates of regression estimates of education and investment on economic growth rates

	OLS		OLS		FE		OLS		OLS		FE	
Change in share of above primary							0.000		0.000		0.000	
							(0.48)		*(0.58)*		*(0.60)*	
Change in share of tertiary							-0.001	**	-0.001		-0.001	*
							(0.04)		*(0.15)*		*(0.09)*	
Change in years of secondary	0.002		0.001		0.001							
	(0.46)		*(0.58)*		*(0.86)*							
Change in years of tertiary	-0.018	*	-0.010		-0.027	*						
	(0.10)		*(0.35)*		*(0.06)*							
Growth rate of capital	0.031	***	0.031	***	0.026	***	0.031	***	0.031	***	0.026	***
	(0.00)		*(0.00)*		*(0.00)*		*(0.00)*		*(0.00)*		*(0.00)*	
Time dummies	No		Yes		-		No		Yes		-	
n	98		98		98		98		98		98	
R^2	0.691		0.723		0.683		0.696		0.726		0.684	

Source: World Bank, Barro and Lee (2010), own calculations. *, **, and *** used to indicate significance at the 10%, 5% and 1% levels respectively.

[8] Specifically, the 16 high income countries from Table 4 have four periods of data, while additional high income countries are included where their data are available for a subset of the time periods.

The purpose of this exercise is to act as a sense-check on micro estimates of the effects of HE on productivity. This is not to say that HE has no effect anywhere (see below), but that on average as countries have shifted towards mass higher education, this has not corresponded with faster growth (and may have corresponded with slower growth). This is consistent with a signaling or job competition approach.

There are, however, specific channels through which HE activity could affect growth. Firstly, parts of the HE sector help to support technological innovation. Aghion et al (2009) find that increases in patenting in the US can be related to exogenous increases in spending on four-year degree courses at research-intensive universities and subsequent economic growth. Vanderbussche et *al* (2006) find a link between five-year growth rates and the levels of HE attainment once distance from the technological frontier is controlled for – countries closer to the frontier grow faster if they have a large proportion of their workforce holding degrees. This indicates that HE plays a role through technological innovation rather than through the technological adoption. In this Issue, Veugelers emphasises the role of "third-mission" activities in universities, where new knowledge produced through research is transferred to society and the economy and discusses the strategies that could be employed in order to enhance this contribution to the economy.

This emphasises the importance of vibrant research in HE institutions but it is not the same as support for mass HE as a policy tool to raise productivity and incomes. In many countries the sort of high quality research that these authors are describing is concentrated in a limited number of universities. Furthermore, as Hanushek (this Issue) shows, measuring education in terms of cognitive skill levels of young people rather than years of schooling is a far better predictor of subsequent economic growth. The measures of educational attainment used for Tables 4 and 5 do not capture the quality of the education system. The two are often correlated, but far from perfectly and rapid expansion could actually reduce the correlation. Hanushek's analysis suggests that this might well be the case.

Finally it is important to be aware that the research described in this section is necessarily backward-looking, which means that any future and significant changes in labour markets and skill requirements limit the extent to which these findings can be used to inform policy. Technological change has the potential to do just this in a

number of ways. On one hand, a proportion of the low skilled jobs in which some graduates find themselves might disappear – Frey and Osborne's (2013) analysis finds many such service jobs such as telemarketers, waiters and waitresses and cashiers are at a high (above 90%) risk of automation. This stands in contrast to the trends of the past 30 years, when low-skilled non-routine service occupations have grown (Autor and Dorn, 2014; Goos, Manning and Salomons, 2009). Newer, higher skilled opportunities might open up in their place, particular in areas that complement the use of these technologies. However, numerous authors have written in recent years about the way in which new digital technologies may be able to replace workers in a variety of the more highly skilled jobs that graduates have typically entered (Brown, Lauder and Ashton, 2011; Susskind and Susskind, 2015). Both cases underline the need to understand both quantitative and qualitative aspects of the demand for skills produced in the HE sector. Moreover they bring into question whether much can be learned from historical rate of return analyses – and the accompanying information and advice disseminated to prospective students – if the labour market future graduates will enter is going to be so different.

4. WHO SHOULD PAY?

When the university sector was small and elite, the question of who should pay for it was hardly an issue, since the cost comprised a relatively insignificant proportion of public expenditure. As countries moved to a mass system it became a matter for live debate. As already noted, Jongbloed and Vossensteyn (this issue) show that the "public share" of expenditure has been falling. Much of the increased share of expenditure met by non-governmental sources has taken the form of cost sharing with undergraduates. The extent to which countries have increased undergraduate tuition fees has varied considerably, as have the methods by which students are helped to meet the cost of these fees – a variety of loan systems and graduate taxes. The UK, together with most of the other English speaking countries, charge relatively high fees and it is therefore unsurprising that it is in these countries that there has been most debate about support systems.

Whilst it is probably true that the move to higher fees has been driven as much by restrictive fiscal stances as by arguments from economic theory, there is a theoretical debate to be had. This debate centres on differences between the private and social

rates of return. In deciding whether or not to go to university an individual will evaluate the personal benefits and costs involved. If the main benefit relates to future labour market prospects then this individual will enter HE if the present value of future higher pay exceeds the private costs of attending HE. Similarly, it is in the interests of society for that individual to go to university if the present value of his or her expected future contribution to society exceeds the costs incurred by society of sending that person to university. Under some, very restrictive, assumptions, these two calculations align – for example, if an individual's increase in pay resulting from his/her studies is equal to the increase in productivity and output in the economy, and if the costs paid by an individual from studying are the same as the loss to society as a whole from allocating the necessary resources to that individual's education.

However, this alignment could and does break down in various ways, in which case the state has a reason to intervene, typically by altering the individual's private cost relative to the social cost. For example, it may be that borrowing costs are higher for an individual than for society as a whole. Or it is likely that labour markets are not perfectly competitive so that part of an individual's additional productivity accrues to firms in terms of higher profits rather than to the worker in terms of higher wages. Note that this raises the issue of whether firms themselves should be contributing to the cost of HE if they are benefiting in this way from it. Finally there may be economic and social externalities accruing from someone attending university. One economic externality is alleged to be that the presence of a graduate in the workplace increases the productivity of his/her colleagues. A second version of this economic externality is that graduates help drive innovation and new technology, which raises the productivity of many workers as this knowledge is shared around the economy (see section 3). Social externalities stem from the fact that graduates "behave better" in a whole manner of ways than do non-graduates – they commit less crime, lead healthier lives and take their civic duties (broadly defined) more seriously. The evidence for the economic externality is relatively weak. Moreover, it is true that graduates "behave better" (see Green and Henseke in this Issue) but what is far less certain is whether this is a consequence of attending university or whether the people concerned would have behaved in exactly the same way had they not gone to university. In other words, there is confusion and false precision when it comes to estimating both types of return.

The policy stance in England, for example, is that graduates are capturing most of the return and therefore, rather than the state covering the costs through general taxation, graduates should bear most, if not all, of the cost, as long as provision is made for those who initially have limited access to capital. Hence there is concern to design an effective support system. This support usually takes the form of a loan to the student. Barr (see, for example, Barr and Johnston 2013) has written extensively on what the design principles for such loans should be. He argues that a "conventional" loan would not be appropriate; rather that repayment should be dependent on the labour market fortunes of the graduate concerned (in this sense, a contingent form of a general graduate tax). In other words repayments should depend on the subsequent incomes of graduates. The real interest rate charged should be realistic and the loan should be large enough to meet the need of the borrower. The English loan arrangements, for example, meet some but not all of these criteria. The loans are indeed income contingent. Nothing is repaid until the borrowers gross earnings hit £21,000 per annum and after 30 years any outstanding balance is forgiven. The interest rate charged is sensible. However, whilst loans fully cover fees, the maximum maintenance loan is very small.

However, all of this fails to take proper account of the possibility that graduates may not be more productive than if they had never been to university, as discussed in the previous section. It is not that university fails to endow them with more skill but that the jobs that many of them enter do not allow them to use their skills, as discussed in section 3. They would still earn a return, on average, because even to get the job that was once done by a non-graduate, now a degree is needed so that those without a degree are pushed into even less skillful jobs. But, unless it can be demonstrated that HE is the most cost-effective sorting mechanism available, the social return is now much less than the private return.

The final point to consider is that, even for individuals, the private return needs careful interpretation. Given that on average graduates earn more, an individual pursuing a university degree is reacting rationally to the incentives he or she faces. But around this average payoff there is a distribution and the realized returns for

many who end up with lower paying jobs may well be insufficient to pay off the debt accrued.[9]

There is debate about the extent of this problem in the US (Dynarski, 2014). The UK government's own estimates suggest that there is a problem there too in that officialdom is currently expecting a default rate of over 40 per cent on student loans in England and Wales. At least in these two countries the debt is forgiven on the terms mentioned above. US graduates have no such luck; student debt continues to remain a burden on the estate of a dead person. But even in England and Wales many graduates will question what, in the narrow economic sense, they have achieved by going to university. Society has created a strange form of entrapment as far as young people's decision making is concerned.

5. THE IMPACT OF HE ON INEQUALITY

> "The result is that across the world, more higher education has at best failed to shake up social inequalities, and at worst increased middle-class dominance of the best opportunities" (P. Marginson, *Times Higher Education*, 16 June 2016).

A prominent theme in the discourse surrounding the expansion of higher education has been its impact on inequality. A larger university sector, it was contended, would enable more children from lower income families to obtain higher qualifications, thus enhancing their labour market prospects. Crawford et al. (this issue) consider how the UK has fared in this respect. Whilst the numbers of students from lower income families has increased significantly, they are still massively under-represented in British universities. In fact the percentage of university students coming from working class families (defined as NS-SEC classes 4, 5, 6 and 7) is little different today from what it had been in the late 1960s. As Crawford et al show, the major proximate reason for their under-representation is lower educational "achievement levels" at school. They also demonstrate that students from lower socio-economic

[9] Moreover, as the system expands further and further, it is not clear that the average earning premia says much about the expected benefits to the marginal student – for example, if those from non-traditional university backgrounds systematically fail to get access to higher paying jobs even when they have a degree. We return to this point in section 5.

backgrounds have higher dropout rates and secure less good results. They go on to show that those lower income students who do get to university do not attend the elite institutions. This has major implications for their labour market fortunes, given that rates of return vary significantly depending on the institution attended (see, for example, Britton et al, 2016). Interestingly, citing the work of Ashley et al. (2015), Crawford et al make the point that not only do the high status occupations recruit disproportionately from the elite universities, even among the students at such establishments it is those from private schools who are more likely to enter these professions. Students from poorer families who actually mange to enter these occupations then, Crawford et al show, earn less than those from better-off families.

Indeed it could be argued that children from poorer families suffer a triple whammy from the expansion of higher education (Keep and Mayhew, 2004). They still find it difficult to get to university and particularly to the elite universities. Even those who do manage to gain entry to the elite institutions do less well, in labour market terms, out of their attendance there. But what about the young people who do not make it into higher education? They face a labour market offering fewer and fewer opportunities. Occupational filtering down, which is observed across Europe (Holmes and Mayhew, forthcoming 2016), means that many jobs that were once available to them as non-graduates no longer are. At the same time, some countries like the UK have seen alternative routes into the labour market squeezed by the expansion of universities. Further education has been grotesquely under-funded whilst, despite many governmental initiatives, the apprenticeship system has faltered (see CIPD 2016). A recent report form the Resolution Foundation for the Social Mobility and Child Poverty Commission (Resolution Foundation 2016) underlines this concern for the fate of non-graduates:

> " A recent added pressure for non-graduates has been the greater proportion of graduates working in non-graduate roles. In part, this is due to the increased number of graduates in the population, but since the downturn the share of graduates in non-graduate roles has risen significantly. Focus group participants saw a double disadvantage in this trend: not only did it become harder to find employment in the first place but routes to progression were blocked with graduates preferred to non-graduates for management positions." (p.7)

Income inequality has increased in most OECD countries since the late 1970s or early 1980s. However, the extent of this increase and of existing levels of inequality differs markedly from country to country. Thus, for example, the US and the UK are far more unequal countries today than are France, Germany, the Netherlands or Sweden. Reflecting this, the average wage returns to completing university are markedly higher in the first two of these countries (see van der Velden and Bijlsma, this Issue). The prize money is greater in the US and the UK. And yet entry into the contest is difficult for children from lower income backgrounds. Surveying the relevant literature, Pickett and Vanderbloemen (2015) came to the following conclusions. Across all countries pre-university educational achievement is strongly affected by family background but "inequalities in educational outcomes are more profound in more unequal countries". The inference to be drawn is that the more unequal the country the more class-biased is entry to universities. The labour market consequences of this are heightened if a country has a strong university hierarchy – if it has elite brands. As Marginson (2015) notes, the elite brand effect is not confined in the UK; there is strong evidence of its importance in the US and in China. In some countries, mainly Nordic or German speaking, higher education has expanded but there has been relatively little emergence of hierarchy between universities. This may well have moderated the impact of HE on labour market inequality.

6. WHAT IS HAPPENING INSIDE OUR UNIVERSITIES?

With the exception of the US, historically economists have been pretty reluctant to delve into the black box and ask what is actually happening within the university system in terms of efficiency, governance and strategy. And yet the rapid, and often largely unplanned, expansion of the sector is likely to have brought with it many issues in these areas. The exact nature of these issues varies from country to country but there are some common themes.

As Johnes and Johnes (this issue) point out, a number of studies of costs have been conducted in the US, the UK, Germany, Italy and Spain. They argue that such studies suggest that the sector is fairly efficient but emphasise that this judgement is based on the finding that there are not massive differences in costs between universities. What the studies do not do is evaluate the efficiency of the sector as a whole. In their contribution to this issue Johnes and Johnes find that the cost of providing

undergraduate courses in the UK is significantly less than the fees being charged and that undergraduate fees are used to subsidise research. These findings are consistent with the research done by KPMG for the UK Department of Business Innovation and Skills. KPMG, examining 17 British universities in 2012-13, found that the average cost of an undergraduate course was £7,694 per annum; and yet all these universities were charging £9,000. Of the 36 specific courses that KPMG's researchers could identify, only 9 of them cost more the £9,000 – the highest cost of £13,965 being for Clinical Dentistry. The remaining 27 courses cost less than £9,000, the lowest cost of £5,539 being for Law.

Johnes and Johnes also identify potential for efficiency gains by concentrating research in a subset of English universities. This raises the important question of how heterogeneous an efficient HE sector should be. In the UK the expansion of the number of universities has been almost entirely within the quasi-public sector. The first expansion phase was in the late 1960s as new universities were created in the aftermath of the Robbins Report. The second was the ending of the binary divide in the early 1990s, when every polytechnic in the country assumed university status. The third phase was more gradual and involved the likes of teacher training colleges and agricultural colleges becoming HEIs. Clearly the HE sector today is composed of very different institutions but, in a sense, they are more homogenous than they might have been. This is because their dependence on public funding has meant that they all face the same incentive structure. In order for their undergraduates to be eligible for student loans they have to accept whatever constraints on fees the government imposes and whatever quality assurance mechanisms the government introduces. Non-fee money from the government has become more and more dependent on evaluations of a university's research performance, as determined by the periodic Research Excellence Framework (REF) (formerly RAE) exercises. Thus most, if not all, HEIs devote massive efforts to maximizing their performance in these exercises, as they do in attempting to obtain funding from the various research councils that act as a conduit of government funding for research. It is possible that the majority of universities will 'win" less money from their REF results than they spend in preparing for the exercise. At first sight this seems strange behaviour by their vice-chancellors. One possible explanation is that they are willing to take the loss because they see participation in the exercise as a way of driving up research standards at their

university. In one sense this is a noble aim but it might also reflect the obsession of the HE sector in many countries with university ranking tables. This in turn might well reflect the concern in many countries with having "world class" universities. As Marginson puts it, "worldwide there is the ever-growing emphasis on 'world-class universities'. Every nation, it seems, now wants its own version of the American science multiversity, the kind of institution that figures in global rankings". Thus, although most of the published rankings are compiled from a whole series of "performance indicators" of which research is only one, it is the research elements that seems to matter to most to many vice chancellors. The other elements, they seem to believe, can be attended to by bureaucratic processes.

Perhaps it is because of this emphasis on research performance that concern has been expressed in a number of countries about the quality/extent of teaching. This concern was reflected, for example, by an OECD study covering 29 institutions in 20 different countries (OECD and Institutional Management in Higher Education, 2009). In the UK context the remarkable fact is that the years of expansion have witnessed the phenomenon that has become known as "grade inflation". One might have thought that as the number of undergraduates increased their average quality would fall. There are more or less innocent possible explanations for this grade inflation. It might be that students work harder or that they are better taught. It might be that assessment methods have changed. Such a change might be that final classifications are based more on coursework and less on unseen examinations. It might be that exams are more of the "learn and churn variety" and demand less original thinking than once was the case. It might be that standards have simply slipped. There is similar debate about grade inflation in Canada and the US.

Accompanying these concerns are questions about how much work allegedly full time students actually do. Some research in the US suggests that student effort has fallen in recent years. For example Babcock and Marks found that whereas in 1961 undergraduates spent 40 hours per week studying, by 2003 this had fallen to 27 hours. In the UK the Higher Education Policy Institute does an annual survey that collects information on the number of hours during term that they work. Their findings show little change over time and for 2016 record an average of 27 hours per week during term – 12 contact hours and 15 private study hours. There are differences across

subjects, with Medicine and Dentistry reporting the longest hours (35) and Mass Communication and Documentation the shortest (22). However there has to be some concern that students are more likely to over- than under-report their hours of work, and it is an issue that merits further investigation.

Whilst, as Jongbloed and Vossensteyn show, worries about quality have been reflected in the growth of performance-based funding, it is far from clear that effective quality control mechanisms have been devised. For example the UK government has recently announced its Teaching Excellence Framework (TEF), with the explicit intent of re-balancing teaching and research. The first TEF exercise will be conducted in 2017 and the initial metrics will cover 'employment/destination", retention/continuation and student satisfaction. These seem to be barely scratching the surface of the potential underlying issues of what in fact is being delivered to undergraduates. Some commentators have suggested that competition between universities would be the route to improving and maintaining quality, and yet there is precious little evidence of such competition. Others have suggested that new technologies would introduce a new intensity of competition, not least through opening up possibilities for private providers. These same technologies could dramatically change and cheapen cost structures, thus changing the cost-benefit calculus of attending university. Flavin (this issue) evaluates such claims, concluding: "higher education resists (so far successfully) disruption, both within individual institutions and on a sectoral level."

7. CONCLUSIONS

As countries have developed mass higher education sectors, HE has come to be seen as a silver bullet by many governments. It will improve underlying growth rates and help to solve problems of inequality. Going alongside that is the apparent belief that the higher the qualification, the better – though the German speaking countries have been less afflicted by this illusion than elsewhere. Econometricians have often aided and abetted this belief by using the level of qualification as a convenient proxy for the amount of human capital possessed and utilized in the labour market. Yet the causal link with growth rates is in fact hard to demonstrate, whilst, at least in some countries, it can be argued that the expansion of HE has exacerbated problems of inequality.

The tenuousness of the link with growth is easier to understand if one accepts the fact that a large number of graduates are entering jobs that are no different from the ones done by their non-graduate parents. Equally it is not hard to understand that HE may not diminish inequality once one accepts that educational deprivation is established in the early years of schooling and, if not attended to then, will afflict individuals throughout their time in education.

It is not the fault of the HE sector that too much has been expected of it by officialdom. Yet the expansion of higher education has created a large interest group – those employed by universities. And, though there are significant differences between countries in this regard, there is perhaps a reluctance of this interest group to contemplate itself with sufficiently critical eyes. There are major questions about the internal organization of universities that have received insufficient attention. These include the quality of the offer, the efficiency of the operation, and the setting of priorities (teaching versus research; undergraduate versus graduate numbers). At the same time it is far from clear that the HE sector has got to grips with either the threats or the opportunities presented by technological developments. These could dramatically change cost structures of HE institutions and also transform the labour market for which these institutions are preparing their students.

Governments in many countries, not least in the UK, need to take a more measured view as to what universities can do for the economy and for the battle against inequality. They may also need to intervene more effectively than they currently do to encourage universities to put their own houses in order. Perhaps most importantly of all they need to devise coherent policies to construct alternative pathways from school to work. We are where we are and it may be difficult to change institutional configurations in any given country; but in many countries change would start by a serious consideration as to whether the bachelors qualification has become too much the "gold standard". More consideration should be given to the role of sub-degree qualifications and to where these qualifications should be acquired. This might be in the workplace (via apprenticeships) or in educational institutions other than conventional universities. Given the power of vested interest, this would be no mean task but, in the case of the UK for instance, any moves in this direction would at the very least almost certainly involve many of its higher education institutions taking on

very different roles from their present ones, even if they continue to call themselves HEIs.

REFERENCES

Aghion, P., Boustan, L., Hoxby, C., and Vandenbussche, J. 2009. "The Causal Impact of Education on Economic Growth: Evidence from the United States", accessed online July 26th 2016: http://scholar.harvard.edu/files/causal_impact_of_education_0.pdf.

Ashley, L., Duberley, J., Sommerlad, H., and Scholarios, D. 2015. *A Qualitative Evaluation of Non-educational Barriers to the Elite Professions*, London: Social Mobility and Child Poverty Commission.

Autor, D., and Dorn, D. 2013. "The growth of low-skill service jobs and the polarization of the US labor market", *American Economic Review*, 103(5): 1553–1597.

Babcock, P., and Marks, M. 2010. *The Falling Time Cost of College: Evidence from Half a Century of Time Use Data*, NBER Working Paper No. 15954.

Barr, N., and Johnston, A. 2013. "Student loan reform, interest subsidies and costly technicalities: lessons from the UK experience", *Journal of Higher Education Policy and Management*, 35(2), 166-177.

Barro, R., and Lee, J. 2010. *A New Data Set of Educational Attainment in the World, 1950–2010*, NBER Working Paper No. 15902.

Blundell, R., Dearden, L., Goodman, A., and Reed, H. 2000. "The returns to higher education in Britain: evidence from a British cohort," *The Economic Journal*, vol. 110, 82-99.

Brown, P., Lauder, H., and Ashton, D. 2011. *The Global Auction*, New York: OUP.

Bratti, M., Naylor, R., and Smith, J. 2008. *Heterogeneities in the Returns to Degrees: Evidence from the British Cohort Study* 1970, working paper no. 2008-40, Department of Economics, Business and Statistics at Università degli Studi di Milano.

Britton, J., Dearden, L., Shephard, N., and Vignoles, A. 2016. *How English Domiciled Graduate Earnings Vary With Gender, Institution Attended, Subject and Socio-Economic Background*, IFS Working Paper W16/06.

CIPD. 2016. *Where Next for Apprenticeships?,* London: CIPD.

Conlon, G., and Patrignani, P. 2011. *The Returns to Higher Education Qualifications*, BIS research paper no. 45, London: Department of Business, Innovation and Skills.

Dynarski, S. 2014. *An Economist's Perspective on Student Loans in the United States*, Brookings, ES Working Paper Series, September.

Elias, P., and Purcell, K. 2013. *Classifying Graduate Occupations for the Knowledge Society*, Futuretrack Working Paper 5.

Freeman, R. 1977. *The Overeducated American*, New York: Academic Press.

Frey, C., and Osborne, M. 2013. *The Future of Employment*, Oxford Martin School research paper, available online: http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Goos, M., Manning, A., and, Salomons, A. 2009. "Job Polarization in Europe", *American Economic Review*, 99(2): 58-63.

Green, F., and Henseke, G. 2014. *The Changing Graduate Labour Market: Analysis Using a New Indication of Graduate Jobs*, LLAKES Research Paper 50.

Harkness, S., and Machin, S. 1999 *Graduate Earnings in Britain, 1974-95*, Department for Employment and Education, Research Report RR95.

Heckman, J., Lochner, L., Todd, P. 2006. "Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond" in *Handbook of the Economics of Education* 1. Amsterdam: North-Holland. pp. 307–458.

HEPI. 2016. *The 2016 Student Academic Experience Survey*, Oxford, HEPI.

Holmes, C. 2013. “Has the expansion of higher education led to greater economic growth?” *National Institute Economic Review* 224, no. 1: R29-R47.

Holmes, C., and Mayhew, K. 2015. *Over-qualification and Skills Mismatch in the Graduate Labour Market*, London: CIPD.

Holmes, C., and Mayhew, K. forthcoming 2016. *Alternative Pathways into the Labour Market*, London: CIPD.

Keep, E., and Mayhew, K. 2004. “The economic and distributional implications of current policies on higher education”, *Oxford Review of Economic Policy*, Summer.

KPMG. 2014. *A Review of the Cost of Postgraduate Taught Education: Report to the Higher Education Funding Council for England*, London: HEFCE.

Machin, S. 2003. “Wage Inequality Since 1975”, in R. Dickens, P. Gregg and J. Wadsworth (eds.) *The Labour Market Under New Labour*, London: Palgrave MacMillan.

Marginson, S. 2015. “Higher education and growing inequality”, *Academic Matters*, January.

Mason, G. 2002. “High skills utilisation under mass higher education: graduate employment in service industries in Britain”, *Journal of Education and Work*, 15(4), pp. 427-456.

OECD. 2002. *Education at a Glance 2002*.

OECD. 2015. *Education at a Glance 2015*.

OECD and Institutional Management in Higher Education. 2009. *Learning our Lesson: Review of Quality Teaching in Higher Education.*

O'Leary, N., and Sloane, P, 2005. "The return to a university education in Britain", *National Institute Economic Review* 193(1), 75-89.

O'Leary, N., and Sloane, P. 2014. *Too Many Graduates? An Application of the Gottschalk-Hansen Model to Young British Graduates between 2001-2010*, IZA Discussion Paper No. 8413.

Pickett, K., and Vanderbloemen, L. 2015. *Mind the Gap: Tackling Social and Educational Inequality*, York: Cambridge Primary Review Trust.

Resolution Foundation. 2016. *Finding Your Routes: Non-Graduate Pathways in the UK's Labour Market*, London: the Resolution Foundation.

Rubery, J. 2006. "Segmentation theory thirty years on", conference paper presented to the 27th conference of the IWPLMS, Copenhagen.

Susskind, R., and Susskind, D. 2015. *The Future of the Professions: How Technology Will Transform the Work of Human Experts*, Oxford: OUP

Thurow, L. 1976. Generating Inequality, London: Macmillan.

Vandenbussche, J., Aghion, A., and Meghir, C. 2006. "Growth, Distance from the Frontier and Composition of Human Capital", *Journal of Economic Growth* 11, pp. 97-107.

Walker, I., and Zhu, Y. 2008. "The college wage premium and the expansion of higher education in the UK", *Scandinavian Journal of Economics*, 110 (4), 695-709.

Walker, I., and Zhu, Y 2013. *The Impact of University Degrees on the Lifecycle of Earnings: Some Further Analysis*, BIS research paper no. 112, London: Department of Business, Innovation and Skills.