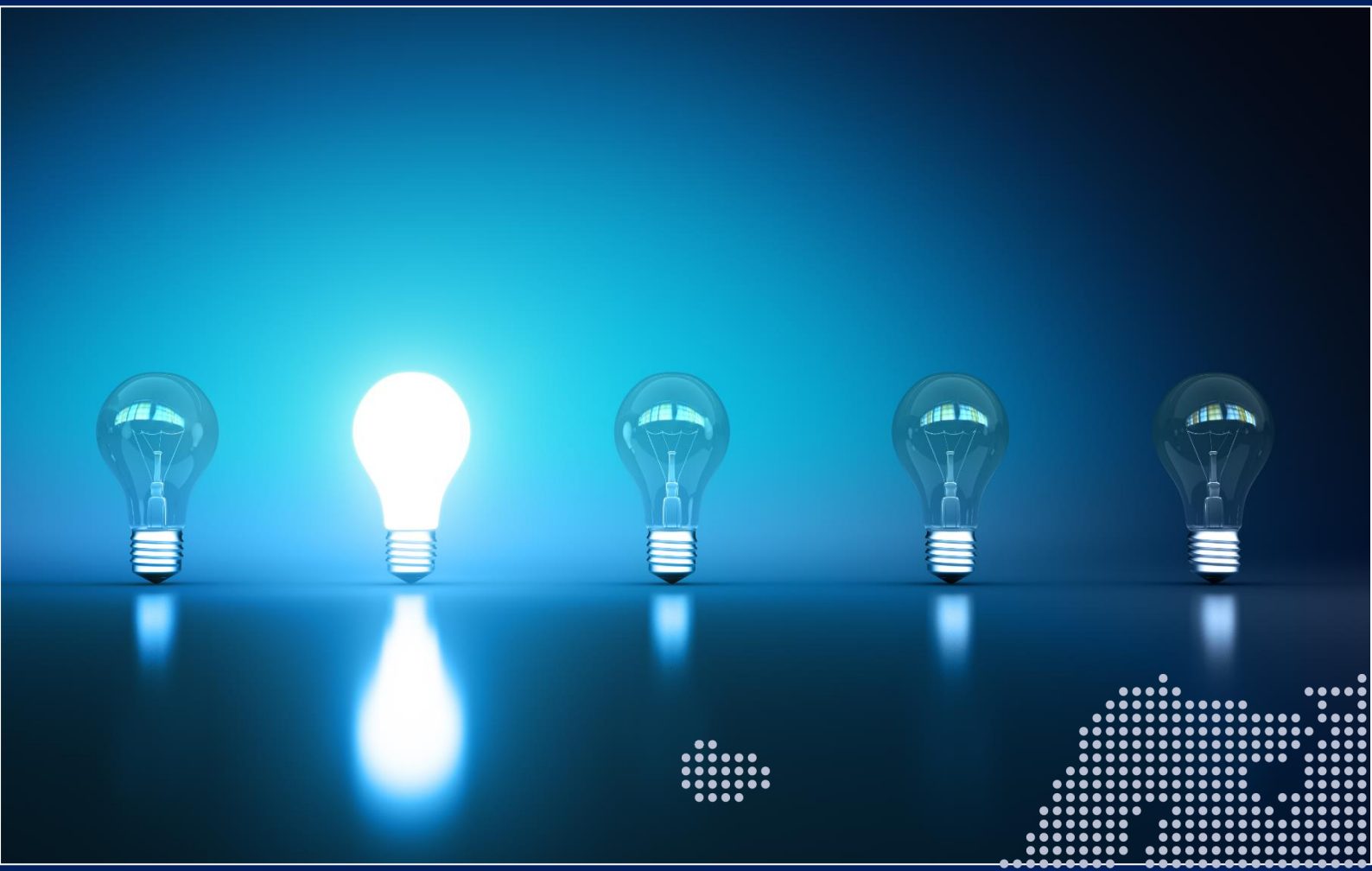
Estimating the returns to part-time undergraduate degrees

Final Report for The Open University



London Economics

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1 Introduction

London Economics were commissioned by The Open University to analyse the net graduate premium and net Exchequer benefit generated by **English-domiciled students starting part-time undergraduate degrees at The Open University in the 2015-16 academic year**.

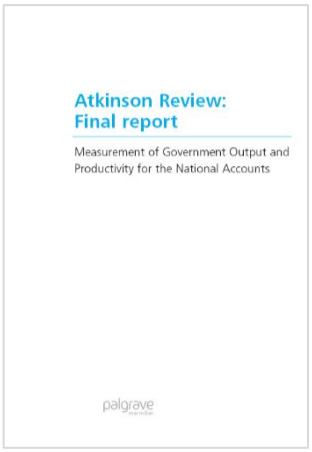
There were a total of **30,390** English-domiciled first-year students starting higher education qualifications or credit bearing modules at The Open University in England in 2015-16[1]. Of this total, **27,980** were engaged in undergraduate studies (at any level), and **22,700**[2] students were undertaking undergraduate degrees specifically**.** While these students started studying at The Open University with varying levels of prior educational attainment, the analysis presented here focuses on the **net graduate premium** and **net Exchequer benefit** associated with the **17,720** students who were in possession of 2 or more GCE 'A' Levels (or equivalent) or 5 or more GCSEs at grades A*-C (or equivalent) as their highest level of qualification upon enrolling with The Open University[3] in 2015-16.

This report provides a summary of our methodological approach (**Section 2**) and of the resulting estimates of the net graduate premium and net Exchequer benefit, and associated return on investment from the perspective of the Exchequer (**Section 3**)[4].

[1] See Higher Education Statistics Agency (HESA), 2017.
[2] Based on HESA information provided by The Open University.
[3] In other words, the analysis is restricted to those individuals in possession of either GCE 'A' Levels or GCSEs as their *highest* qualification, with those individuals with degree level qualifications as their highest level of prior attainment are omitted from the analysis.
[4] Note that full results, and a more detailed description of our methodological approach, are presented in the Annex.

2 Methodological approach

2.1 Valuing the economic contribution of higher education



Atkinson's (2005) report to the Office for National Statistics was tasked with determining the appropriate methodology to be used when assessing the economic impact of a range of public sector activities. Traditionally, to estimate the value associated with **education outcomes**, straightforward *input-output* analysis has been used. This approach simply asserts that the value of inputs into the education system equals the value of outputs associated with educational attainment. However, this approach in no way captures the productivity or growth impacts associated with having a more highly educated workforce, and as such undervalues the productivity benefits associated with higher education. In particular, Atkinson stated that **the economic value of education and training is essentially the value placed on that qualification as determined by the labour market**.

Note that the approach presented here takes a very narrow view of the value of higher education qualification attainment. We ignore any wider benefits associated with the acquisition of higher education qualifications that are not reflected in graduate labour market outcomes (earnings and employment outcomes). For instance, it is clear that there are wider benefits accrued by the **individual** and **society** associated with higher education qualification attainment (i.e. increased life satisfaction, self-esteem and community cohesion); by **employers** (i.e. increased productivity and profitability); and the **Exchequer** (through reduced public service costs (i.e. less reliance on public services and lower public purse costs associated with social protection and healthcare))[5]. Though significant, all of these wider impacts have been omitted from the analysis.

In the following, we detail the methodological approach we used to analyse the labour market returns associated with enhanced qualification attainment and skills acquisition – to **both the individual and the public purse**.

2.2 Defining the returns to higher education qualifications

The fundamental objective of the analysis is to generate the **net graduate premium** to the individual and the **net public purse benefit** associated with part-time undergraduate degree attainment at The Open University, defined as follows:

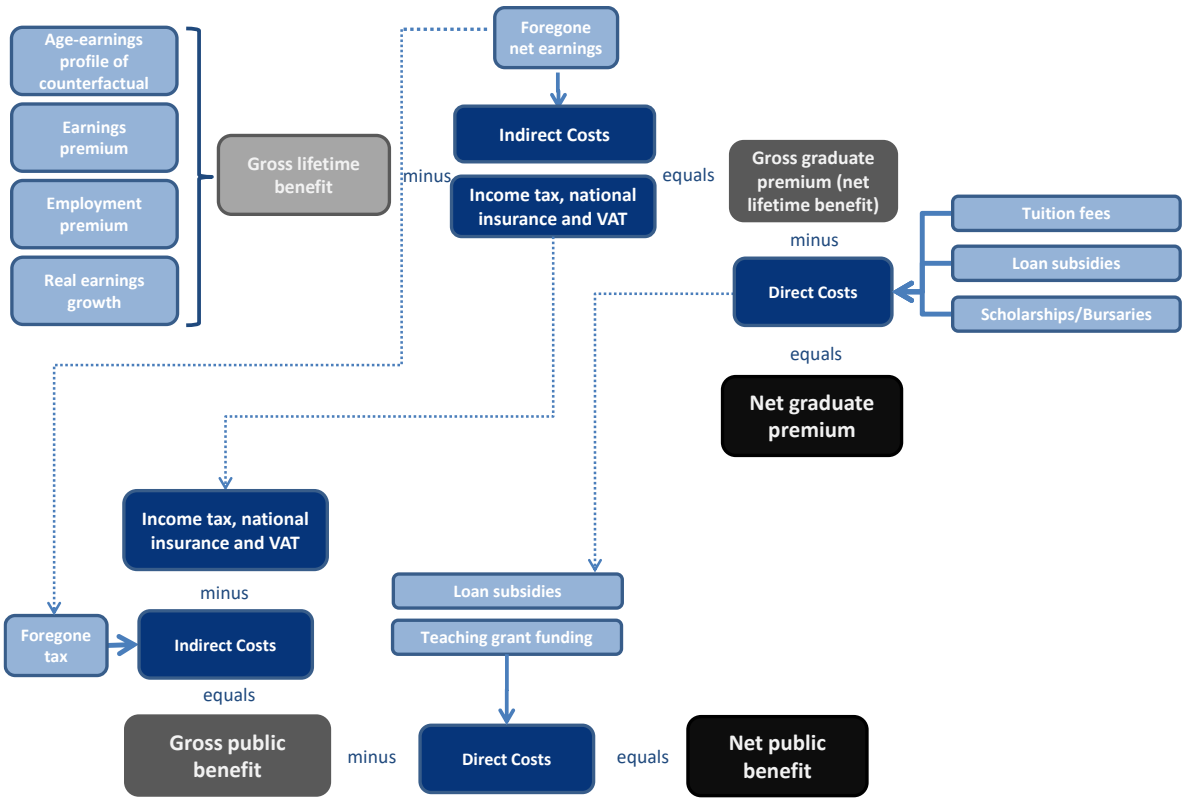
- The ***gross* graduate premium** associated with qualification attainment is defined as the **present value** of **enhanced after-tax earnings** (i.e. after income tax, National Insurance and VAT are removed, and following the deduction of any foregone earnings) relative to an individual in possession of the counterfactual qualification.
- The ***gross* benefit to the public purse** associated with qualification attainment is defined as the **present value** of **enhanced taxation** (i.e. income tax, National Insurance and VAT, following the deduction of the costs of foregone tax earnings) relative to an individual in possession of the counterfactual qualification.

[5] For more information on these wider benefits, see Department for Business, Innovation and Skills (2013).

- The ***net* graduate premium** is defined as the gross graduate premium *minus* the present value of the (direct) costs associated with qualification attainment. Similarly, the ***net* benefit to the public purse** is defined as the gross benefit *minus* the (direct) costs of provision during the period of attainment.

The specific components of the analysis are presented in Figure 1.

Figure 1 Overview of gross and net graduate premium and net Exchequer benefit



Note: We assume that any opportunity costs of foregone earnings associated with further qualification attainment are applicable to full-time students only; hence, for part-time students, we have assumed that these students are able to combine work with their academic studies and as such, do not incur any opportunity costs in the form of foregone earnings.

Source: London Economics' analysis for the Department for Business, Innovation and Skills (2011)

2.3 Counterfactual groups

Throughout the analysis, we consider two different **counterfactual groups** to analyse the returns to part-time undergraduate degrees at The Open University. Specifically, we compare the earnings and employment of individuals in possession of undergraduate degrees to each of these counterfactual groups, to ensure that **we assess the economic benefit associated with the *qualification itself*, rather than the economic returns generated by the specific characteristics of the *individual in possession of the qualification***. This is a common approach in the literature[6], and allows for the removal of other personal, regional or socioeconomic characteristics that might influence *both* the determinants of qualification attainment as well as earnings and employment.

[6] For instance, see London Economics (2017).

For the purpose of this analysis, we compare undergraduate degree holders to a counterfactual group consisting of individuals holding 2 or more GCE 'A' Levels (or equivalent) as their highest qualification. In addition, we also include a separate specification comparing the earnings associated with GCE 'A' Levels to possession of 5 or more GCSEs at grades A* - C (or equivalent). This additional analysis was undertaken to provide an indication of the fact that the academic 'distance travelled' by a significant proportion of Open University students is greater than might be the case compared to those in possession of levels of prior attainment 'traditionally' associated with higher education entry.

To assess the returns to part-time undergraduate degrees for those students from 'non-traditional' educational backgrounds (i.e. compared to 5 or more GCSEs at grades A*-C), the analysis then used a **'stepwise' calculation of additional lifetime earnings**. In particular, to calculate the earnings and employment returns for a student in possession of 5 or more GCSEs (at grades A* - C) as their highest level of prior attainment undertaking an undergraduate degree at The Open University, we *added* the returns associated with achieving 2 or more GCE 'A' Levels (relative to GCSEs) to the returns to undertaking an undergraduate degree (relative to 2 or more 'A' Levels).

2.4 Estimating the returns to part-time undergraduate degrees

2.4.1 Assessing the gross graduate premium

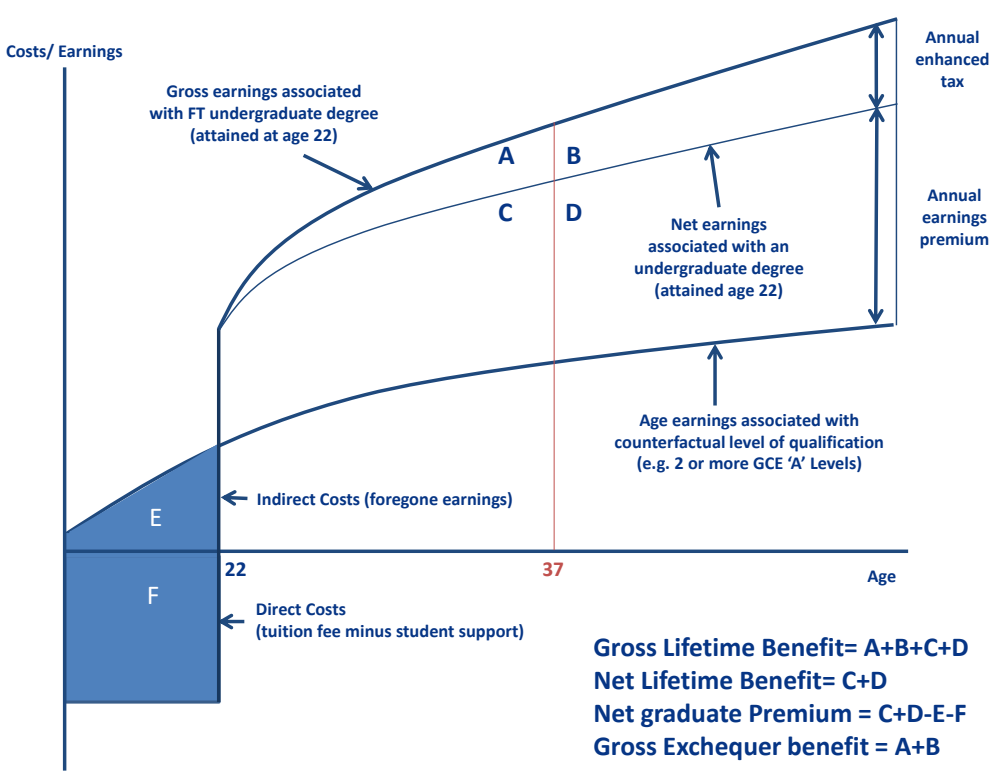
As outlined above, the analysis focuses on estimating the labour market value associated with a particular higher education qualification, rather than simply assessing the labour market outcomes achieved by individuals *in possession* of that higher education qualification. To achieve this, we undertook an **econometric analysis** where the 'treatment' group consists of those individuals in possession of the qualification of interest, and the 'counterfactual' group consists of those individuals with comparable personal and socioeconomic characteristics but with the next highest (i.e. adjacent) level of qualification. This comparison of the earnings and employment outcomes of the treatment group and the counterfactual groups 'strips away' those other personal and socioeconomic characteristics that might affect labour market earnings and employment (such as gender, sector or region of employment), leaving just the labour market gains attributable to the qualification itself. Full details of the econometric approach and subsequent calculation of gross graduate premiums are presented in A2.1 and A2.2, and an illustration of this in relation to full-time undergraduates is presented in Figure 2 (left-hand panel).

Throughout the analysis, the assessment of earnings and employment outcomes associated with part-time undergraduate degree attainment is undertaken *separately* by gender, reflecting the difference in labour market outcomes between men and women in the wider economy. In addition, given the fact that part-time students (on average) undertake and complete higher education qualifications later in life than full-time students, the analysis applies a linear '**decay function**' to the returns associated with part-time qualification attainment, to reflect the shorter period of time in the labour market (see A2.3 and right-hand panel of Figure 2)[7].

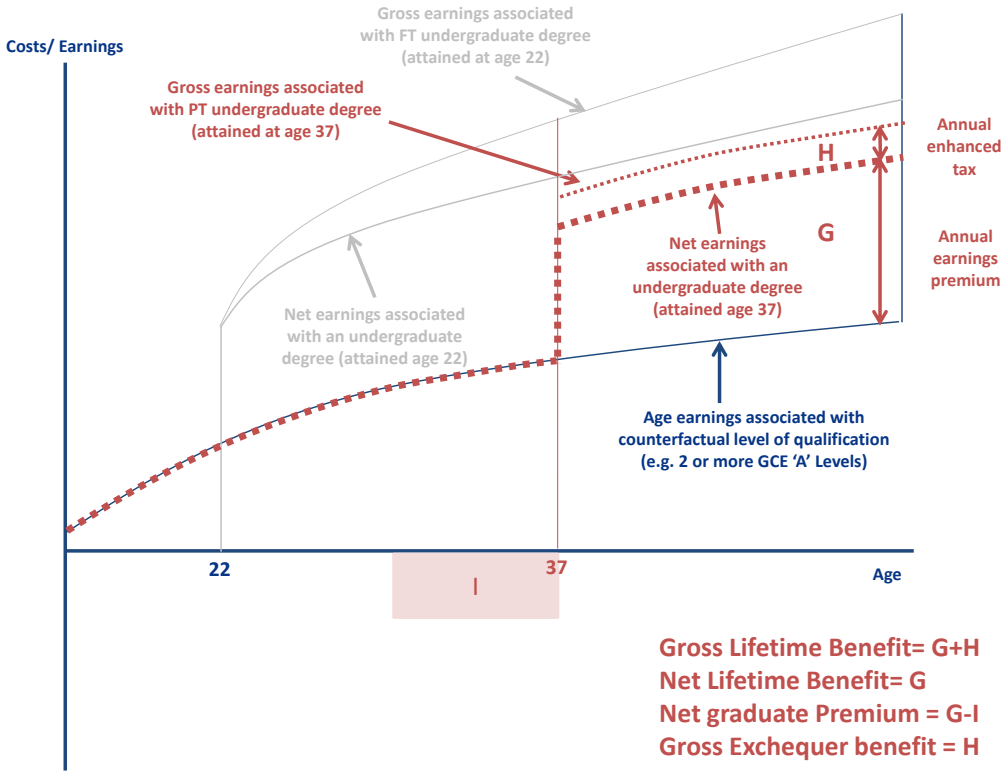
[7] Estimates of the resulting gross graduate premium are presented in A3.2.

Figure 2 Estimating the gross graduate premium for full-time and part-time students

Full-time students



Part-time students



Note: The age-earnings profile associated with a full-time degree is presented in left-hand panel, while the comparable age-earnings profile for a part-time student incorporating an 'age-decay function' is presented in the right-hand panel. We assume that any *opportunity* costs of foregone earnings associated with further qualification attainment are applicable to full-time students only; hence, for part-time students, we have assumed that these students are able to combine work with their academic studies and as such, do not incur any opportunity costs in the form of foregone earnings (i.e. they are assumed to incur only direct costs).

This illustration is based on an analysis of the cohort data for the 2015-16 cohort where the **mean age** of starting a part-time undergraduate degree stands at 31 and requires 6 years to complete (see A3.1 for more information on the cohort's age distribution).

Source: London Economics

In particular, the application of this 'decay function' results in part-time students only achieving a proportion of the comparable full-time graduate premium from the point at which they gain the qualification. This proportion (of the comparable full-time premium) declines with increasing age at qualification completion. In other words, early attainment results in part-time students 'capturing' a greater number of years of the estimated 'full-time' premium, as well as a greater proportion of the full-time premium for those years in the labour market. At the other extreme, the later the attainment of the qualification means that there are fewer years for which any labour market premium is captured, but also that the proportion of the comparable full-time labour market premium declines[8].

2.4.2 Assessing the gross benefits to the public purse

The potential benefits accruing to the Exchequer from the provision of higher education learning are derived from the enhanced taxation receipts that are associated with a higher likelihood of being employed and the enhanced earnings associated with more highly-skilled and productive employees. Based on the analysis of the lifetime earnings and employment benefits associated with undergraduate degree attainment, and combined with administrative information on the relevant taxation rates and bands (from HM Revenue and Customs), we estimated the **present value** of additional income tax, National Insurance and VAT associated with undergraduate degree qualification attainment (by gender and prior attainment)[9].

2.4.3 Assessing the net graduate premium

The differences between the gross and net graduate premium relate to the **direct costs** of acquisition[10]. These direct costs refer to the **proportion of the tuition fee paid by the student**[11] net of the **fee loan support** provided to English-domiciled part-time students by the Student Loans Company (SLC)[12], and minus any **fee waivers** paid by The Open University in England[13] as appropriate. In this respect, the student benefit associated with tuition fee loan support equals the **Resource Accounting and Budgeting Charge** (RAB charge, or interest rate and write-off subsidy), capturing the proportion of the loan that is not repaid[14] [15].

[8] For more information on the assumed 'decay function', please refer to A2.3.
[9] Estimates of the resulting gross Exchequer benefit are presented in A3.2.
[10] Note again that the *indirect* costs associated with qualification attainment, in terms of the foregone earnings during the period of study, are assumed to be applicable to full-time students only, so we assume zero foregone earnings associated with part-time study.
[11] To calculate an average fee per student, we made use of Open University information on the full-time equivalent fee rate per undergraduate degree student studying with The OU in England in the 2015-16 academic year, multiplied by the average study intensity per English-domiciled part-time undergraduate student in the 2015-16 cohort.
[12] The analysis makes use of *average* tuition fee loan paid per student, based on data by the SLC on student support for higher education in England (see Student Loans Company, 2016). Note that it was not possible to distinguish the average loan paid to *English-domiciled* student as compared to *EU-domiciled* students studying in England, due to a lack of granularity in the SLC data, so we use an average across both these domiciles instead.
[13] Average fee waivers per student can be calculated based on information on total fee waiver spending in 2015-16 by The OU in England from the Office for Fair Access (see OFFA, 2017). However, the fee waivers offered by The Open University were not provided to potential students undertaking Level 6 (undergraduate degree level) qualifications, but were focused on students engaged on Access courses (Level 0), and are therefore excluded from his analysis.
[14] We have estimated a RAB charge of **36.1%** associated with tuition fee loans for English-domiciled part-time students undertaking undergraduate degrees in England. This is based on a model of the English HE funding system developed by London Economics, and uses the increased earnings thresholds for loan repayment announced in October 2017 (and compares to a RAB charge estimate of **44.0%** associated with full-time undergraduate degrees for English-domiciled students studying anywhere in the UK, and EU-domiciled students studying in England).
[15] As noted in the footnote 14, the RAB charge associated with part-time undergraduate degrees in England was estimated to be **36.1%** compared to a comparable estimate of **44.0%** for full-time undergraduate degrees. In relation to other undergraduate qualifications, our analysis indicates that the RAB charge associated with undertaking **HNC/HNDs** on a part time (full-time) basis stands at **25.9%** (**46.5%**); with **Foundation Degrees** at **57.5%** (**61.3%**); and '**other' undergraduate qualifications** at **53.0%** (**50.4%**).

2.4.4 Assessing the net public purse benefit

The direct costs to the Exchequer include the **teaching grants paid directly to The Open University in England** by the Higher Education Funding Council for England (HEFCE)[16], and the above-described **student support** in the form of interest rate or write-off **subsidies** associated with part-time tuition fee loans (i.e. the RAB charge).

These direct costs associated with qualification attainment to both students and the Exchequer are calculated from start to completion of a student's learning aim – based on the expected duration of study (**6 years**[17]) of students starting part-time degrees at The Open University in 2015-16. Throughout the analysis, to ensure that the values of the economic benefits and costs are computed in **present value** terms (i.e. in 2015-16 money terms), all benefits and costs occurring at points in the future were discounted using the standard HM Treasury Green Book discount rate[18].

Deducting the respective costs to the student and Exchequer from the estimated *gross* graduate premium and *gross* Exchequer benefit, we arrive at the estimated **net graduate premium** and **net Exchequer benefit** per student.

Despite the RAB charge incurred by the Exchequer generally being lower for part-time students compared to full-time students on a like for like basis, the composition of the full-time and part-time student bodies across the different undergraduate qualifications results in the aggregate RAB charge across *all* undergraduate-level qualifications being very slightly higher for part-time students (**46.8%**) compared to full-time students (**44.6%**) as a whole. In particular, compared to full-time students, a higher proportion of part-time students are engaged in 'other' (sub-degree) undergraduate qualifications, which tend to be associated with a higher RAB charge than undergraduate degrees.

[16] To estimate the level of teaching grant per student, we divided HESA information on the total amount of HEFCE teaching grant paid to The OU in England by the total number of first-year and continuing students enrolled with the university in 2015-16 (excluding any non-EU domiciled students and postgraduate research students; i.e. it is assumed that there is no teaching funding associated with these students).

[17] This was calculated by dividing the average expected study duration for full-time undergraduate degrees (3 years) by the average study intensity amongst English-domiciled students starting part-time undergraduate degrees at The Open University in 2015-16 (49%).

[18] We use a standard real discount rate of **3.5%** (see HM Treasury (2011).

3 Estimates of the returns to OU part-time degrees

3.1 Net graduate premium and Exchequer benefit

Table 1 presents the estimated net graduate premiums and net Exchequer benefits achieved by English-domiciled students starting part-time undergraduate degrees at The Open University in England in 2015-16 (by gender and prior attainment).

Table 1 Net graduate premium and net Exchequer benefit per OU part-time undergraduate degree, by gender and prior attainment

Prior attainment	Net graduate premium		Net Exchequer benefit	
	Men	Women	Men	Women
GCSEs	£93,000	£49,000	£95,000	£43,000
A-levels	£52,000	£34,000	£57,000	£29,000

Note: All estimates are presented in 2015-16 prices, discounted to reflect net present values, and rounded to the nearest £1,000.
[1] i.e. 5 or more GCSEs at grades A* - C [2] i.e. 2 or more GCE 'A' Levels
Source: London Economics' analysis

The analysis indicates that the **net graduate premium** achieved by a representative[19] English-domiciled student in the 2015-16 cohort completing a part-time undergraduate degree at The Open University with **GCE 'A' Levels** as their highest level of prior attainment is **£52,000** in today's money terms per male graduate and **£34,000** per female graduate[20]. Furthermore, reflecting the larger academic 'distance' travelled, when estimating the net lifetime benefit achieved by a part-time undergraduate degree holder in possession of **5 or more GCSEs** as their highest level of attainment, the net graduate premium for men stands at approximately **£93,000** compared to **£49,000** for women[21].

The **net Exchequer benefits** generated by individuals in the 2015-16 Open University cohort are of roughly comparable size as the net benefits achieved by graduates themselves. Compared to individuals in possession of **GCE 'A' Levels** as their highest level of prior attainment, the net Exchequer benefit per representative English-domiciled part-time undergraduate degree student at The Open University stands at **£57,000** for male and **£29,000** for female graduates. The respective

[19] The analysis is based on an average age at graduation of 37 for English-domiciled part-time students starting undergraduate degrees The OU in England in 2015-16.
[20] It is important to note that the economic benefits associated with higher education qualification - expressed in monetary terms - are generally lower for women than men - predominantly as a result of the increased likelihood of spending time out of the active labour force. However, as with the majority of the wider economic literature, it is often the case that the *returns* associated with higher education qualification attainment - expressed as either the percentage increase in hourly earnings or enhanced probability of employment - are greater for women than for men.
[21] Presented in more detail in A3.5, in a recent analysis undertaken to estimate the economic impact associated with the Russell Group of universities (also associated with the 2015-16 cohort of students), the London Economics (2017) analysis illustrated that the net graduate premium achieved by a representative male undertaking an undergraduate degree on a **full-time basis** was approximately **£107,000**, while the return posted by a representative female student undertaking an undergraduate degree was approximately **£71,000** (both compared to GCE 'A' Levels as their highest qualification). Note that this analysis for Russell Group universities adjusts the earnings and employment returns to reflect the subject of study undertaken and in particular, the higher than average incidence of medicine, dentistry and STEM qualifications on offer. The comparable estimates of the net Exchequer benefit were **£118,000** for men and **£66,000** for women.
In addition, the analysis also considered the returns posted by part-time students attending Russell Group universities, and illustrated that the net graduate premium achieved by representative male and female English-domiciled undergraduate students was **£70,000** and **£23,000** respectively, while the next Exchequer benefits were estimated to be **£88,000** and **£29,000** respectively.

net Exchequer benefit relative to possession of **5 or more GCSEs** stand at **£95,000** per male and **£43,000** per female graduate, respectively.

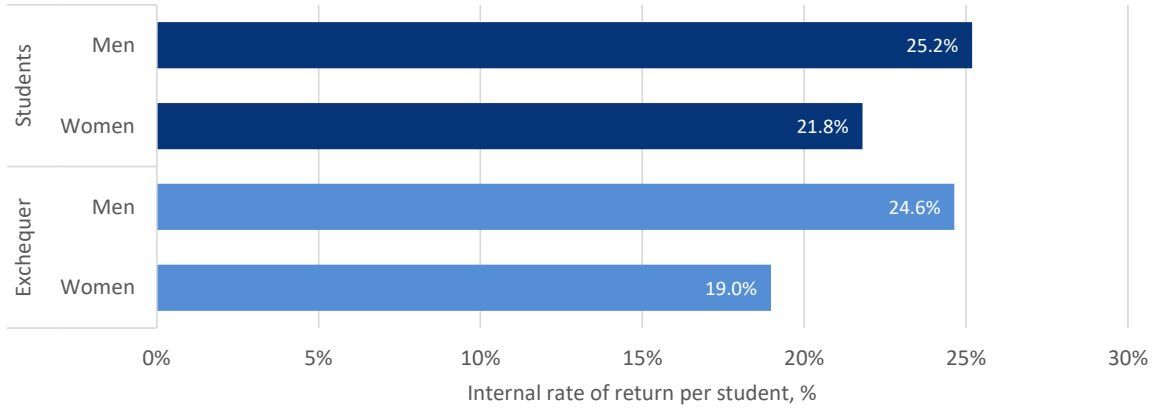
The analysis illustrates that there are **substantial lifetime benefits to graduates and the Exchequer associated with Open University part-time degrees**.

3.2 Internal rate of return

In addition to measuring the returns in monetary net benefits, it is possible to estimate the **internal rate of return (IRR)**[22] to students and the Exchequer. Essentially, from an investment perspective, the internal rate of return is a means of comparing alternative investment decisions[23].

In relation to the return to students/graduates, the analysis indicates that the IRR accrued by a representative part-time English-domiciled undergraduate degree student in the 2015-16 Open University cohort (relative to possessing GCE 'A' Levels) stands at **25.2%** for a male graduate and **21.8%** for a female graduate (see Figure 3). The comparable IRR to the **public purse** was estimated at **24.6%** and **19.0%** for male and female graduates, respectively. In other words, in deciding whether or not to undertake a part-time undergraduate degree at The Open University (at the age of 31[24]), the Government would need to achieve a return of more than **24.6%** from an alternative investment to make that alternative investment more worthwhile than funding the Open University degree.

Figure 3 Internal rate of return to students and the Exchequer associated with OU part-time undergraduate degrees (relative to GCE 'A' Levels) for English-domiciled students



Source: London Economics' analysis

Putting these estimates into wider context, compared to the yield associated with a 30 year Treasury Gilt of **1.924%**[25], the estimated internal rates of return highlight the **very substantial returns** to both students and the public purse associated with part-time degree attainment at The Open University.

[22] Technically, the internal rate of return is essentially the discount rate at which the present value of the costs equals the present value of the benefits

[23] In Annex 3, we also provide information on the benefit to cost ratio to the Exchequer associated with the funding of undergraduate degrees undertaken on a part-time basis (see Table 6 in A3.4).

[24] This corresponds to the average age amongst English students starting part-time undergraduate degrees at The Open University in 2015-16.

[25] Generic 30 year Gilt yield as of 31st January 2018 (GUKG30:IND) (Bloomberg).

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Annex 1 References

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Annex 2 Methodological Annex

A2.1 Estimating the wage and employment returns to undergraduate degrees

Analysis of wage returns

To assess the impact of qualification attainment on earnings, using information from pooled Quarterly Labour Force Surveys, we estimated a standard **Ordinary Least Squares** linear regression model, where the dependent variable is the natural logarithm of hourly earnings and the independent variables include the full range of qualifications held alongside a range of personal, regional and job-related characteristics that might be expected to influence earnings. In this model specification, we included individuals who were employed on either a full-time or a part-time basis. This approach has been used widely in the academic literature. The basic specification of the model was as follows:

$$\ln(\omega_i) = \alpha + \beta' X_i + \varepsilon_i \qquad \text{for } i = 1 \text{ to n}$$

where $ln(\omega_i)$ represents the natural logarithm of hourly earnings, ε_i represents an error term, and X_i provides the independent variables included in the analysis as follows:

- Age and age-squared;
- Ethnic origin;
- Region of usual residence;
- Highest qualification held;
- Marital Status;
- Number of dependent children under the age of 16;
- Full-time/part-time employment;
- Temporary or permanent contract;
- Public or private sector employment;
- Workplace size; and
- Yearly Dummies.

Using the above specification, we estimated earnings returns in aggregate and **for men and women separately**. Further, to analyse the benefits associated with different education qualifications (i.e. undergraduate degrees *or* 2 or more GCE 'A' Levels) over the lifetime for individuals holding these qualifications, the regressions were estimated separately across **a range of specific age bands** for the working age population.

Note that the analysis of earnings premiums was undertaken at a national (UK-wide) level. However, to adjust for domicile and location of study, these UK-wide earnings premiums were then combined with the relevant differential direct costs facing the individual and/or the Exchequer for English part-time undergraduate students studying in England.

To estimate the impact of higher education qualifications on labour market outcomes using this methodology, we used information from **pooled Quarterly UK Labour Force Surveys between 2004 and 2016**.

Analysis of employment returns

We adopted a **probit model** to estimate the likelihood of individuals in possession of different qualifications being in employment or otherwise. The basic specification defines an individual's labour market outcome to be either in employment (working for payment or profit for more than 1 hour in the reference week (using the standard International Labour Organisation definition)) or not in employment (being either unemployed or economically inactive). The specification of the model was as follows:

$$probit(EMPNOT_i) = \alpha + \gamma' Z_i + \varepsilon_i$$

The dependent variable adopted represents the binary variable *EMPNOT*, which is coded 1 if the individual is in employment and 0 otherwise. We specified the model to contain a constant term as well as a number of standard independent variables including the qualifications held by an individual (represented by Z_i in the above equation) as follows:

- Gender;
- Age;
- Age squared;
- Ethnic origin;
- Region of usual residence;
- Highest qualification held;
- Marital Status;
- Number of dependent children under the age of 16; and
- Yearly Dummies.

Again, ε_i represents an error term. Similar to the methodology for estimating earnings returns, the described probit model was estimated in aggregate and separately for men and women, and split into different **age-bands**. Further, and again similar to the analysis of earnings returns, employment returns were estimated at the national (i.e. UK-wide) level.

The resulting estimates of marginal wage and employment returns to undergraduate degrees (relative to 2 or more GCE 'A' Levels) and to 2 or more GCE 'A' Levels (relative to 5 or more GCSEs at grades A* - C) are presented in Table 2.

Table 2 Marginal earnings and employment returns to education qualifications used for analysis of 2015-16 cohort

Qualification level	Male										Female									
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-64	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-64
Earnings returns (percentages)																				
2 or more A-levels[1]	9.6%	4.3%	11.1%	18.5%	24.5%	17.7%	23.0%	15.6%	15.4%	13.2%	9.6%	3.3%	10.2%	12.5%	17.8%	17.9%	13.3%	11.3%	10.5%	10.0%
UG Degree[2]		12.5%	16.6%	22.6%	21.0%	24.7%	19.8%	25.4%	24.2%	25.9%		12.0%	19.2%	27.5%	31.3%	26.7%	30.5%	30.2%	26.5%	21.2%
Employment returns (percentage points)																				
2 or more A-levels[1]		-16.9%	2.0%		1.9%		2.0%				2.3%	-10.3%					3.1%	2.9%		
UG Degree[2]		15.1%	3.1%	4.2%	3.4%	2.1%	2.6%	4.1%	3.2%		16.4%	16.8%	6.1%	7.6%	8.6%	5.9%	5.5%	3.1%	3.8%	

Note: Marginal earnings returns have been exponentiated to reflect percentage wage returns. In cases where the estimated coefficients are not statistically significantly different from zero (at the 10% level), the coefficient is assumed to be zero; these are displayed as gaps in the table.

[1] Returns to holding 2 or more GCE 'A' levels compared to 5 or more GCSEs at A*-C;

[2] Returns to undergraduate degrees returns are estimated relative to individuals holding 2 or more GCE 'A' levels as their highest qualification.

Source: London Economics' analysis of Labour Force Survey 2004-2016

A2.2 Estimating the gross graduate premium and gross public benefit

The gross graduate premium associated with qualification attainment is defined as the **present value** of **enhanced post-tax earnings** (i.e. after income tax, National Insurance and VAT are removed[26]) relative to an individual in possession of the counterfactual qualification. To estimate the gross graduate premium, it is necessary to extend the econometric analysis (presented in A2.1) by undertaking the following elements of analysis (separately by gender):

1. We estimated the employment-adjusted **annual earnings** achieved by individuals in the counterfactual groups (i.e. 2 or more GCE 'A' Levels (or equivalent), or 5 or more GCSEs at grades A* - C (or equivalent)).
2. We inflated these baseline or counterfactual earnings using the above-presented earnings premiums and employment probabilities, adjusted to reflect late attainment (as outlined in section A2.3), to produce **annual age-earnings** profiles associated with the possession of undergraduate degrees[27].
3. We adjusted these age-earnings profiles to account for the fact that earnings would be expected to increase in real terms over time, at an assumed rate of **1.3%** per annum (based on the long-term real earnings growth rate estimated by the Office for Budget Responsibility (2017)).
4. Based on the earnings profiles generated by undergraduate degree holders, and income tax and National Insurance rates and allowances for the relevant academic year[28], we computed the future stream of net earnings (i.e. post-tax)[29].
5. We calculated the **discounted** stream of additional (employment-adjusted) future earnings compared to the relevant counterfactual group (using a standard real discount rate of **3.5%** as presented in HM Treasury Green Book (HM Treasury, 2011)), to generate a present value figure. We thus arrive at the **gross graduate premium**.
6. The **discounted** stream of enhanced taxation revenues derived in element 4 provides an estimate of the **gross public benefit** associated with undergraduate degree attainment at The Open University.

Note again that the analysis of gross graduate premiums and public purse benefits was undertaken at a **national** (UK-wide) level, i.e. on an aggregated level across individuals residing in the different Home Nations. To adjust for domicile and location of study, these UK-wide premiums were then combined with the relevant student support costs (as well as teaching grant costs) facing the individual and/or the Exchequer for English-domiciled students undertaking part-time undergraduate degrees in England.

A2.3 Age-decay function

Many of the economic analyses (e.g. Walker and Zhu (2013)) considering the lifetime benefits associated with higher education qualifications to date have focused on the returns associated with the 'traditional path' of higher education qualification attainment – namely progression directly

[26] For full-time students, this would also involve the deduction of foregone earnings during study; again, for part-time students, we have assumed that these students are able to combine work with their academic studies and as such, do not incur any opportunity costs in the form of foregone earnings.

[27] As well as individuals in possession of 2 or more GCE 'A' Levels (estimated to take account of the fact that the academic 'distance travelled' by a significant proportion of Open University students is greater than might be the case compared to those in possession of levels of prior attainment 'traditionally' associated with higher education entry).

[28] i.e. 2015-16. Note that the analysis assumes fiscal neutrality, i.e. it is asserted that the earnings tax and National Insurance income bands grow at the same rate of real annual earnings growth of **1.3%**.

[29] The tax adjustment also takes account of increased VAT revenues for HMG, by assuming that individuals spend **69%** of their annual income consuming goods and services within the economy (i.e. assuming a 69% propensity to consume), and a VAT rate of **20%**.

from secondary level education and completion of a three- or four-year undergraduate degree from the age of 19 onwards (completing by the age of 21 or 22). Importantly, these analyses make the implicit assumption that any and all of the estimated earnings and/or employment benefit achieved accrues to the individual.

However, the labour market outcomes associated with the attainment of higher education qualifications on a part-time basis are fundamentally different from those achieved by full-time students. In particular, part-time students typically undertake higher education qualifications several years later than the 'standard' full-time undergraduate; generally undertake their studies over an extended period of time; and often combine their studies with full-time employment. For example, the average age at enrolment amongst students starting part-time undergraduate degrees at The Open University in the 2015/16 academic year was **31**[30]**.** Combined with an average study duration of **6 years**, this shows that OU students typically complete their qualification much later in life (at the age of **37**) than typical full-time undergraduate degree students (completing by the age of 21 or 22).

Given these characteristics, significant adjustments to the methodology need to be made when estimating the returns to part-time education attainment. The key change relates to the introduction of an **'age-decay' function**. This approach assumes that possession of an undergraduate degree is associated with a certain earnings or employment premium, and that this entire labour market benefit accrues to the individual *if* the qualification is attained before the age of 25.

However, as the age of attainment increases, it is expected that a declining proportion of the potential value of the estimated earnings and employment benefit accrues to the individual[31]. This calibration implies that those individuals completing qualifications at a relatively older age will see relatively low earnings and employment benefits associated with higher education qualification attainment (and perhaps reflect potentially different motivations amongst this group of learners). In contrast, those individuals attaining qualifications earlier in their working life will see a greater economic benefit (potentially reflecting the investment nature of qualification acquisition).

Table 3 presents the assumed age-decay adjustment factor which we apply to the marginal earnings and employment returns to part-time students undertaking undergraduate degrees at The Open University. To interpret the information, we have assumed that a (hypothetical) student undertaking an undergraduate degree on a full-time basis would achieve the full earnings and employment premium indicated from the econometric analysis (for their entire working life). However, for a part-time male student undertaking a degree at The OU, we assume that because of the late attainment (at age **37**), these students recoup only **63%** of the corresponding earnings and employment premiums *from* the age of attainment (with no returns achieved before qualification attainment).

Table 3 Assumed age decay adjustment factors for OU students undertaking part-time undergraduate degrees

Age at graduation	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
Adjustment factor	100%	100%	88%	75%	63%	50%	38%	25%	13%	0%

Source: London Economics' analysis based on HESA data

[30] For more information on the distribution of the 2015-16 Open University cohort by age at enrolment, please refer to A3.1.

[31] Callender et al. (2011) suggest that the evidence points to decreasing employment returns with age at qualification: older graduates are less likely to be employed than younger graduates three and a half years after graduation; however, there are no differences in the likelihood of graduates undertaking part- and full-time study being employed according to their age or motivations to study.

Annex 3 Supplementary information

A3.1 Age distribution

Figure 4 presents information on the distribution of English-domiciled students starting part-time undergraduate degrees at The Open University in 2015-16 by **age at enrolment** (including the mean and median age at enrolment). While the average age at enrolment among individuals in the cohort stands at approximately 31 years, the median stands at 28 years, indicating that the distribution is slightly skewed to the right (in other words, 'bunched up' to the left (younger ages) with a long 'tail' stretching to the right (older ages)).

A3.2 Gross graduate premium and Exchequer benefit

Table 4 presents the estimated **gross graduate premiums** and **gross Exchequer benefits** achieved by English-domiciled students starting part-time undergraduate degrees at The Open University in England in 2015-16 (by gender and prior attainment).

Table 4 Gross graduate premium and gross Exchequer benefit per OU part-time undergraduate degree, by gender and prior attainment

Prior attainment	Gross graduate premium		Gross Exchequer benefit	
	Men	Women	Men	Women
GCSEs	£102,000	£58,000	£106,000	£53,000
A-levels	£61,000	£43,000	£67,000	£39,000

Note: All estimates are presented in 2015-16 prices, discounted to reflect net present values, and rounded to the nearest £1,000.
[1] i.e. 5 or more GCSEs at grades A* - C [2] i.e. 2 or more GCE 'A' Levels
Source: London Economics' analysis

A3.3 Undiscounted gross graduate premium and Exchequer benefit

Table 5 presents the undiscounted **gross graduate premiums** and **gross Exchequer benefits** achieved by English-domiciled students starting part-time undergraduate degrees at The Open University in England in 2015-16 (by gender and prior attainment). Note that the results are presented *without* being discounted (i.e. a zero discount rate rather than a discount rate of 3.5% adopted throughout the rest of the analysis)

Table 5 Gross graduate premium and gross Exchequer benefit per OU part-time undergraduate degree, by gender and prior attainment

Prior attainment	Gross graduate premium		Gross Exchequer benefit	
	Men	Women	Men	Women
GCSEs	£186,000	£103,000	£191,000	£93,000
A-levels	£115,000	£77,000	£123,000	£70,000

Note: All estimates are presented in 2015-16 prices, undiscounted, and rounded to the nearest £1,000.
[1] i.e. 5 or more GCSEs at grades A* - C [2] i.e. 2 or more GCE 'A' Levels
Source: London Economics' analysis

A3.4 Benefit to cost ratios and public return on investment

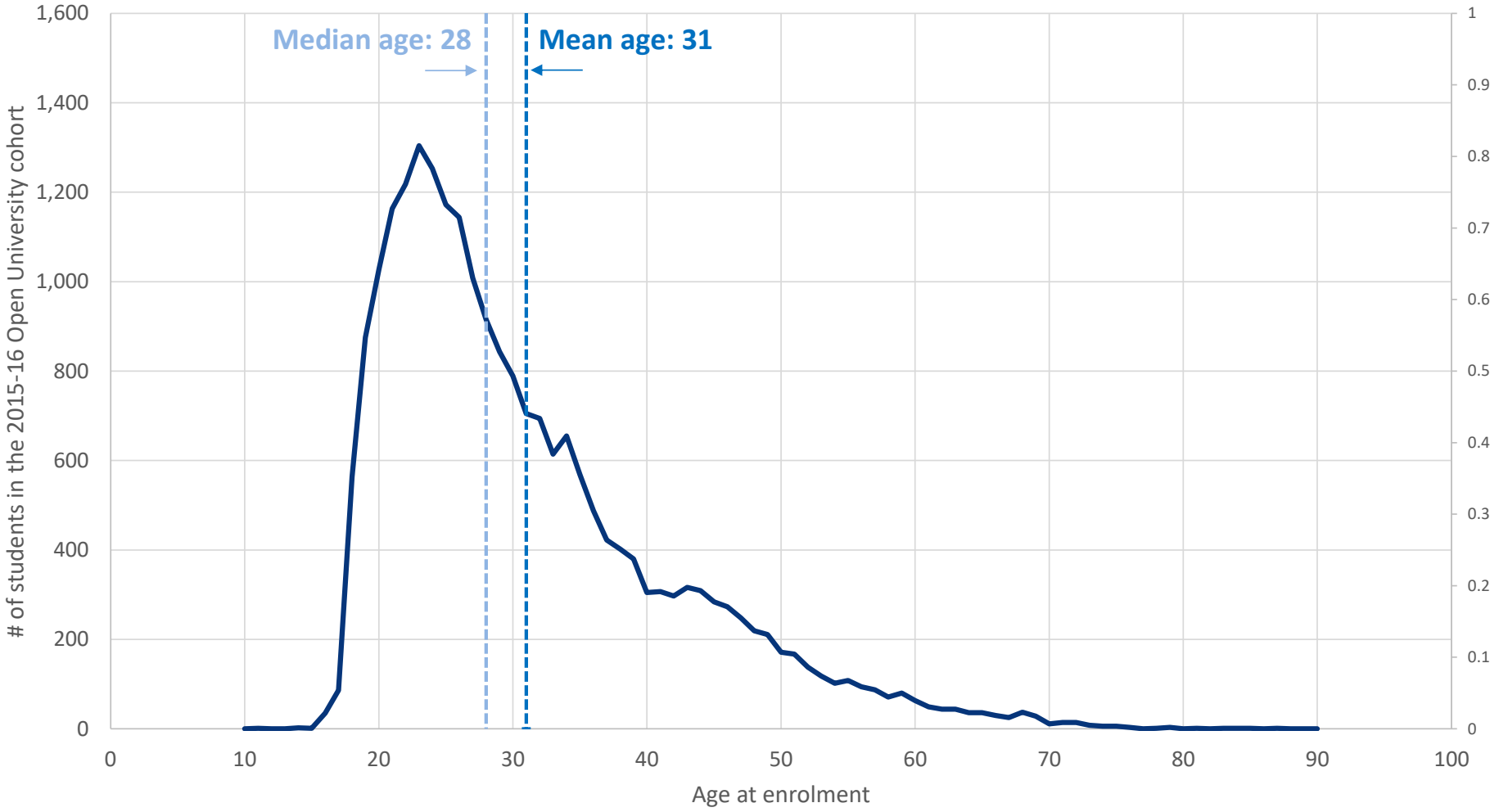
As an alternative means of presenting the return on investment, Table 6 presents estimates of the **benefit to cost ratios** associated with part-time English-domiciled undergraduate degree students in the 2015-16 Open University cohort. These were calculated by dividing the *gross* Exchequer benefit per student (in present value terms) by the Exchequer cost per student (again in present value terms). The analysis indicates that the benefit to cost ratio achieved by the Exchequer associated with the funding of a part-time undergraduate degree at the Open University stands at **7** for the representative male student and **4** for a representative female student. For those students whose highest level of prior attainment was equivalent to 5 or more GCSEs at grades A*-C, the benefit to cost ratios stand at **10** and **5** for men and women respectively.

Table 6 Public benefit to cost ratio per OU part-time undergraduate degree, by gender and prior attainment

Prior attainment	Public benefit to cost ratio	
	Men	Women
GCSEs	10	5
A-levels	7	4

Note: The estimates are calculated by dividing the gross public purse benefit by the Exchequer cost associated with part-time undergraduate degree attainment.
[1] i.e. 5 or more GCSEs at grades A* - C [2] i.e. 2 or more GCE 'A' Levels
Source: London Economics' analysis

Figure 4 Distribution of English-domiciled students starting part-time undergraduate degrees at The Open University in 2015-16 by age at enrolment



Source: London Economics' analysis of HESA data provided by The Open University

A3.5 Net graduate premium and Exchequer benefit per full-time undergraduate student

To provide a **comparison between the returns to part-time undergraduate degrees and typical full-time undergraduate degrees**, Table 7 presents our recent estimates of the net graduate premium and net Exchequer benefit per student starting a full-time undergraduate degree student at Russell Group universities in 2015-16 (relative to individuals in possession of 2 or more GCE 'A' Levels as their highest level of qualification) (see London Economics, 2017).

It should be noted the estimates associated with Russell Group degrees:

- Relate to **English-domiciled students** studying at Russell Group institutions **in *any* of the Home Nations** (though 20 of the 24 Russell Group institutions are located in England);
- Are based on an average age at enrolment of **19** and a **3-year study duration** (for full-time degrees); and
- Included an adjustment for the specific **subject mix** of students attending Russell Group universities specifically – so may not be representative of all UK higher education institutions.

Further, our estimates for OU part-time degrees have been adjusted for the increased earnings thresholds for student loan repayment announced in October 2017, with a resulting estimated RAB charge of **36.1%** associated with tuition fee loans for English-domiciled part-time students undertaking undergraduate degrees in England. However, the estimates for the Russell Group were based on the previous system – i.e. calculated using the previous lower earnings thresholds – with an associated lower RAB charge (as the lower thresholds implied that graduates were expected to repay a larger share of their loan). Under the lower thresholds, the corresponding RAB charge associated with fee loans for English-domiciled part-time students undertaking undergraduate degrees in England was estimated at **20.8%**. To provide a more like-for-like comparison, in addition to our central estimates of the net graduate premium and net Exchequer benefit to OU part-time degrees (assuming a **36.1%** RAB charge), Table 7 further presents revised estimates assuming the previous lower repayment thresholds (with a **20.8%** RAB charge).

Table 7 Net graduate premium and net Exchequer benefit per OU part-time and Russell Group full-time and part-time undergraduate degree, by gender and prior attainment

Prior attainment	Net graduate premium		Net Exchequer benefit	
	Men	Women	Men	Women
2015-16 Russell Group cohort (English-domiciled full-time UG degrees)				
A-levels[2]	£107,000	£71,000	£118,000	£66,000
2015-16 Russell Group cohort (English-domiciled part-time UG degrees)				
A-levels[2]	£70,000	£23,000	£88,000	£29,000
2015-16 OU cohort (part-time UG degrees) – old loan repayment thresholds				
GCSEs[1]	£91,000	£47,000	£97,000	£45,000
A-levels[2]	£50,000	£32,000	£59,000	£31,000
2015-16 OU cohort (part-time UG degrees) – new loan repayment thresholds				
GCSEs[1]	£93,000	£49,000	£95,000	£43,000
A-levels[2]	£52,000	£34,000	£57,000	£29,000

Note: All estimates are presented in 2015-16 prices, discounted to reflect net present values, and rounded to the nearest £1,000.
[1] i.e. 5 or more GCSEs at grades A* - C [2] i.e. 2 or more GCE 'A' Levels ***Source: London Economics' analysis***

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