The impact of student loan repayments on graduate taxes

Final Report for the University and College Union

London Economics

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Executive Summary

Background and scope of analysis

London Economics were commissioned by the University and College Union to assess the lifetime costs to higher education students associated with receiving and repaying student loans provided by Student Finance England. In addition to assessing the loan balance on graduation and repayments made, the analysis estimates the **effective average and marginal tax rates** associated with tuition fee and maintenance loan repayments in the following typical graduate professions:

- **School teachers** (in secondary, primary, nursery and special needs education);
- **Social workers**;
- **Nurses and midwives**;
- **Engineering professionals** (e.g. civil or mechanical engineers);
- **IT professionals** (e.g. programmers and software developers);
- **Legal professionals** (e.g. barristers and solicitors);
- **Finance professionals** (e.g. finance and investment analysts, brokers); and
- **Medical professionals** (i.e. medical practitioners).

In terms of the cohort of students considered, the analysis focuses on **individuals from England who started full-time undergraduate degrees at English Higher Education Institutions and Further Education Colleges in the 2016/17 academic year**, based on the English student support system's tuition fee loan and maintenance loan rates available to new students in 2016/17.

Key findings

- Student loans impose a significant additional 'tax burden' upon graduates in their mid-life years, with those with mid-range earnings negatively impacted to the greatest extent.
- Over their working lives, the additional tax burden imposed by student loans varies significantly between occupations and by gender.
- The effective marginal tax rates for graduates (i.e. the proportion of every £1 of *additional* earnings paid in income tax, National Insurance or student loan repayments) are prohibitive compared to both graduates without loans, and non-graduates. Graduates in some occupations face prospective tax rates up to **51%** for an extended period of time, compared to **42%** for graduates without loans in the same profession (and **32%** for a representative non-graduate with Level 3 qualifications).
- Certain occupations are disproportionately impacted by student loan repayments - specifically because of the **duration** of repayment - and the resulting accumulation of interest on the outstanding loan balance. For example, despite borrowing **£44,000** during their studies and paying **9%** repayments on earnings over £21,000 for 30 years (and making **£46,000** in repayments), male graduates in social work professions have **£16,000** in loans outstanding at the end of the repayment period.

Detailed findings

The analysis estimates that for those individuals in receipt of three years of tuition fee and maintenance support, the average level of debt at graduation (including accumulated interest)

stands at approximately **£44,000** in real present value terms[1]. Because of the extended duration of study, this increases to between **£59,000** and **£60,000** for those entering the teaching and medical professions. Based on their expected earnings, male teachers, social workers or nurses will not be expected to repay the entire loan balance by the end of the 30-year repayment term, with between **£3,000** and **£38,000** outstanding at the point of write-off (again in real present value terms). In the case of **teachers**[2], this outcome arises from the fact that, in spite of making **£54,000** in repayments, based on the level of post-graduation earnings and the timing of repayments, these individuals spend 30 years paying accumulated interest on their loans. This compares to men working in **financial service occupations**, who make a similar level of repayment (**£55,000**), but make higher repayments immediately upon graduation, and are thus expected to be able to pay off their entire debt by the age of **38**.

A similar phenomenon can be seem amongst females in occupations with above-average earnings, such as women in **IT professions**, who make approximately **£56,000** in loan and accumulated interest repayments. Despite a **£10,000** outstanding balance existing at the end of the repayment period, this still represents a greater level of repayment (in real present value terms) than men in finance or legal occupations (**£55,000**).

In other words, in terms of loan repayments (in real present value terms), there appear to be incentives to pay off student loans early – or not at all – but being positioned in the middle of the earnings distribution appears to offer the worst possible financial outcome from the individual's perspective.

Income-contingent loan repayments: progressive or regressive?

Despite the widely-cited premise that the income-contingent loan repayment system is **progressive**, and it is when all graduates are making repayments **at a particular point in time**, the analysis indicates that there are certain occupations that are disproportionately negatively impacted by student loan repayments - specifically because of the **duration** of repayment - and the resulting accumulation of interest on the outstanding loan balance.

For example, for as long as it takes men in legal professions to repay their entire student loan and accumulated interest (**16** years), the **average** level of student loan repayments as a proportion of income stands at between **4%** and **7%**. For teachers, whose earnings are lower, the average contribution ranges between **2%** and **5%** in this period. However, from the 17th to the 30th year of repayment, while those in legal occupations have no further repayments to make, teachers continue to pay approximately **5%** of their total earnings in loan repayments. As Table 1 illustrates, men in public sector professions – with median earnings (or slightly below) – face a greater loan repayment burden over their working lives than higher paid individuals, who repay their loans early. Compared to men in financial or legal professions, who pay an average of **2.0%**-**2.1%** of gross earnings towards the costs of repaying their student loans, men in social work, teaching and nursing occupations pay between **3.2%** and **3.6%** over their working lives.

Similarly, for women in relatively high-paying occupations (legal, financial and medical professions), the average level of student loan repayment as a proportion of earnings across the working life was estimated to be between **3.4%** and **4.0%**. This again suggests that individuals in the middle of the earnings distribution are disproportionately impacted by student loan repayments over the course of their working lives.

[1] – i.e. in constant 2017 prices, and discounted to reflect net present values.
[2] Males in teaching profession have earnings between the 4th and 5th deciles of the overall earnings profile, while males in financial sector occupations have earnings between the 8th and 9th deciles.

Marginal taxation rates

Since graduate loan repayments are payroll deductions, we have defined the (effective) **marginal tax** rate as the proportion of every £1 of *additional* earnings paid in income tax, National Insurance or student loan repayments. Compared to non-graduates with Level 3 qualifications (as highest), who pay a marginal tax rate of **32%** on average, graduates (irrespective of whether they have loans) will generally face higher marginal tax rates as a result of the earnings and employment boost associated with their higher education qualification attainment. For men, for all occupations with the exception of teaching, the marginal rate of taxation reaches **51%** of earnings, but - more importantly - this high marginal tax rate is paid for up to **17** years in the case of medical professions, **15** years in the case of engineers and **12** years in the case of nurses.

Reflecting generally lower graduate earnings for women, the highest marginal rate of taxation paid by female social workers, teachers and nurses was estimated to be **41%**; however, the tax burden associated with loan repayment (equating to 9% of earnings in excess of £21,000) is expected to last for at least **30** years. For women working in legal, financial or medical professions, graduates face a marginal taxation rate of up to **51%**, which lasts for between **16** and **22** years.

Policy implications

The 2012 tuition fee reforms are controversial, and their impact on whether students attend university is contested. However, notwithstanding this, our analysis shows that the reforms may have perverse consequences for many of those who do still choose to go to university.

For most graduates, their middle years of working life are likely to be characterised by significant deductions from their pay packet – reaching up to **4%** of average earnings over their entire working lives. This will clearly lead to a reduction in their disposable income at a time when many graduates will be looking to start a family and/or purchase a house. This 'middle age squeeze' on graduates' incomes is a largely unforeseen consequence of the 2012 reforms.

In addition to a substantial additional average tax burden, graduates in middle age will also face very high marginal tax rates - far higher than those of either graduates without loan obligations – or non-graduates. These high marginal tax rates may act as a disincentive to supply additional labour or return to work after periods out of the labour market.

The analysis finds that the 2012 reforms may have created particular problems for those with average earnings profiles. For men, these graduates will typically include those who have chosen public service careers, such as nursing, teaching and social work. The impact of student loan repayments for the entire duration of these key workers' working lives may result in prospective applicants being less likely to choose these careers over other higher earning jobs. In effect, the current shortages of qualified staff in some of these sectors is likely to be exacerbated.

The difference in the treatment of men and women by the 2012 reforms is substantial. We find that the typical earnings profile of a woman - even when compared to a man in a similar job - means they tend to pay more and for a longer period of time, in particular through their middle working years.

Overall our analysis leads to some challenging questions for policy makers. Supporting the widespread academic research demonstrating that going to university generates a substantial boost in the labour market, our analysis bears this out in terms of lifetime earnings. However the current student loan system acts as a significant drag on the earnings (and hence disposable income) of graduates in their middle years.

Table 1 Summary of findings - Men

	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.	No degree
Study duration	3	4	3	3	3	3	3	5	-
Outstanding loan balance at graduation (PV)	£44,000	£59,000	£44,000	£44,000	£44,000	£44,000	£44,000	£60,000	-
Total repayments (PV)	£46,000	£54,000	£59,000	£60,000	£59,000	£55,000	£55,000	£79,000	-
Outstanding loan balance at end of repayment period (PV)	£16,000	£38,000	£3,000	£0	£0	£0	£0	£0	-
Age of repayment	Never	Never	Never	49	45	39	38	44	-
Loan repayment as a % of income	3.2%	3.6%	3.6%	3.0%	2.7%	2.1%	2.0%	2.5%	-
Highest marginal tax rate (with/ without loans)	51%/42%	41%/32%	51%/42%	51%/42%	51%/42%	51%/42%	51%/42%	51%/42%	32%
Age at which this first applies	46	24	41	33	29	26	25	26	22
Duration for which this applies (years)	6	30	12	15	15	12	13	17	43

Note: All monetary values are presented in **real terms**, and discounted to **present values**.
Duration: Period in years for which highest marginal tax rate applies.
No Degree: Individual in possession of Level 3 qualifications (academic or vocational) as highest – 5th decile.
Loan balance outstanding at end of 30 year repayment period expressed in real present value terms.
Loan repayment as a % of income constitutes the average annual proportion of income spent on loan repayment, from graduation to retirement (calculated based on net present values in real terms).
The **marginal tax rate** is expressed as the percentage of every £1 of additional earnings paid in income tax, National Insurance or student loan repayments.
Source: London Economics' analysis

Table 2 Summary of findings - Women

	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.	No degree
Study duration	3	4	3	3	3	3	3	5	-
Outstanding loan balance at graduation (PV)	£44,000	£59,000	£44,000	£44,000	£44,000	£44,000	£44,000	£60,000	-
Total repayments (PV)	£24,000	£27,000	£26,000	£47,000	£56,000	£61,000	£62,000	£87,000	-
Outstanding loan balance at end of repayment period (PV)	£30,000	£49,000	£29,000	£18,000	£10,000	£0	£0	£0	-
Age of repayment	Never	Never	Never	Never	Never	49	51	52	-
Loan repayment as a % of income	2.0%	2.4%	2.2%	3.3%	3.6%	3.4%	3.7%	4.0%	-
Highest marginal tax rate (with/ without loans)	41%/32%	41%/32%	41%/32%	41%/32%	51%/42%	51%/42%	51%/42%	51%/42%	32%
Age at which this first applies	23	24	23	23	45	29	34	29	23
Duration for which this applies (years)	30	30	30	30	7	19	16	22	37

Note: All monetary values are presented in **real terms**, and discounted to **present values**.
Duration: Period in years for which highest marginal tax rate applies.
No Degree: Individual in possession of Level 3 qualifications (academic or vocational) as highest – 5th decile.
Loan balance outstanding at end of 30 year repayment period expressed in real present value terms.
Loan repayment as a % of income constitutes the average annual proportion of income spent on loan repayment, from graduation to retirement (calculated based on net present values in real terms).
The **marginal tax rate** is expressed as the percentage of every £1 of additional earnings paid in income tax, National Insurance or student loan repayments.
Source: London Economics' analysis

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1 Introduction and scope

With the introduction of £9,000 fees in 2012/13, there has been increasing concern in relation to the burden faced by graduates over their working lives. Although the fee and maintenance loans currently available to support English-domiciled undergraduate students are income-contingent, the associated interest rates of up to 3% plus RPI (Retail Price Index), as well as the current freeze in the loan repayment threshold at £21,000, imply that many graduates will face high loan repayment commitments over the whole 30 year repayment period, with many facing limited prospects of ever repaying the entirety of the loan.

London Economics were commissioned by the University and College Union to assess the lifetime costs to higher education students associated with receiving and repaying student loans provided by Student Finance England. The analysis aims to estimate the **effective tax rates** (as a proportion of income) associated with graduates' tuition fee and maintenance loan repayments, as well as the total tax contributions (including loan repayment, income tax and National Insurance (NI) employee contributions) that graduates make over their lifetimes. In terms of the cohort of students considered, the analysis focuses on **individuals from England who started full-time undergraduate degrees at English Higher Education Institutions and Further Education Colleges in the 2016/17 academic year**, based on the English student support system's tuition fee loan and maintenance loan rates available to new students in 2016/17[3].

Based on the overall objective of understanding the impact of student loan repayments on graduates' tax contributions, the analysis consisted of **three key components**:

1) Compare the lifetime tax contributions of students in the 2016/17 cohort in receipt of student loans during their studies and who subsequently work in a number of different **key occupations** across the earnings distribution. Using the Office for National Statistics' Standard Occupational Classification 2010 (SOC2010)[4], the analysis considers the differential tax rates paid by[5]:
   - **School teachers** (in secondary, primary, nursery and special needs education);
   - **Social workers**;
   - **Nurses and midwives**;
   - **Engineering professionals** (e.g. civil or mechanical engineers);
   - **IT professionals** (e.g. programmers and software developers);
   - **Legal professionals** (e.g. barristers and solicitors);
   - **Finance professionals** (e.g. finance and investment analysts, brokers); and
   - **Medical professionals** (i.e. medical practitioners).
2) Compare the lifetime contributions of students who receive fee and maintenance loans during their studies to the tax payments of:
   - Students who **do not take any student loan support** during their studies, and

[3] Note that recent changes to the English student support system implied that, in contrast to previous academic years, students entering HE from 2016/17 onwards were no longer eligible to apply for *both* a (non-repayable) maintenance grant and a (lower) maintenance loan. Instead, maintenance grants were abolished to be replaced by additional maintenance loan support, resulting in an increase in the maintenance loans available to entrants in the 2016/17.
[4] For more information on the classification, please refer to Office for National Statistics (2010a).
[5] Table 4 in Annex 2 provides an overview of the SOC2010 occupational codes included in each of these groups.

- Individuals who **do not attend university** (but instead hold a Level 3 qualification as their highest level of attainment).

3) Analyse the lifetime tax contributions of students in the 2016/17 cohort under the (hypothetical) **abolition of tuition fees** in England. As part of this component, we analyse the tax contributions made by students taking out maintenance loans only (rather than both a fee and maintenance loan as under the current system), essentially mimicking the difference in repayment burden existing between Scottish students studying in Scotland and English students studying in England.

In terms of the key measures considered, we estimate (separately for men and women, and by year):

- In **monetary terms**, the level of income tax payments, National Insurance contributions, student loan repayments and outstanding loan balance per student per year, expressed in:
  - **Nominal terms** – i.e. in current prices (without any adjustment for inflation); and
  - **Real present value terms** – i.e. in constant 2017 prices, and discounted to reflect net present values.
- In **relative terms**, the value of income tax, NI contributions and loan repayments as a proportion of gross income per student per year, in terms of both *average* tax rates (expressed as a proportion of *every* £1 of gross income) as well as marginal tax rates (expressed as a proportion of an *additional* £1 of gross income).

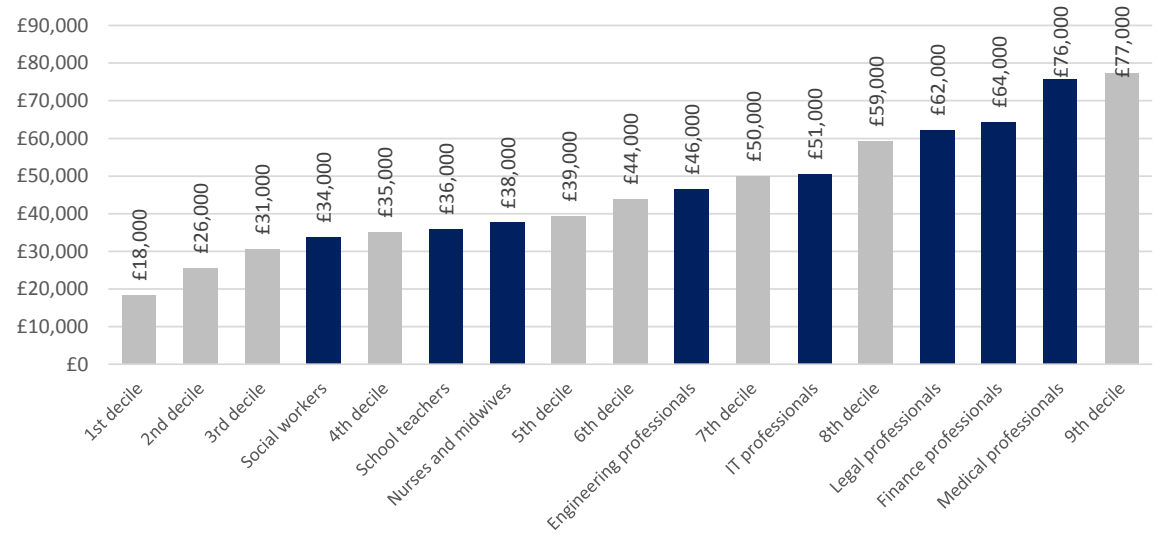
Section 2 of this report presents the detailed estimates of the impact of student loan repayments on graduate taxation under each of the three analysis components; and **Section 3** summarises our main findings. Finally, the methodological approach underlying the analysis is outlined in **Annex 2**.

2 The impact of student loan repayments on graduate tax contributions

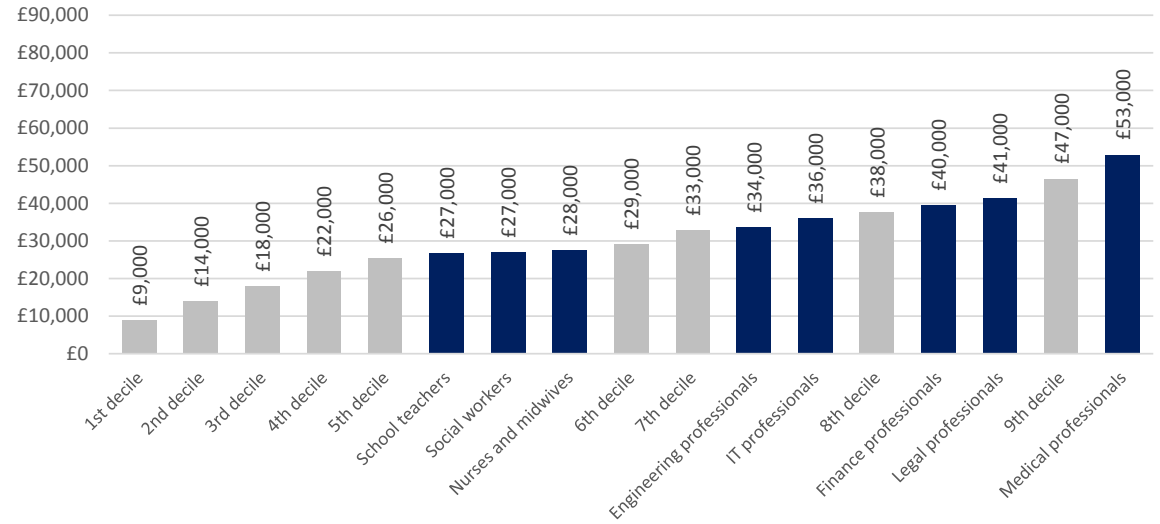
In terms of the average earnings across the different occupations of interest, we have deliberately selected occupations at different positions across the spectrum of post-graduation earnings profiles. Presented in Figure 1, the analysis indicates that **social workers** are positioned between the 3rd and 4th income deciles for men and between the 5th and 6th deciles for women. For men, **teaching** and **nursing** professionals are positioned between the 4th and 5th earnings deciles, while for women, these professions are located between the 5th and 6th deciles. Moving up the distribution, for both men and women, **engineering** and **Information Technology** professionals are positioned around the 7th earnings decile, while **legal professionals** are positioned around the 8th decile. **Medical** professionals are positioned near the top decile of earnings.

Figure 1 Average annual income (£, NPV in constant prices), occupations vs. income deciles

Men



Women



Note: Monetary values constitute averages over lifetime from graduation until retirement. Estimates are presented in constant prices, are discounted to reflect present values, and are rounded to the nearest £000.
Source: London Economics' analysis

2.1 Stage 1: Graduates with loans by occupation

2.1.1 Loan repayment and outstanding balance (monetary terms)

Loan balance at graduation

We estimated that on average, **students undertaking a three year degree** in 2016-17 will graduate with a total debt of approximately **£45,000** in **nominal terms**[6] (excluding interest). This is based on receiving an average of approximately **£9,000** in fee loans (net of bursaries etc.) and **£6,000** maintenance loans in each of the three years of study[7]. However, once interest is included, which compounds at a rate of **RPI + 3%** per annum during study, a further **£4,000** is added to the balance. Therefore, the total loan balance on graduation including accumulated interest was estimated to be almost **£50,000**. In **real present value terms**[8], this is equivalent to **£44,000**.

For graduates entering **teaching professions**, given their longer study duration (see Table 5), the average level of debt on graduation was estimated to be **£68,000** in nominal terms (including **£60,000** in loans plus an additional **£8,000** in accumulated interest), equivalent to **£59,000** in real present value terms.

For graduates entering **medical professions**, the average level of debt on graduation was estimated to be **£73,000** (including **£61,000** in loans plus **£12,000** in interest), equivalent to **£60,000** in real present value terms.

Repayments and loan balance after 30 year repayment period

The analysis presented in Figure 2 illustrates the total level of expected repayments associated with different occupations over the 30 year period of loan repayment – separately by gender.

For **medical professionals**, the analysis indicates that men will make **£142,000** in nominal repayments over the repayment period, which is equivalent to **£79,000** in real present value terms. The entire loan and accumulated interest is repaid approximately **19** years following graduation. The analysis further indicates that female medical professionals will make **£192,000** in nominal repayments over the repayment period, which is equivalent to **£87,000** in real terms, with full repayment not taking place until age 52 (i.e. approximately 27 years post-graduation).

Looking at the group of occupations where students accumulate three years' worth of financial support, the difference in levels of repayment across occupation becomes more apparent. For men who become **social workers** or **nursing professionals**, the average level of repayment (in nominal terms) over the 30 year repayment period was estimated to be **£105,000** and **£133,000** respectively, equivalent to **£46,000** and **£59,000** in real terms respectively (because much of the repayment takes place later in life than for other professions). In both cases, despite these real values of the repayments over the 30-year period exceeding the initial loan balance on graduation (**£44,000**), the total loan balance is never fully repaid because such a significant proportion of the repayments are associated with paying off the interest charged, rather than reducing the capital outstanding. In particular, as presented in Figure 3 (upper panel), by the end of the 30-year repayment period, male social workers and nurses have approximately **£16,000** and **£3,000** of loans outstanding in real terms, respectively.

[6] Again, by nominal terms, we refer to monetary values in current prices (and *not* discounted to present values).
[7] All monetary values have been rounded to the nearest £1,000. The exact average tuition fee (net of bursaries) amounts to £8,765, while the average level of maintenance loan per year was estimated at £6,360.
[8] Again, by real present value terms, we refer to monetary values in constant 2017 prices, and discounted to reflect present values.

For women who become social workers or nurses, the average expected level of repayment over the 30 year repayment period was estimated to be **£52,000** and **£59,000** respectively (in nominal terms), equivalent to **£24,000** and **£26,000** in real terms. Again, in both cases, the total loan balance is never fully repaid. As presented in the lower panel of Figure 3, by the end of the 30-year repayment period, female social workers and nurses have approximately **£30,000** and **£29,000** of loans outstanding in real terms, respectively.

Taking another example of a profession associated with three years' worth of student support, male and female graduates entering **legal occupations** make approximately **£85,000** and **£114,000** in nominal repayments post-graduation (equivalent to **£55,000** and **£61,000** in real terms). In both cases, the loan (and accumulated interest) is fully repaid, by the ages of **39** and **49** respectively.

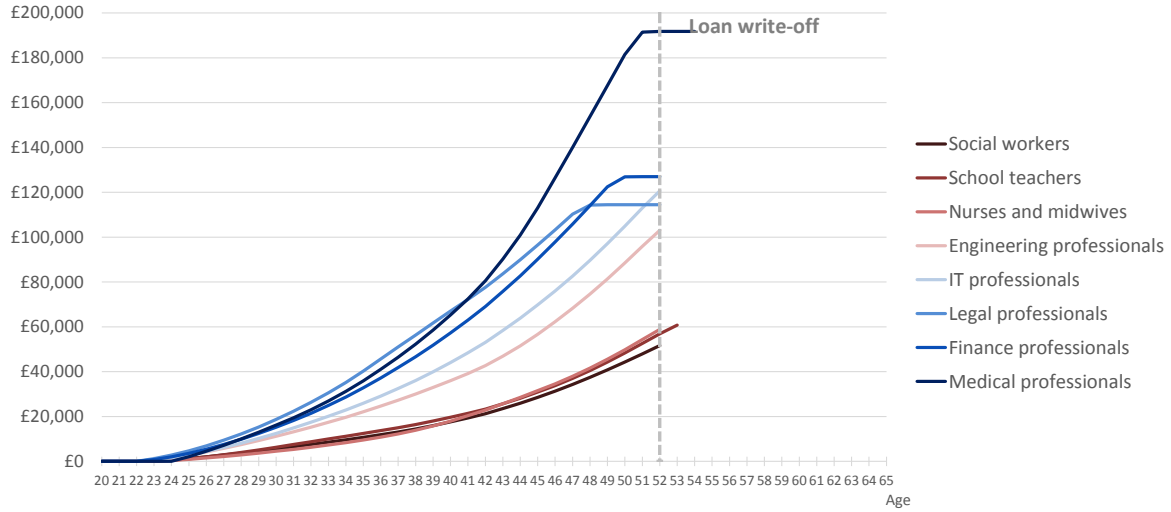
Finally, turning to **school teachers**, where we have assumed that individuals receive 4 years of student loans (throughout their degree and subsequent PGCE), the average level of debt in real terms on graduation was estimated to be approximately **£59,000** in real present value terms. Male teachers make **£121,000** in repayments (**£54,000** in real terms), compared to **£61,000** (**£27,000** in real terms) for women. However, in terms of the level of debt outstanding at the end of the 30 year repayment period, male teachers have **£128,000** in outstanding debt (**£38,000** in real terms) compared to female teachers who have **£164,000** in outstanding debt (**£49,000** in real terms). The reason for these high outstanding balances is the fact that, with the additional years' worth of student support, the outstanding loan balance increases more rapidly from a higher base, combined with the relatively low earnings of teachers resulting in only small repayments.

Figure 2 Cumulative student loan repayment per graduate (in £), by gender and occupation

Men

	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.
Study duration	3	4	3	3	3	3	3	5
Repayments (nominal)	£105,000	£121,000	£133,000	£119,000	£106,000	£85,000	£86,000	£142,000
NPV repayments (real)	£46,000	£54,000	£59,000	£60,000	£59,000	£55,000	£55,000	£79,000

Women



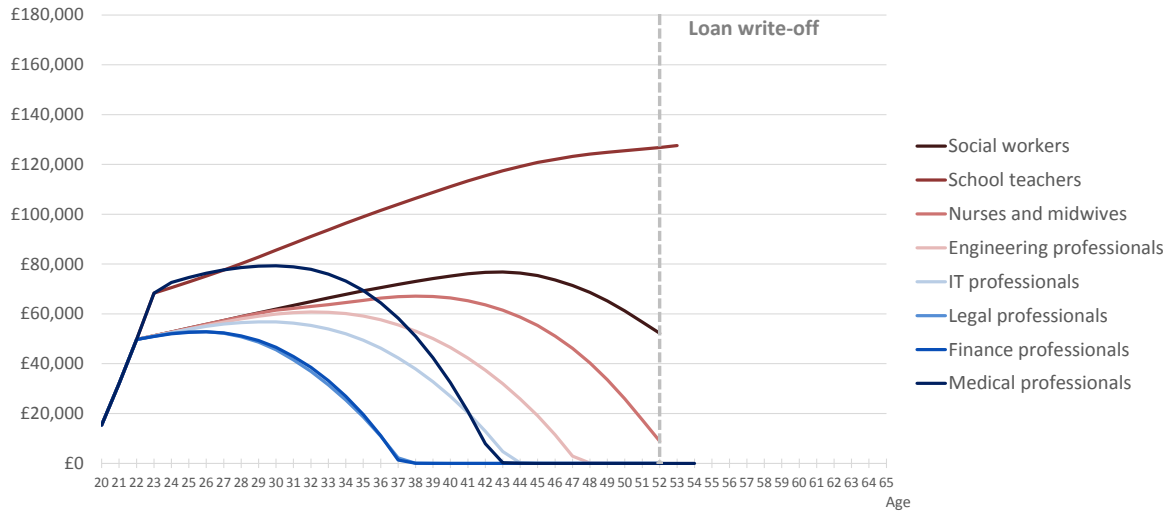
	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.
Study duration	3	4	3	3	3	3	3	5
Repayments (nominal)	£52,000	£61,000	£59,000	£103,000	£121,000	£114,000	£127,000	£192,000
NPV repayments (real)	£24,000	£27,000	£26,000	£47,000	£56,000	£61,000	£62,000	£87,000

Note: Values in tables are rounded to the nearest £000s. Net present values (in real terms) present the value of total repayments made over graduates' lifetimes. We have assumed that the age of loan write-off amongst school teachers and medical professionals equals 53 and 54 respectively (rather than 52), based on the relatively longer assumed duration of study for individuals in these occupations (see Table 5).

Source: London Economics' analysis

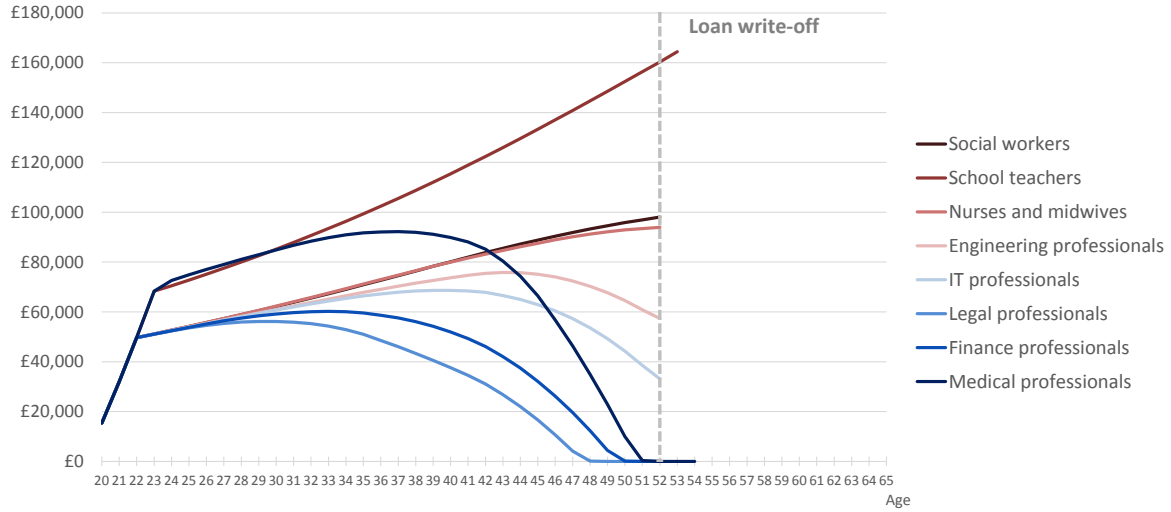
Figure 3 Outstanding loan balance per graduate (in £), by gender and occupation

Men



	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.
Study duration	3	4	3	3	3	3	3	5
Outstanding balance (nominal)	£52,000	£128,000	£9,000	£0	£0	£0	£0	£0
NPV Outstanding balance (real)	£16,000	£38,000	£3,000	£0	£0	£0	£0	£0

Women



	Social workers	School teachers	Nurses & midwives	Engineering prof.	IT prof.	Legal prof.	Finance prof.	Medical prof.
Study duration	3	4	3	3	3	3	3	5
Outstanding balance (nominal)	£98,000	£164,000	£94,000	£57,000	£33,000	£0	£0	£0
NPV Outstanding balance (real)	£30,000	£49,000	£29,000	£18,000	£10,000	£0	£0	£0

Note: Values in tables are rounded to the nearest £000s. We have assumed that loan write-off amongst school teachers and medical professionals occurs after the ages of 53 and 54 respectively (rather than 52), based on the relatively longer assumed duration of study for individuals in these occupations (see Table 5).

Source: London Economics' analysis

Despite the widely-cited premise that the income-contingent loan repayment system is **progressive**, the analysis indicates that there are certain categories of occupation that are disproportionately impacted by student loan repayments - specifically because of the **duration** of repayment.

In particular, **men** in more public sector orientated occupations with relatively low wages (for instance, nursing - see Figure 1), end up making repayments for the entire duration of the repayment period (and despite this, never repay their full loan balance). This compares to higher-paying occupations, such as legal professions, where because repayment takes place earlier in a male graduate's working life (and there is less accumulated interest), the total repayment in real terms is actually marginally *lower* than repayments in the nursing profession (**£59,000** compared to **£55,000**).

A similar phenomenon can be seem amongst **females** in occupations with above-average earnings (IT professions, for instance), where approximately **£56,000** in loan and accumulated interest repayments are made. Despite a **£10,000** outstanding balance existing at the end of the repayment period, this still represents a greater level of real repayment than *men* in finance or legal occupations.

In other words, there appear to be incentives to pay off student loans early – or not at all – but being positioned in the middle of the earnings distribution appears to offer the worst possible outcome from the individual's perspective.

2.1.2 Long term burden of student loan repayment

Given the fact that student loans are repayable over the 30 year period, how does this burden manifest itself in terms of individuals' effective tax rates? Although the loan repayment rate stands at 9% of income in excess of £21,000, in Figure 4, we illustrate these loan repayments as a proportion of total income, to understand the **average** burden for the different occupations over the working lifetime. In Figure 5, we present the total tax burden from income taxation, National Insurance *and* loan repayments[9].

For **men** in the higher-paying occupations (e.g. **finance and legal occupations**), loan repayments as increase steadily from approximately **4%** of gross income at graduation to almost **7%** by the age of **37** (with the overall average tax burden standing at almost **40%** (see Figure 5)). Given the fact that loans are repaid in their entirety by the age of **38** and **39** (respectively), the average loan repayment burden drops to zero thereafter. For **medical professionals**, given the larger initial loan balance, the loan repayment burden lasts a further **5-6** years.

In contrast, for males in relatively lower-paying professions, loan repayment burdens increase significantly and steadily over the entire repayment period. In the **nursing professions**, the loan burden is less than **3%** in the first 5 years post-graduation (of a total average tax burden of approximately **15-25%**). This increases steadily to approximately **5%** by the early thirties, but because the loan balance is never fully repaid, male nurses continue to experience a loan burden of approximately **5-6%** (out of a total of **30-33%**) of gross income) until the end of the loan repayment period (at age of 52).

In relation to **female** graduates, a comparable picture is illustrated, although especially in the case of higher-than-average paying professions, the duration of the exposure to loan repayments is considerably longer. **Legal and finance professionals** contribute **5%-6%** of their earnings to loan repayments between the ages of approximately **30** and **50** (out of a total tax burden of **30-32%**), with **medical professionals** contributing around **5%-7%** over the same period (of a total **30-38%**). In

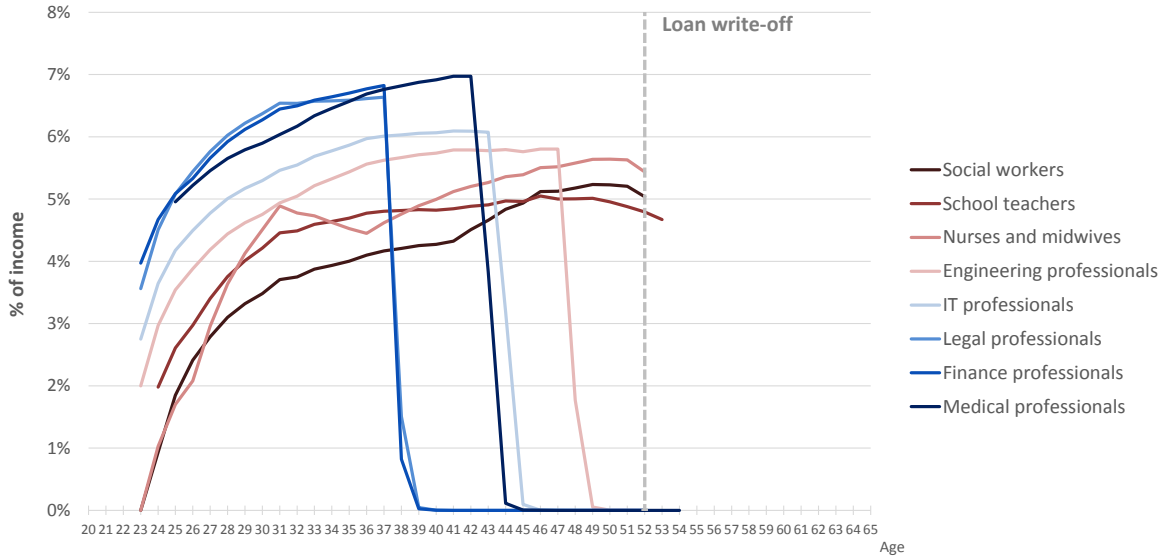
[9] Further breakdowns of this total average tax burden into the different tax components – separately by occupation – are presented in Annex A3.1.

contrast, for females in predominantly public sector occupations, the level of loan contributions increases gradually from approximately **3%** to **5%** of total earnings between the ages of **30** and **50** (as the total tax burden increases from **20%** to **25%** over the same period)[10].

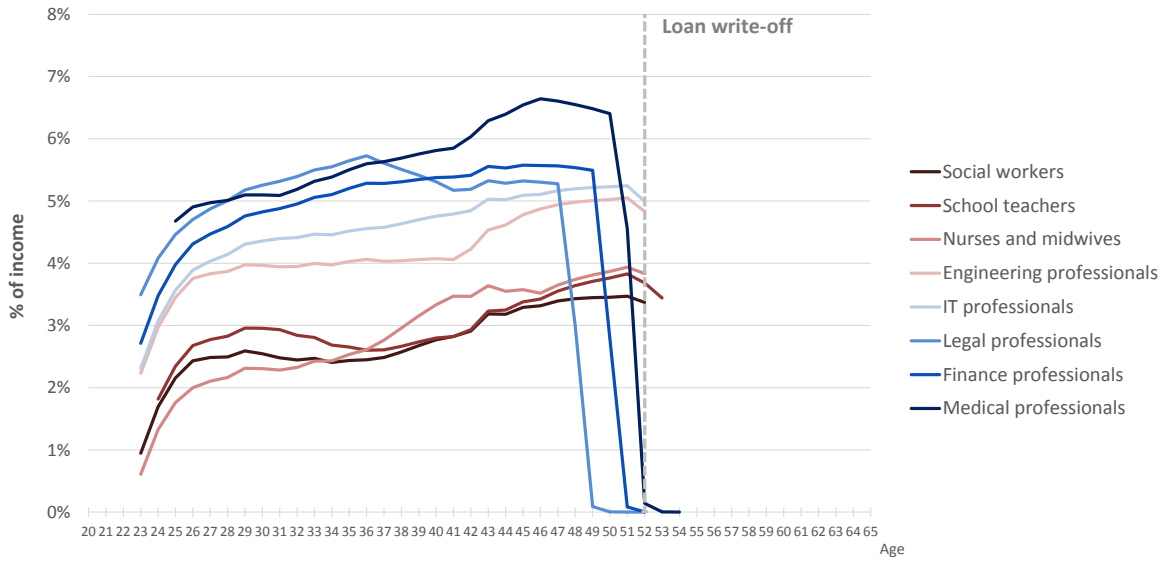
2.1.3 Graduate repayment contributions as a % of income

Figure 4 Student loan repayment as a % of income, by gender and occupation

Men



Women



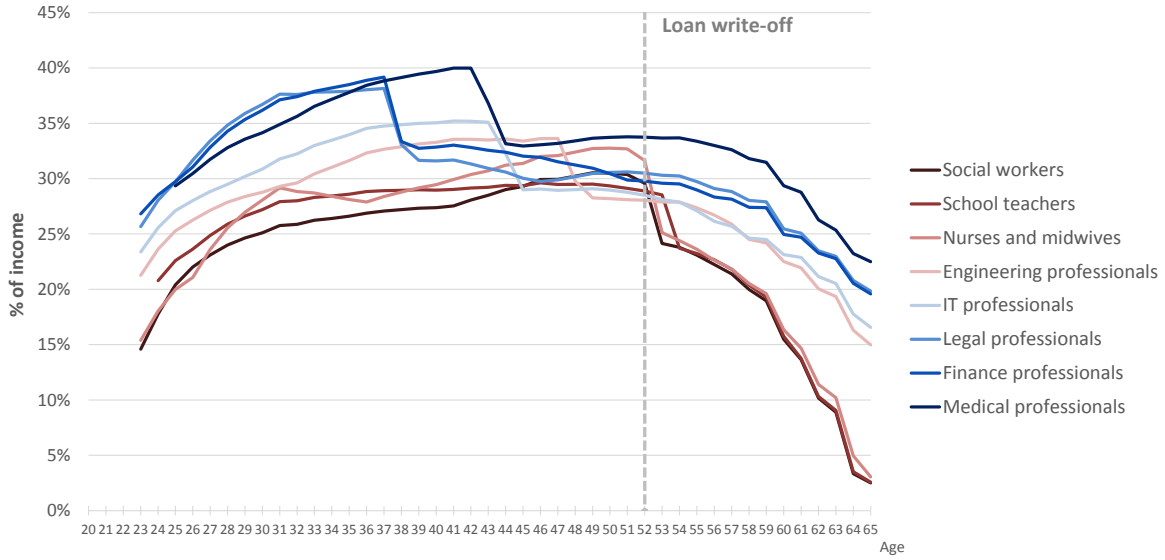
Note: We have assumed that loan write-off amongst school teachers and medical professionals occurs after the ages of 53 and 54 respectively (rather than 52), based on the relatively longer assumed duration of study for individuals in these occupations (Table 5).

Source: London Economics' analysis

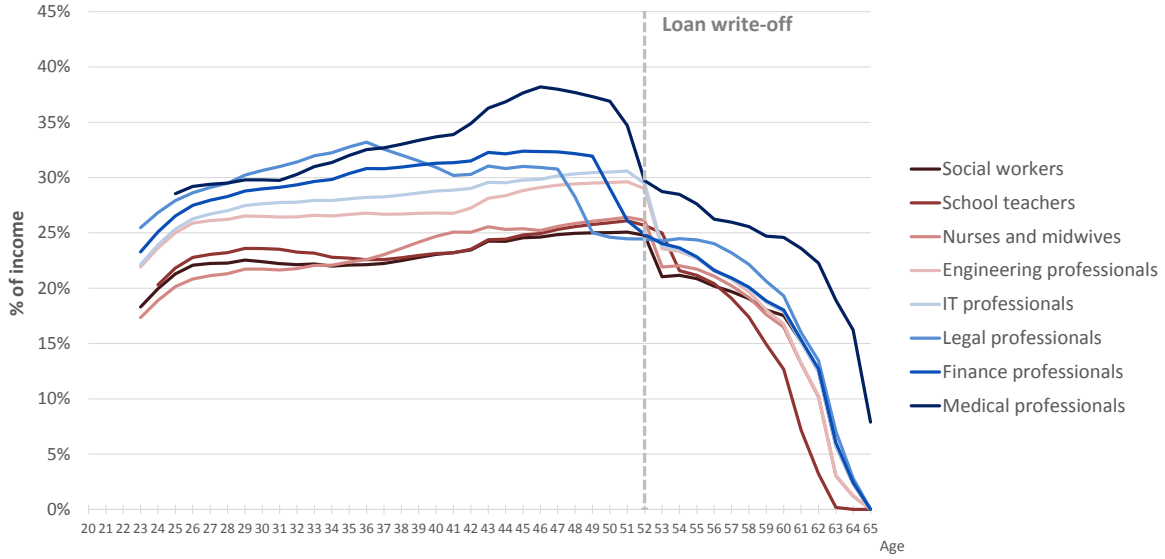
[10] Again, please refer to Annex A3.1 for more detailed breakdowns of the total tax burden by occupation.

Figure 5 Total tax contributions (including loan repayment, income tax and NI) as a % of income, by gender and occupation

Men



Women



Note: We have assumed that loan write-off amongst school teachers and medical professionals occurs after the ages of 53 and 54 respectively (rather than 52), based on the relatively longer assumed duration of study for individuals in these occupations (see Table 5).

Source: London Economics' analysis

2.1.4 Average income tax, National Insurance and loan contributions over the entire working life

Again, the analysis presented in the previous section illustrates what might be expected from a 'progressive' taxation system – namely higher earners contribute a higher proportion of their earnings in taxation. This is correct in a particular time period, and is also the case (more generally) in relation to income taxation. However, given the fact that some occupations continue to make loan repayment contributions for a significantly longer period of time than others, it is not always

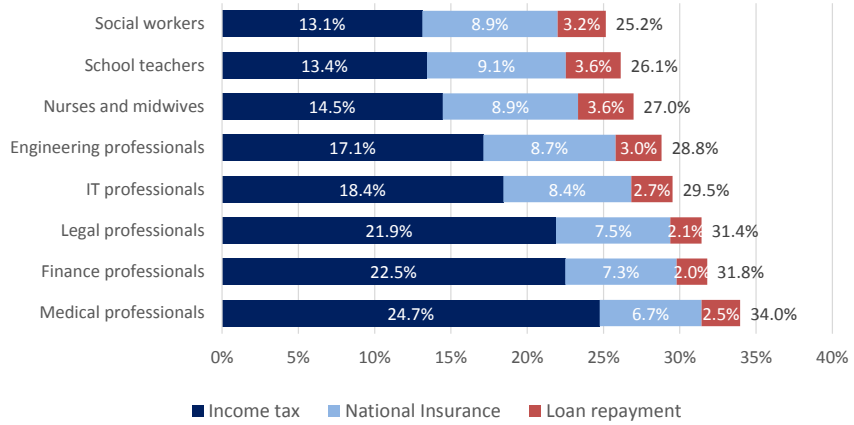
the case that the highest earners are faced with the heaviest student loan repayment burden. This raises the question as to what extent the student loan repayment system can be truly considered progressive over the **entire working life**.

In particular, Figure 6, illustrates the average proportion of total earnings spent on income tax, National Insurance and loan repayment contributions (all in real net present value terms) – between the age of graduation (23-25) and retirement (65). The analysis illustrates that men in social work, teaching and nursing professions contribute **13.1%**, **13.4%** and **14.5%** in income taxation over their working lives, which compares to **21.9%** and **24.7%** for legal professions and medical professions respectively (thus illustrating general progressivity). In contrast, men in these predominantly public sector occupations contribute **8.9%, 9.1%** and **8.9%** in National Insurance contributions (reflecting the higher relative percentage of National Insurance contributions at lower earnings levels (compared to **7.5%** and **6.7%** for legal professions and medical professions, respectively). Combining **income tax and National Insurance contributions**, the system remains progressive.

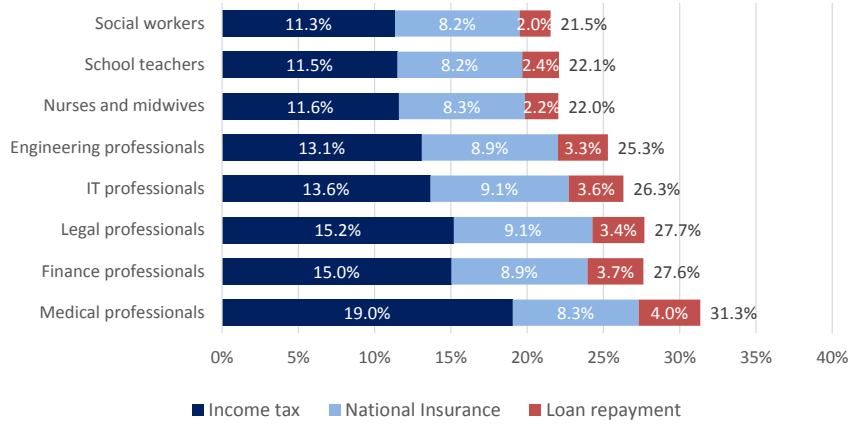
However, in relation to **student loan contributions**, men in social work, nursing and teaching professions contribute **3.2%**, **3.6%** and **3.6%** (respectively) on average over their working lives. This compares to only **2.1%, 2.0%** and **2.5%** for legal, financial and medical professions respectively. Further, reflecting the previous analysis of the repayments made by women in different occupations, Figure 6 suggests that the average level of contribution towards student loans for women in the medical, financial and legal professions was estimated to be **4.0%**, **3.7%** and **3.4%** on average over their working lives, which compares to **2.0%**, **2.4%** and **2.2%** for women in social work, nursing and teaching professions.

Figure 6 Average tax contributions as a % of income over the total working life, by gender and occupation

Men



Women



Note: Figures are based on values in constant prices, discounted to reflect present values.

Source: London Economics' analysis

Table 3 Gross income and average annual tax contributions in £ (NPV in constant prices), by gender and occupation

Men

Occupation	Gross income	Income tax	National Insurance	Loan repayment	Total contributions
Social workers	**£33,700**	£4,400	£3,000	£1,100	**£8,500**
School teachers	**£35,900**	£4,800	£3,300	£1,300	**£9,400**
Nurses & midwives	**£37,600**	£5,400	£3,300	£1,400	**£10,100**
Engineering prof.	**£46,500**	£8,000	£4,000	£1,400	**£13,400**
IT prof.	**£50,500**	£9,300	£4,200	£1,400	**£14,900**
Legal prof.	**£62,100**	£13,600	£4,700	£1,300	**£19,600**
Finance prof.	**£64,300**	£14,500	£4,700	£1,300	**£20,500**
Medical prof.	**£75,600**	£18,700	£5,100	£1,900	**£25,700**

Women

Occupation	Gross income	Income tax	National Insurance	Loan repayment	Total contributions
Social workers	**£26,900**	£3,000	£2,200	£500	**£5,700**
School teachers	**£26,900**	£3,100	£2,200	£600	**£5,900**
Nurses & midwives	**£27,600**	£3,200	£2,300	£600	**£6,100**
Engineering prof.	**£33,500**	£4,400	£3,000	£1,100	**£8,500**
IT prof.	**£36,000**	£4,900	£3,300	£1,300	**£9,500**
Legal prof.	**£41,400**	£6,300	£3,800	£1,400	**£11,500**
Finance prof.	**£39,600**	£5,900	£3,500	£1,400	**£10,800**
Medical prof.	**£52,900**	£10,100	£4,400	£2,100	**£16,600**

Note: Values are presented in constant prices, discounted to reflect present values, and rounded to the nearest £100.

Source: London Economics' analysis

2.2 Stage 2: Tax contributions of graduates with and without loans, and individuals without degrees

To better understand the duration of the student loan repayment burden, Figure 7, Figure 9 and Figure 11 illustrate the **average** expected burden of income taxation, National Insurance and student loan repayments for social workers, teachers and legal professions (with all remaining occupations presented in the Annex[11]). By comparing individuals in these occupations - with and without student loans - it is possible to isolate the repayment burden associated with fee and maintenance loans. Furthermore, alongside, in Figure 8, Figure 10 and Figure 12, we have also illustrated the **marginal tax rate** associated with these three forms of payroll deduction. Compared to the average tax rate (which considers the total impact of the three payroll deductions across ***every*** £1 of income (including any tax-free earnings)), the marginal tax rate assesses the extent to which an ***additional*** £1 of gross earnings is reduced as a result of the various payroll deductions.

For example, in Figure 7, for male **social workers**, the analysis indicates that the *average* tax contributions of individuals with loans are approximately **5 percentage points** higher (between the ages of **30** and **50**) than the tax contributions of social workers without student loans. The same outcome is illustrated for female social workers, where the comparison of individuals with and without loans again clearly illustrates the additional burden associated with loan repayment (though the difference is marginally smaller than for men). In terms of *marginal* tax rates (Figure 8), of particular interest is the fact that while male social workers *without* student loans pay a marginal rate of tax of approximately **32%** between the ages of **23** and **45** (and **42%** between the ages of **46** and **51**), social workers *with* loans face a much higher rate of **41%** between the ages of **24** and **45**, and as much as **51%** between the ages of **46** and **51** (before declining to **32%** thereafter).

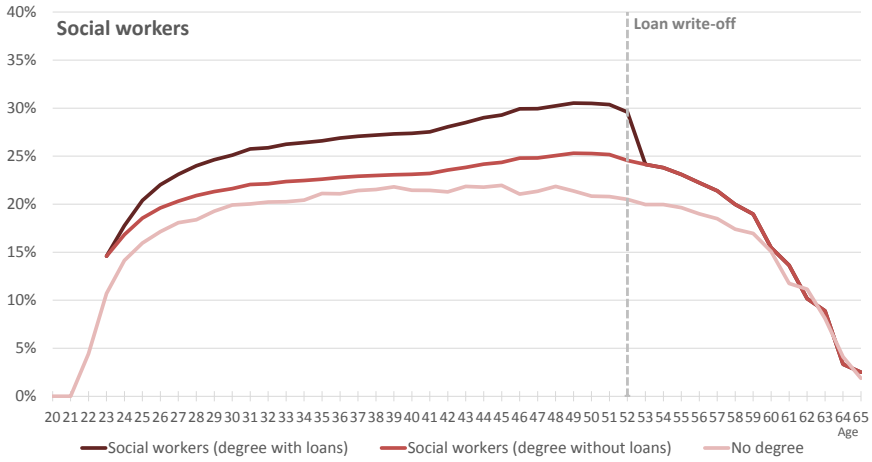
For both male and female **school teachers**, the analysis illustrates that the *average* level of additional contribution incurred by graduates with loan obligations stands at approximately **3-5 percentage points** over the entire loan repayment period (between the ages of 24 and 53). Despite never reaching the higher income taxation rate, the fact remains that these graduates face a total marginal tax rate of **41%** over the first 30 years of their working lives (compared to **32%** for those individuals with no student loan obligations).

Finally, note the difference in the marginal taxation rates faced by women and men working in **legal professions** (Figure 11 and Figure 12). The tax rates for women are of particular interest, as this is one of the occupations where women are likely to pay off their entire loan and accumulated interest, and - related to this - earnings are relatively sizeable in the years immediately post-graduation. Due to the timing and duration of their repayments, female legal professionals *with* student loan obligations face a marginal taxation rate of **51%** between the ages of **29** and **47** (with the loan paid off by the end of **49**), compared to **42%** for female legal professionals *without* student loan obligations. In contrast, for male legal professionals with loan repayments to make, the **51%** marginal taxation burden ceases by the age of **37** (with the loan fully paid off by the age of **39**).

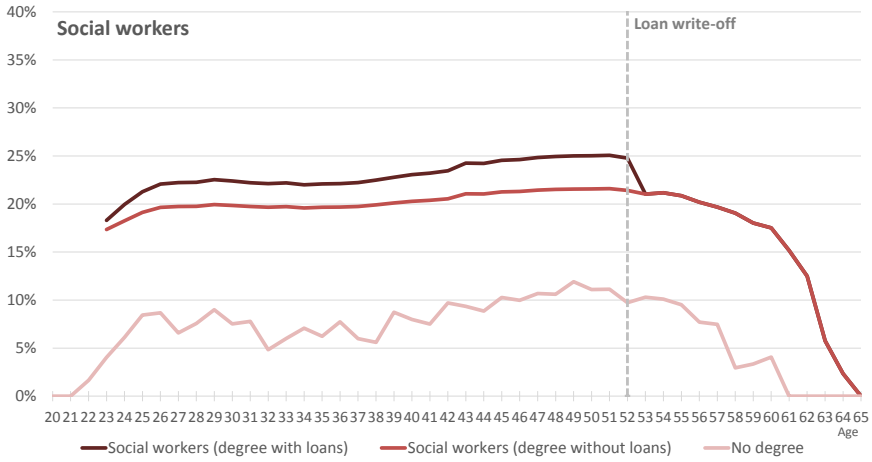
[11] See Annex A3.2 for further information.

Figure 7 *Average* tax contributions as a % of income for graduate social workers with and without loans, and individuals without degrees

Men



Women

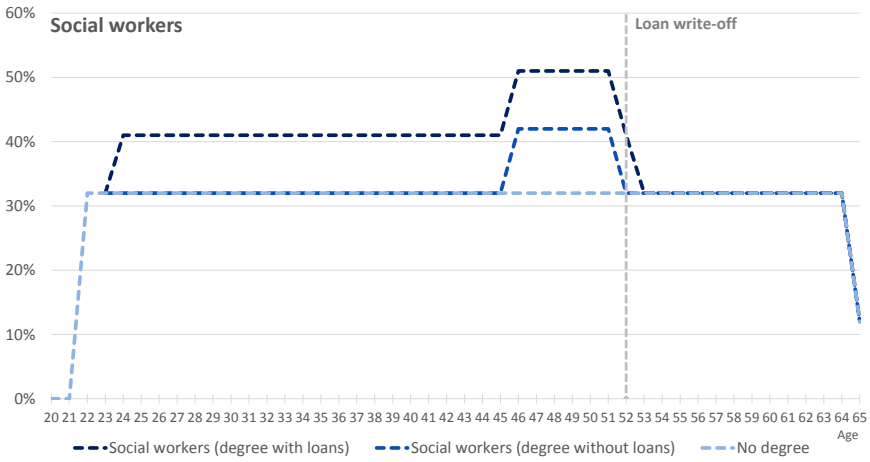


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

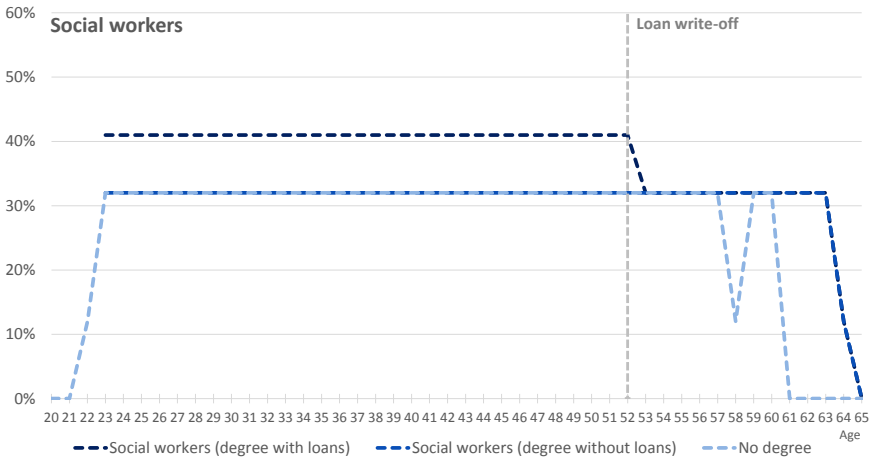
Source: London Economics' analysis

Figure 8 *Marginal* tax contributions as a % of income for graduate social workers with and without loans, and individuals without degrees

Men



Women

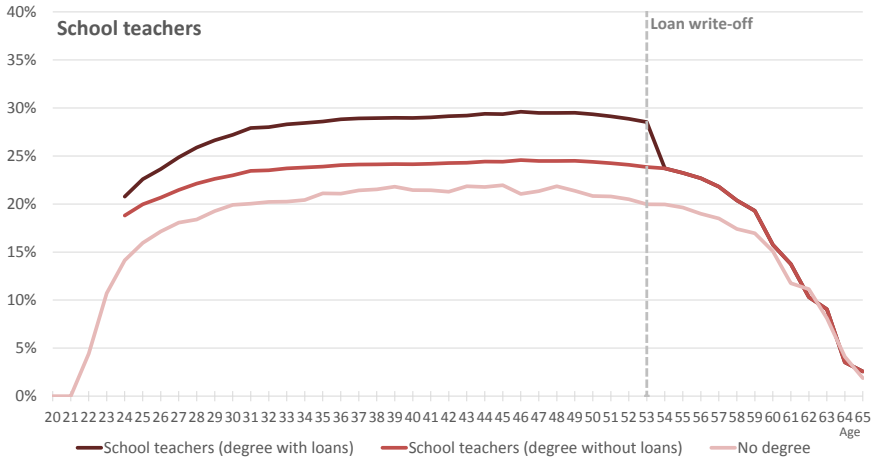


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

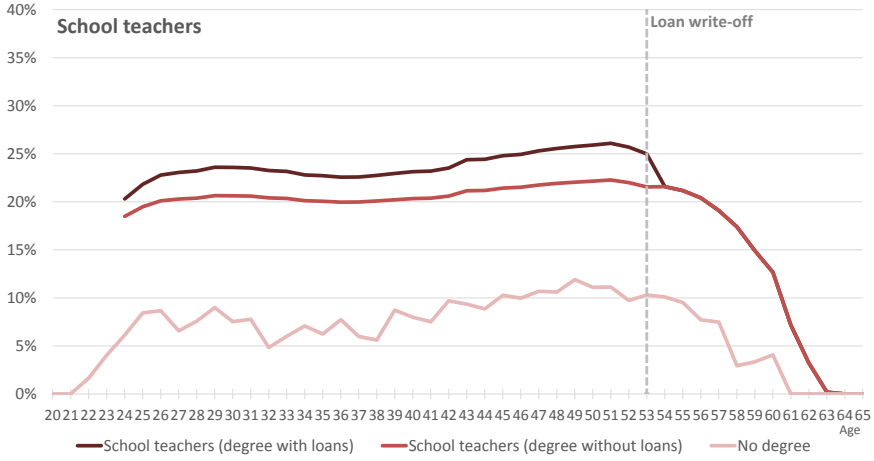
Source: London Economics' analysis

Figure 9 *Average* tax contributions as a % of income for graduate school teachers with and without loans, and individuals without degrees

Men



Women

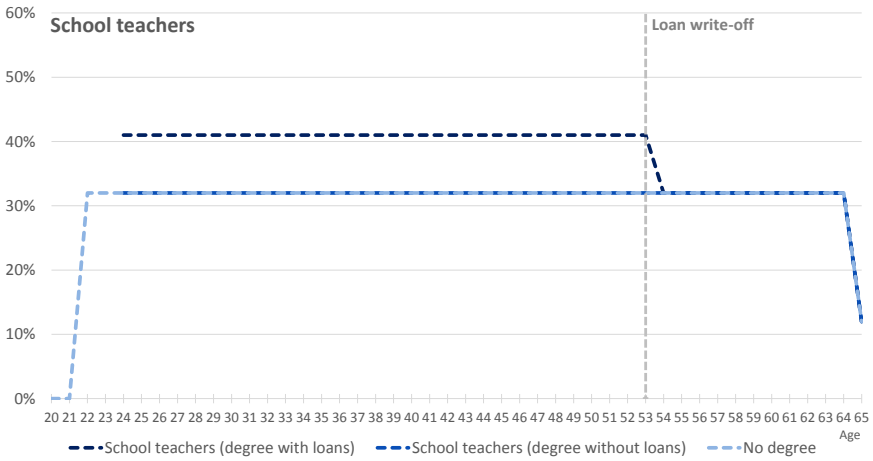


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

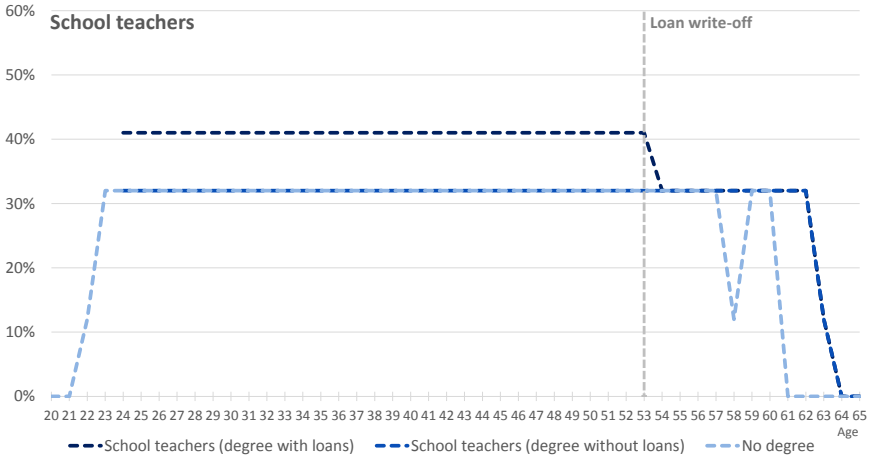
Source: London Economics' analysis

Figure 10 *Marginal* tax contributions as a % of income for graduate school teachers with and without loans, and individuals without degrees

Men



Women

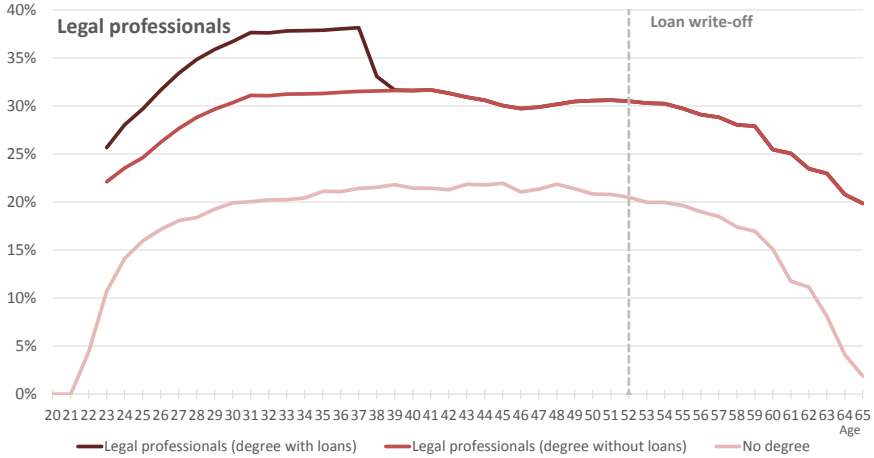


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

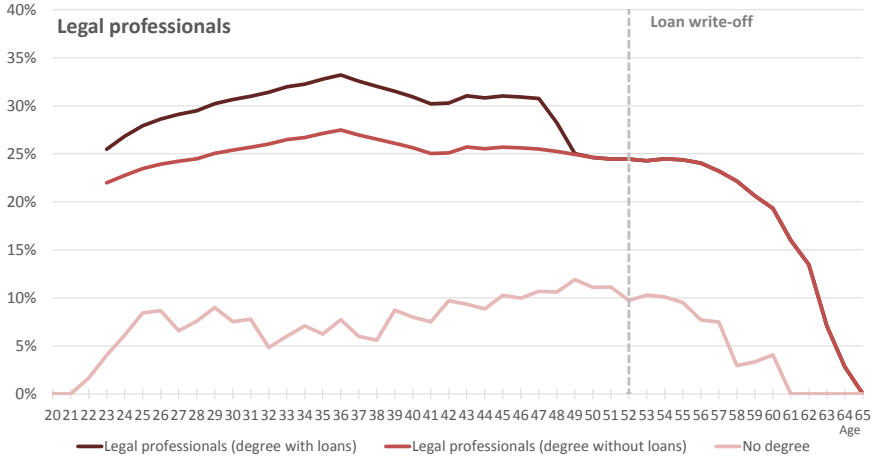
Source: London Economics' analysis

Figure 11 *Average* tax contributions as a % of income for graduate legal professionals with and without loans, and individuals without degrees

Men



Women

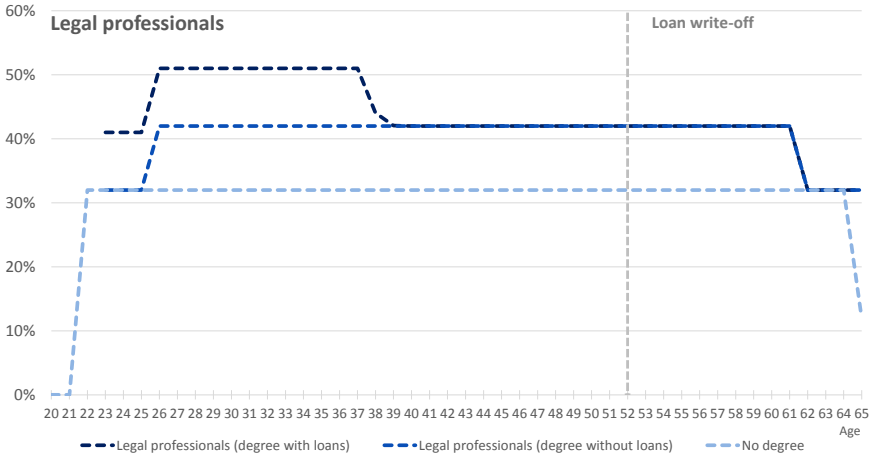


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

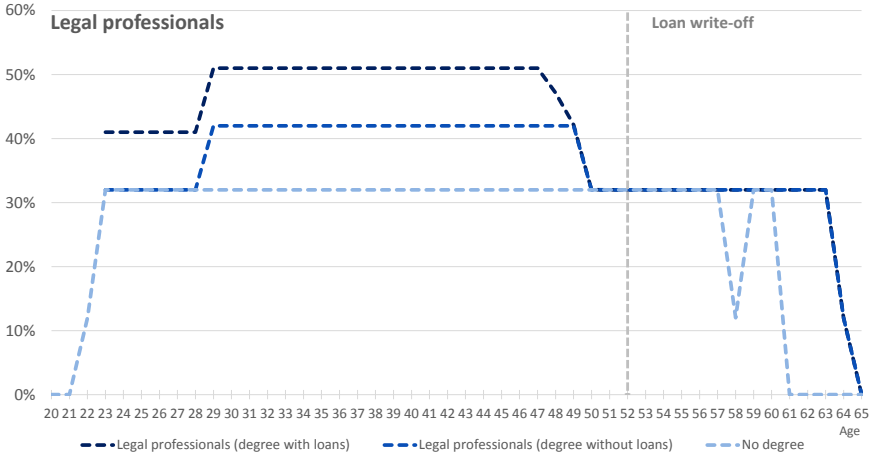
Source: London Economics' analysis

Figure 12 *Marginal* tax contributions as a % of income for graduate legal professionals with and without loans, and individuals without degrees

Men



Women



Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

Source: London Economics' analysis

2.3 Stage 3: The impact of removing tuition fees

In this section, we consider the impact of the absence of tuition fee loan repayments on tax burdens over the working life, again focusing on social workers, school teachers and legal professionals. Specifically, we replicate the analysis presented in the previous section, illustrating the effect the difference in average tax contributions for graduates working in social work occupations with and without income-contingent loan repayments. However, we *also* illustrate the **effect of removing tuition fee loan repayments** on loan-paying graduates' lifetime tax burden.

Whilst of interest in itself given the Labour Party's recent political commitment to abolish tuition fees, the analysis is also informative as it demonstrates (for instance) the difference between graduates in different Home Nations of the United Kingdom. In particular, taking the example of individuals entering the nursing professions, the fact that Scottish domiciled students studying in Scotland do not pay any tuition fees (and assuming the level of maintenance loans is broadly comparable across the Home Nations), this analysis illustrates the difference in the lifetime tax burden faced by Scottish-domiciled nurses and English-domiciled nurses (following the removal of NHS Bursaries in England).

As before, we present information on both *average* tax rates among social workers, teachers and legal professionals and *marginal* tax rates for the same occupations.

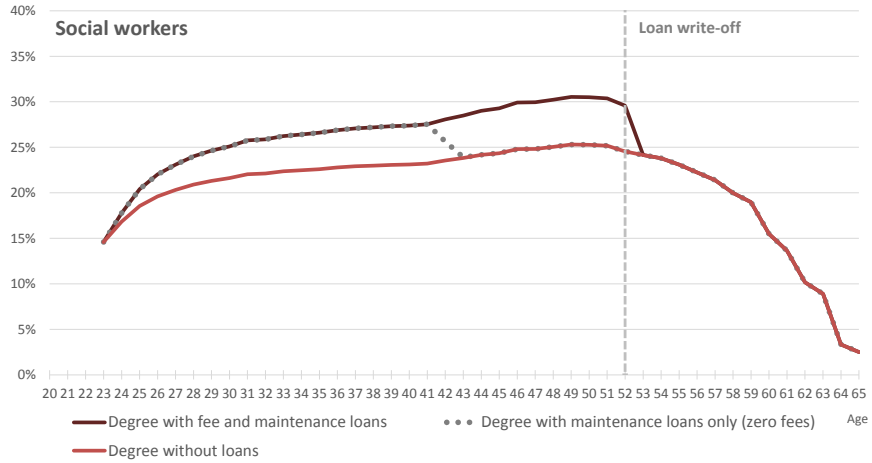
For male **social workers** (Figure 13 and Figure 14), the analysis demonstrates that, rather than facing the burden of loan repayment up to the age of **52**, following the removal of tuition fees (and associated loans), this burden would be removed **10** years earlier (by the age of **42**). In relation to marginal tax rates, rather than ever facing a rate of **51%**, the marginal taxation rate would decline to **32%** at the age of **43**, and remain at between **32** and **41%** thereafter (depending on earnings). For women, given the fact that only a small proportion of either the maintenance or fee loan is expected to be repaid under the current system, the removal of tuition fee loans would have a relatively limited impact: rather than facing an additional tax burden for the entire repayment period to the age of **52**, the removal of tuition fee obligations would slightly shorten the duration of the loan repayment burden to the age of **50**.

A similar picture emerges for **teaching professionals** (Figure 15 and Figure 16). With the removal of tuition fee debt obligations, rather than having their (tuition fee and maintenance loans) written off at the end of the repayment period, male teachers would be able to repay their full (maintenance only) loan by the age of **44**. In relation to the difference in marginal tax rates, rather than paying a rate of **41%** up to and including the age of **52**, this would decline to **32%** at the age of **41.** For women, again given the fact that only a small proportion of either the maintenance or fee loan is currently expected to be repaid (in part because of the size of the initial loan balance), the removal of tuition fee loans would make no difference to the marginal taxation rate: female teachers would continue to face a marginal taxation rate of **41%** for the entire repayment period up to the age of **52**.

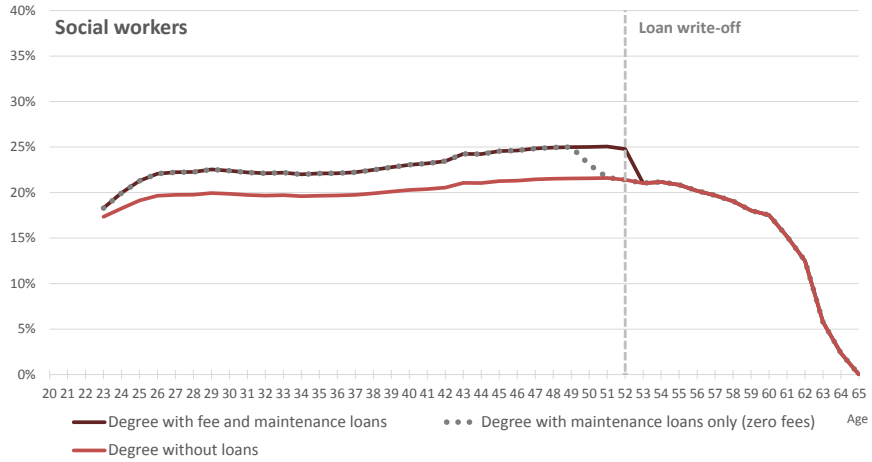
Finally, consider the impact of tuition fee removal for graduates entering **legal professions** (Figure 17 and Figure 18). With the removal of tuition fee debt obligations, for men, the student loan repayment requirement would be removed by the age of **31** (instead of **39**). In addition, rather than facing a marginal tax rate of **51%** up to and including the age of **37**, this declines to **42%** at the age of **31.** For women, again given the relatively high earnings immediately post-graduation, there is a very significant positive impact associated with the removal of tuition fee loans. Specifically, the removal of tuition fees would result in the elimination of the debt obligation by the age of **34** (instead of **49**), and, rather than paying a maximum marginal tax rate of **51%** for the majority of the period of loan repayment, this would decline to **42%** at the age of **34**.

Figure 13 ***Average*** **tax contributions as a % of income for graduate social workers with fee and maintenance loans, with maintenance loans only, and without loans**

Men



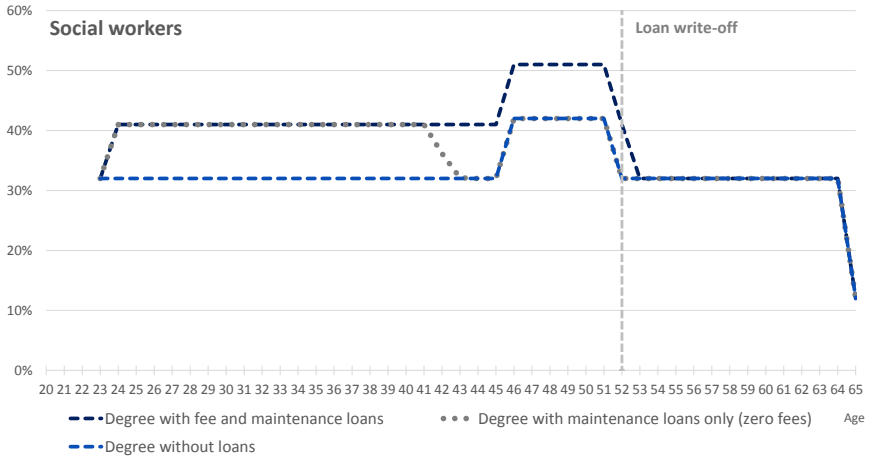
Women



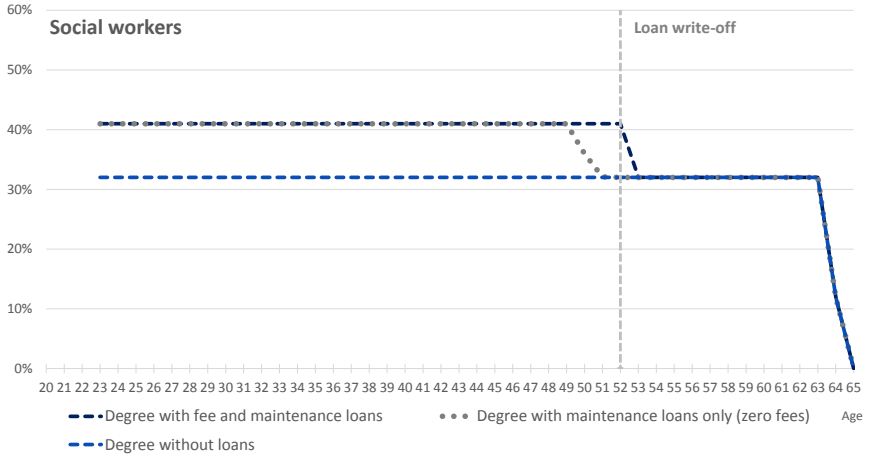
Source: London Economics' analysis

Figure 14 ***Marginal*** **tax contributions as a % of income for graduate social workers with fee and maintenance loans, with maintenance loans only, and without loans**

Men



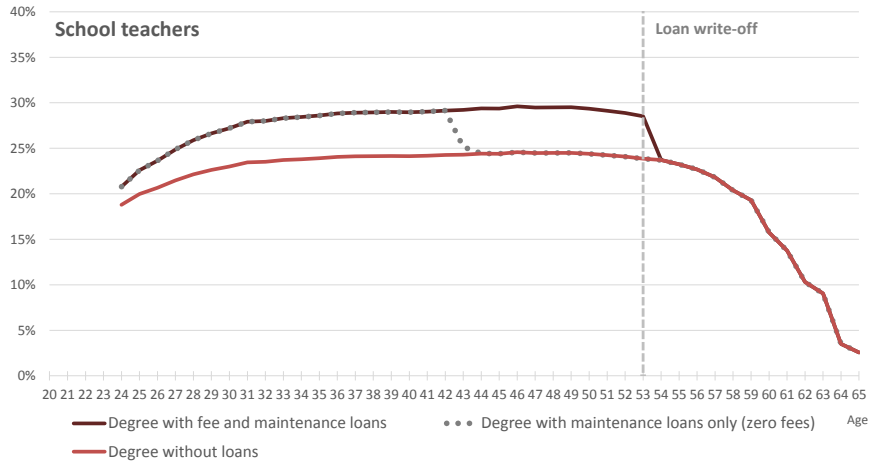
Women



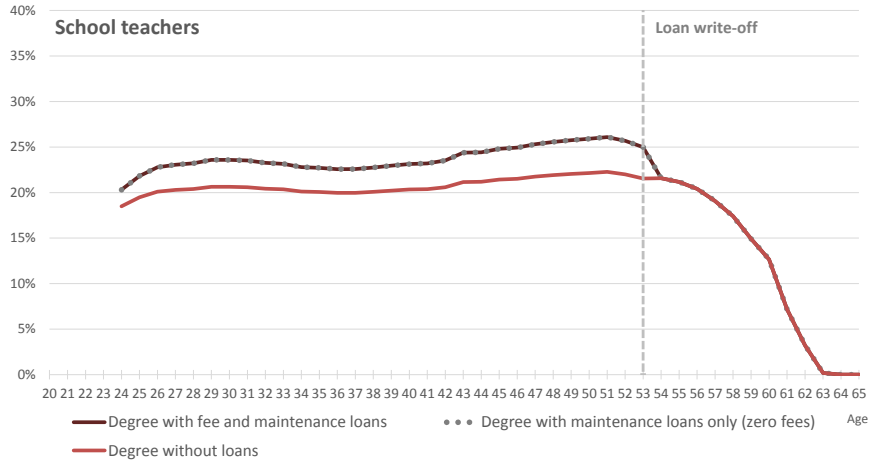
Source: London Economics' analysis

Figure 15 *Average* tax contributions as a % of income for graduate school teachers with fee and maintenance loans, with maintenance loans only, and without loans

Men



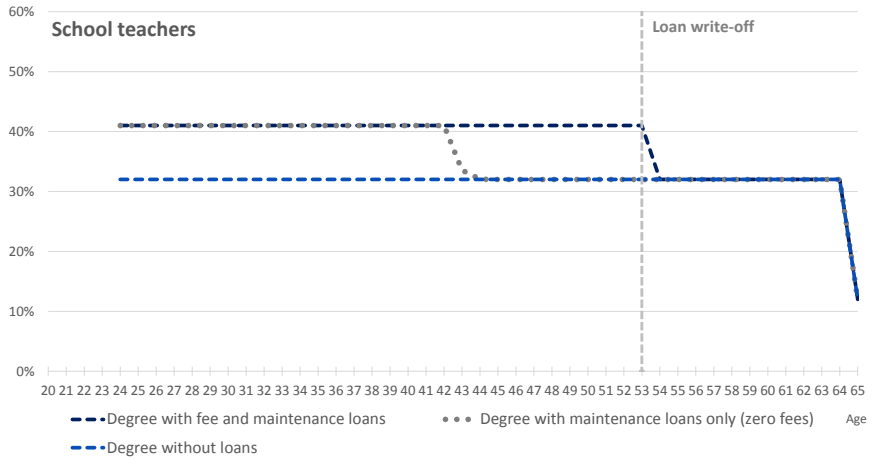
Women



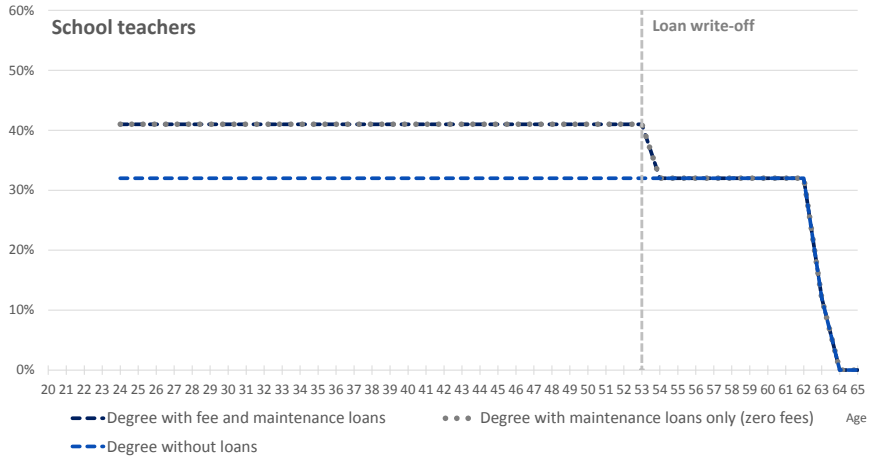
Source: London Economics' analysis

Figure 16 *Marginal* tax contributions as a % of income for graduate school teachers with fee and maintenance loans, with maintenance loans only, and without loans

Men



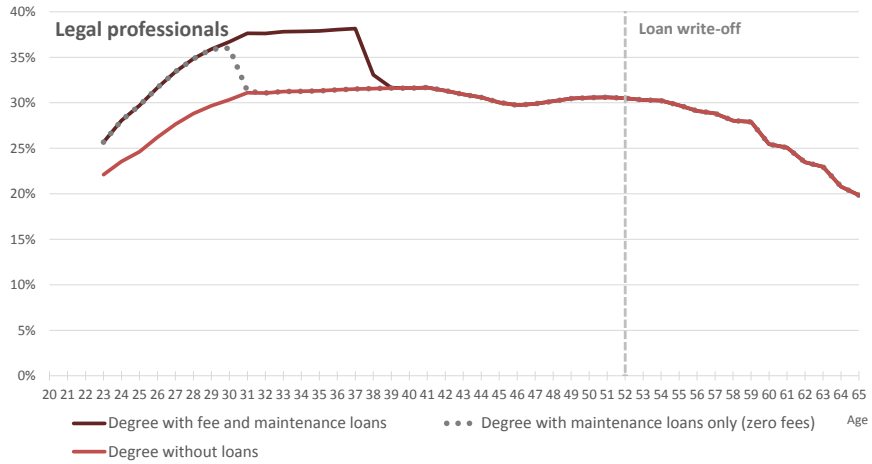
Women



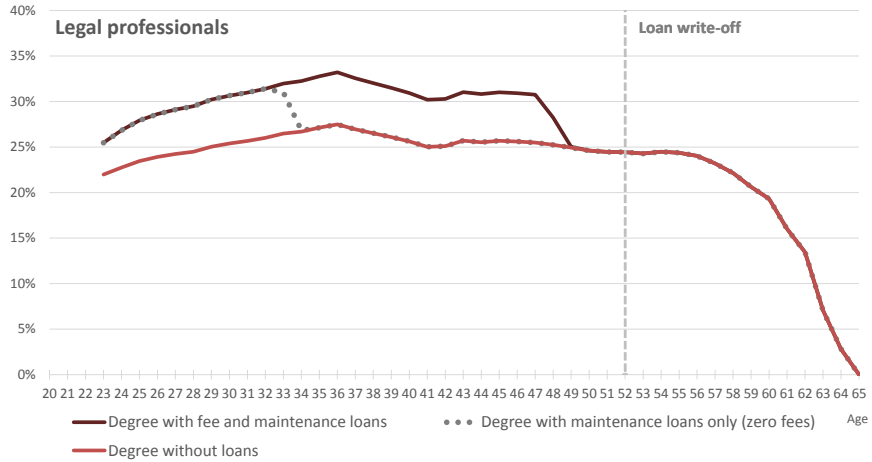
Source: London Economics' analysis

Figure 17 ***Average*** **tax contributions as a % of income for graduate legal professionals with fee and maintenance loans, with maintenance loans only, and without loans**

Men



Women

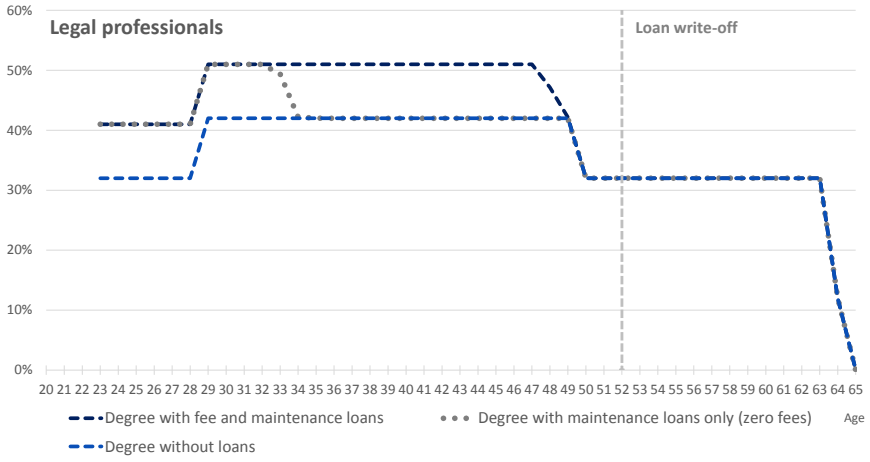


Source: London Economics' analysis

Figure 18 ***Marginal*** **tax contributions as a % of income for graduate legal professionals with fee and maintenance loans, with maintenance loans only, and without loans**

Men

Women



Source: London Economics' analysis

3 Conclusions and policy implications

The 2012 tuition fee reforms are controversial, and their impact on whether students attend university is contested. However, notwithstanding this, our analysis shows that the reforms may have perverse consequences for many of those who do still choose to go to university.

For most graduates, their middle years of working life are likely to be characterised by significant deductions from their pay packet – reaching up to **4%** of average earnings over their entire working lives. This will clearly lead to a reduction in their disposable income at a time when many graduates will be looking to start a family and/or purchase a house. This 'middle age squeeze' on graduates' incomes is a largely unforeseen consequence of the 2012 reforms.

In addition to a substantial additional average tax burden, graduates in middle age will also face very high marginal tax rates - far higher than those of either graduates without loan obligations – or non-graduates. These high marginal tax rates may act as a disincentive to supply additional labour or return to work after periods out of the labour market.

The analysis finds that the 2012 reforms may have created particular problems for those with average earnings profiles. For men, these graduates will typically include those who have chosen public service careers, such as nursing, teaching and social work. The impact of student loan repayments for the entire duration of these key workers' working lives may result in prospective applicants being less likely to choose these careers over other higher earning jobs. In effect, the current shortages of qualified staff in some of these sectors is likely to be exacerbated.

The difference in the treatment of men and women by the 2012 reforms is substantial. We find that the typical earnings profile of a woman - even when compared to a man in a similar job - means they tend to pay more and for a longer period of time, in particular through their middle working years.

Overall our analysis leads to some challenging questions for policy makers. Supporting the widespread academic research demonstrating that going to university generates a substantial boost in the labour market, our analysis bears this out in terms of lifetime earnings. However the current student loan system acts as a significant drag on the earnings (and hence disposable income) of graduates in their middle years.

Index of Tables and Figures

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ANNEXES

Annex 1 References

Department for Business, Innovation and Skills (2015). 'Freezing the student loan repayment threshold. Government response to the consultation on freezing the student loan repayment threshold'. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/479539/bis-15-626-freezing-student-loan-repayment-threshold-government-response.pdf

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Annex 2 Methodological approach

To estimate graduates' (and non-degree holders') lifetime student loan repayments, income tax and National Insurance contributions, we undertook the following elements of analysis (separately by age/age band, gender, and occupation (see Table 4)).

Table 4 Occupations considered for individuals in possession of degrees or postgraduate qualifications

Occupation group	SOC2010 occupational codes included
Social workers	2442 Social workers
School teachers	2314 Secondary education teaching professionals 2315 Primary and nursery education teaching professionals 2316 Special needs education teaching professionals
Nurses and midwives	2231 Nurses 2232 Midwives
Engineering professionals	2121 Civil engineers 2122 Mechanical engineers 2123 Electrical engineers 2124 Electronics engineers 2126 Design and development engineers 2127 Production and process engineers 2129 Engineering professionals n.e.c.
IT professionals	2133 IT specialist managers 2134 IT project and programme managers 2135 IT business analysts, architects and systems designers 2136 Programmers and software development professionals 2137 Web design and development professionals 2139 IT and telecommunications professionals n.e.c.
Legal professionals	2412 Barristers and judges 2413 Solicitors 2419 Legal professionals n.e.c.
Finance professionals	3532 Brokers 3533 Insurance underwriters 3534 Finance and investment analysts and advisers 3537 Financial and accounting technicians 3538 Financial accounts managers
Medical professionals	2211 Medical practitioners

Note: "n.e.c." refers to occupations not elsewhere specified in the Standard Occupational Classification 2010 framework.
Source: London Economics' analysis based on Office for National Statistics (2010a)

A2.1 Generating (gross) age-earnings profiles

Using 16 years of pooled Quarterly Labour Force Survey (LFS) data (from Quarter 2 of 2001 to Quarter 1 of 2017[12],[13]), we estimated the **average annual earnings and employment probabilities** associated with individuals in possession of undergraduate or postgraduate degrees[14], and

[12] Note that the choice of Q2 for 2001 as the first quarter of data was based on the fact that a new occupational classification system (the SOC2000, the predecessor to SOC2010) was first introduced to the LFS data for that quarter. From 2011 onwards, the SOC2000 was replaced by the SOC2010. Using information from the Office for National Statistics (2010b), for all quarters where the old occupational coding system was still in use, we matched the SOC2000 to the SOC2010 to be able to categorise respondents into the occupation groups of focus (see Annex 2). In instances where a single SOC2000 code could be matched to multiple SOC2010 codes, we generated duplicate data points so that the respective individual was recorded under multiple SOC2010 occupation codes where applicable.
[13] Each quarter's LFS sample consists of five "waves", each of which is interviewed in five successive quarters. Hence, in any one quarter, one wave will be receiving their first interview, one wave their second, and so on, with one wave receiving their final (fifth) interview. To avoid duplicates (i.e. where we would include both the first and fifth interviews of the same wave of respondents), we included only the first wave of each quarter's LFS sample throughout the analysis.
[14] Specifically, this includes individuals in possession of first degrees, Level 7 Diplomas/Certificates, Level 8 Diplomas/Certificates/Awards, and higher degrees.

individuals in possession of Level 3 qualifications (i.e. A-levels and equivalent[15]) as their highest level of attainment – **separately by occupation**. In line with the overall focus on English-domiciled students studying in England, we restricted the data to include individuals usually resident in England. In addition:

- In terms of **earnings**, while the average earnings of individuals with Level 3 qualifications were estimated by yearly age, the average earnings of individuals in possession of degrees or postgraduate qualifications by occupation were estimated in total across different age bands[16] [17]. After spreading these earnings by age band across individuals' whole working lifetime, this resulted in the generation of lifetime **age-earnings profiles** (separately by qualification level and occupation). These were typically estimated from the age of 23 onwards for individuals in possession of undergraduate or postgraduate qualifications (using an average age of enrolment of 20 years, and an average study duration of 3 years), and from age 20 onwards for individuals with Level 3 qualifications as their highest attainment (for comparability).

  Note that some amendments were made in relation to teachers, who in general undertake a PGCE and receive 4 years of student support, as well as medical professionals, who undertake a 5 year undergraduate programme (and receive student support from Student Finance England in the first four years). In this respect, Table 5 provides an overview of our assumptions regarding the key timeframes within which individuals in the 2016/17 cohort are expected to complete their studies, receive student support, and have their outstanding debt written off.
- In terms of **employment probabilities**, an individual was defined to be in employment if working for payment or profit for more than 1 hour in the reference week (using the standard International Labour Organisation definition). The resulting employment probabilities were then (again) estimated separately by age, gender and qualification, across all occupations (since the LFS only records occupational codes for those *in employment*, so that employment probabilities cannot be derived separately by occupation).

We adjusted the age-earnings profiles to account for the fact that earnings are expected to increase in real terms over time, and adjusted for inflation, based on the Office for Budget Responsibility's most recent medium-term and long-term economic forecasts (see Office for Budget Responsibility (2017a, b)[18]). We then multiplied the age-earnings profiles by the respective employment probability by age (and gender and highest qualification) to adjust for individuals' **likelihood of being in employment**.

[15] We include both vocational and academic qualifications at Level 3 (based on the National Qualifications Framework).
[16] These age bands included 20-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, and 61-65.
[17] The use of *age bands* rather than individual *age* was required to avoid instances where the granularity of the data would otherwise result in negligible sample sizes. In instances where sample sizes were still lower than 10 (even after the use of age bands), the average earnings for a particular occupation in a particular age band were extrapolated based on the growth in overall average earnings throughout that age band across all occupations (again separately by gender).
[18] The medium-term forecasts cover the period between 2017 and 2021 (see Office for Budget Responsibility, 2017a), and the long-term forecasts cover 2022 and beyond (see Office for Budget Responsibility, 2017b). In terms of forecasts of the Retail Price Index (RPI), in line with the Office for Budget Responsibility's long-term forecasts, we have calculated this as the Consumer Price Index (CPI) plus 1.0 percentage points.

Table 5 Assumptions on average study duration, years of loan receipt and age at which debt is written off

Occupation	# of years...					
	...of age at enrolment	...of student loan receipt	...of total study duration	...of age at graduation	...until loan write-off	...of age at loan write-off
Social workers	20	3	3	23	30	52
School teachers[1]		4	4	24		53
Nurses and midwives		3	3	23		52
Engineering professionals		3	3	23		52
IT professionals		3	3	23		52
Legal professionals		3	3	23		52
Finance professionals		3	3	23		52
Medical professionals[2]		4	5	25		54

Note: [1] Individuals studying to be become qualified school teachers typically undertake an undergraduate degree (of 3 years duration), followed by a Postgraduate Certificate of Education (of 1 year duration). While these students technically become eligible to repay their loan once they have completed the 3-year undergraduate degree, we have treated these students as if they effectively undertake a total of 4 years of undergraduate-level education (i.e. we assume that these students only have to start repaying their student loans following the completion of their 1-year PGCE).
[2] Individuals studying medicine at undergraduate level typically undertake 3 years of pre-clinical studies and 2 years of clinical studies. While these students can apply for tuition fee loan and maintenance loan from Student Finance England in Years 1 to 4 of their studies, Year 5 students typically receive alternative fee and living cost funding through the NHS Bursary Scheme. As a result, we assume that these students only take out 4 years of student loans, and become liable to repay these after they complete their studies (i.e. after 5 years).
Source: London Economics' assumptions

A2.2 Estimating lifetime tax contributions

Using the resulting employment-adjusted gross age-earnings profiles (before tax), we then applied income tax and National Insurance rates for 2016/17[19] to compute the **income tax and NI contributions** of graduates (and individuals with Level 3 qualifications as their highest attainment) over their lifetime.

In addition, using information on the level of maintenance and tuition fee loan available and the repayment conditions for English-domiciled full-time undergraduate students entering HE in 2016/17, we estimated the **average amount of loans received** each year throughout the duration of studies, as well as the **expected loan repayments** (and outstanding loan balance) by graduates in the 2016/17 cohort over their lifetime.

In particular, the average amount of **tuition fee loan** taken out was based on the average fee per new full-time undergradaute student in 2016/17, net of average fee waivers (i.e. bursaries) paid to students (both based on information provided by OFFA[20]).

In contrast to fee loans, the level of **maintenance loan** available to students depends on their household income and location of study. Therefore, it was necessary to replicate the means-testing undertaken for maintenance loans. For this, we used information provided by the Student Loans Company[21] on the maximum level of loan support available – separately for students living at home, living away from home outside of London, or living away from home in London. This was combined with information on the relevant income thresholds and loan reductions/tapers per £1 of household

[19] We assume fiscal neutrality, i.e. we assume that the income thresholds and bands associated with income tax and National Insurance contributions grow at the same real growth rates and inflation (RPI) as assumed for average earnings (again, see Office for Budget Responsibility (2017a, b)).
[20] See OFFA (2015).
[21] See Student Loans Company (2016).

income[22], as well as data on household income distributions[23]. We then calculated a weighted average maintenance loan based on information on students' living circumstances provided by the Higher Education Funding Council for England[24,25].

A key aspect of estimating graduates' expected loan repayments involves calculating the proportion of loans that students do not repay, as captured by the **Resource Accounting and Budgeting (RAB) charge**. The RAB charge measures the long-term cost to the public purse of providing student loan support, arising from the fact that:

- Any outstanding loan (including interest) is **written off** 30 years after an individual becomes liable to repay (or under other specific circumstances (e.g. death or disability)); and
- The loans are provided with a potential interest rate **subsidy**, where the (average) interest rate charged to some borrowers is lower than the Government's own cost of debt.

For the purpose of this analysis, we estimated the RAB charge – and thus, inversely, the amount of loans repaid by graduates - by combining the above employment-adjusted age-earnings profiles (by gender and occupation) with the repayment conditions attached to tuition fee and maintenance loans. These repayment conditions include:

- The rate of repayment;
- The income threshold for repayment[26];
- The interest rate charged (depending on income and whether the individual is still studying or not); and
- The number of years before any outstanding loan is written off in full[27].

Note that we assume that students do not start repaying any of their loans during their studies, and assume that all outstanding balances are written off 30 years after graduation (i.e. we do not explicitly model any write-off of debt due to death or disability).

[22] Based on information from Student Finance England (2016).
[23] This was based on the proportion of student support applicants in receipt of full (43%), partial (14%) or zero (43%) maintenance loans in the 2015/16 academic year. Again see Student Loans Company (2016).
[24] See Higher Education Funding Council for England (2009).
[25] Note that, in contrast to fee loans, we assume that publicly-funded maintenance loans and institution-funded maintenance bursaries are complements, i.e. we assume that students receive the same level of maintenance loan irrespective of whether they are in receipt of a maintenance bursary.
[26] As with income tax and National Insurance thresholds, we assume that the loan repayment conditions are fiscally neutral, i.e. that the income threshold (currently frozen at £21,000 until 2021 (see Department for Business, Innovation and Skills, 2015)) will grow at the same rate as average earnings thereafter.
[27] For more information on these repayment conditions, please refer to Student Loans Company (2017).

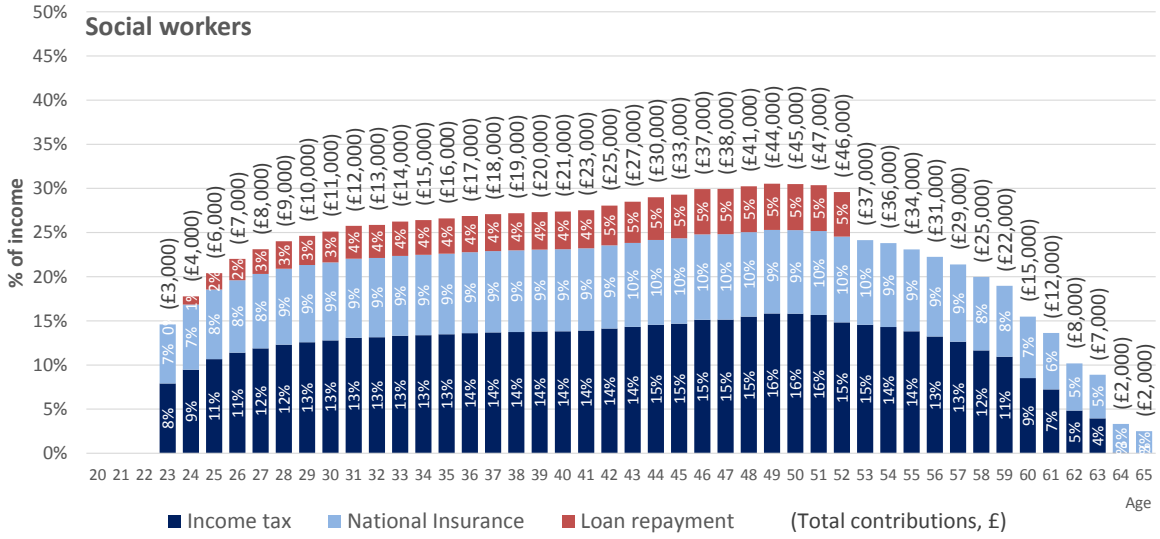
Annex 3 Supplementary information

A3.1 Stage 1: Additional findings

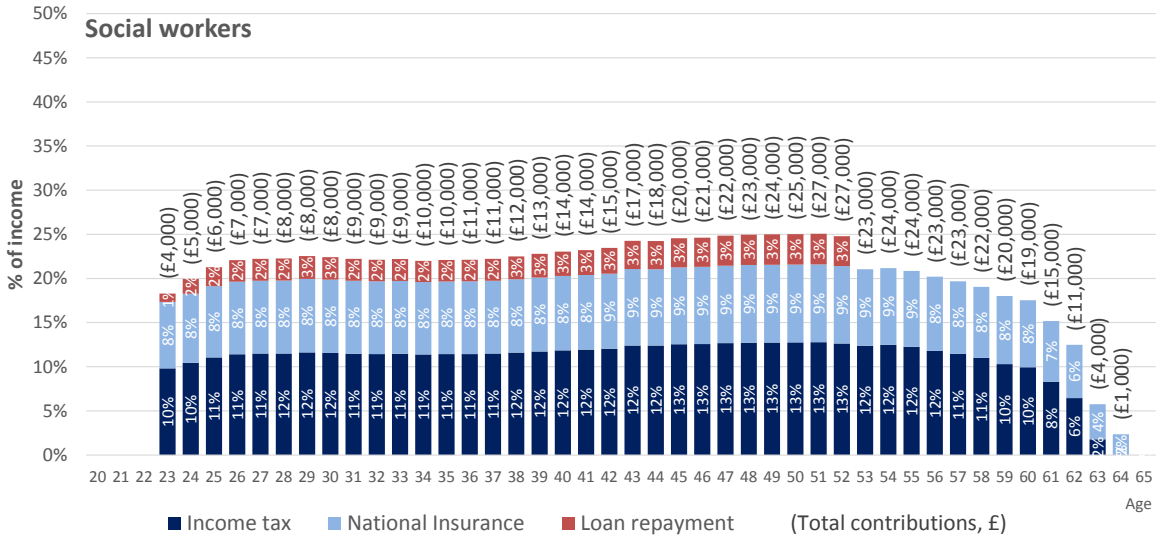
Supplementing the information on the total tax contributions of graduates as a proportion of income (see Figure 5), Figure 19 to Figure 26 present the breakdown of these contributions (as well as the total monetary value) into income tax, National Insurance and loan repayments. The figures are presented separately by occupation and gender.

Figure 19 Total tax contributions of social workers as a % of income (and total in £), by gender

Men



Women

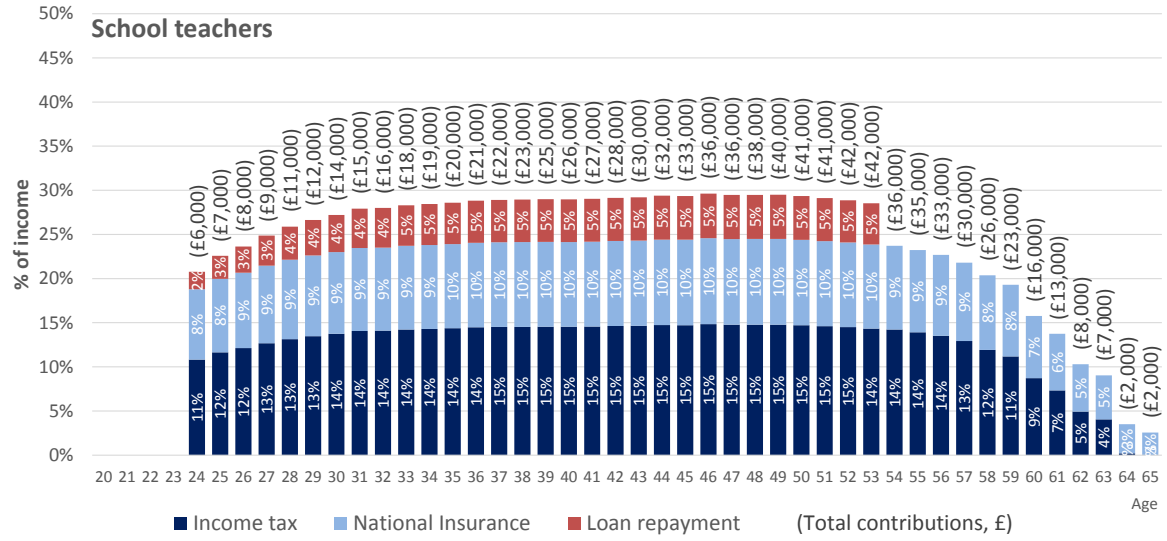


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

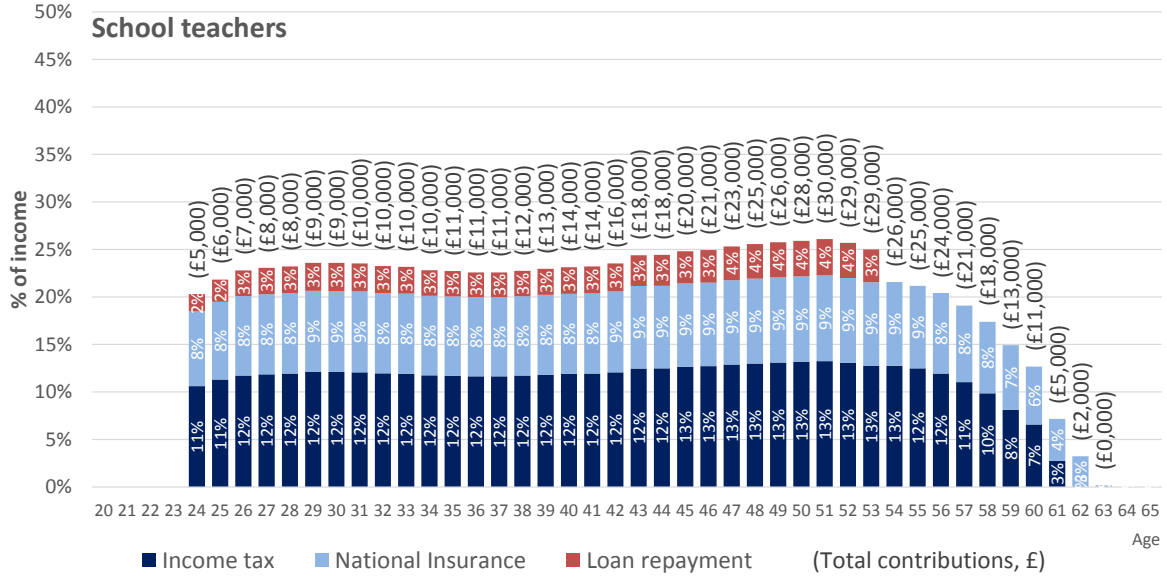
Source: London Economics' analysis

Figure 20 Total tax contributions of school teachers as a % of income (and total in £), by gender

Men



Women

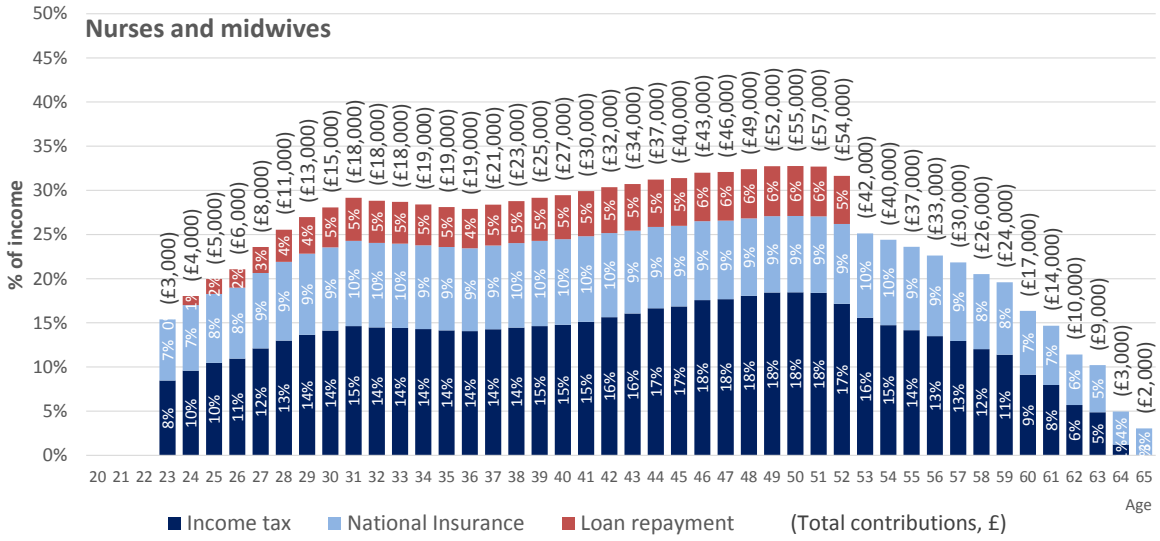


Note: We have assumed that loan write-off amongst school teachers occurs after the age of 53 (rather than 52), based on the relatively longer assumed duration of study for individuals in this occupation (see Table 5). Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

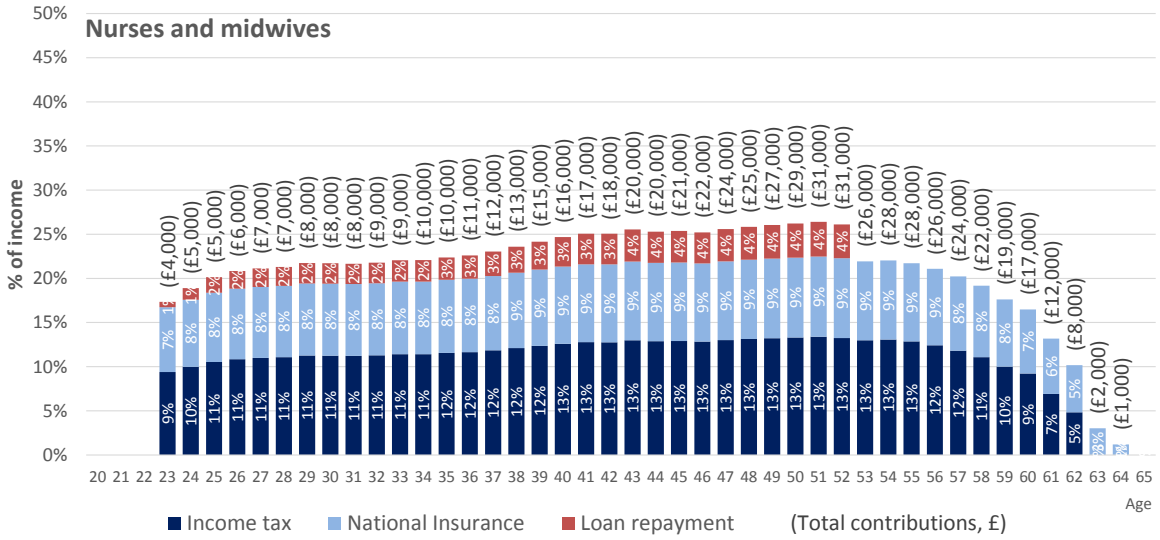
Source: London Economics' analysis

Figure 21 Total tax contributions of nurses and midwives as a % of income (and total in £), by gender

Men



Women

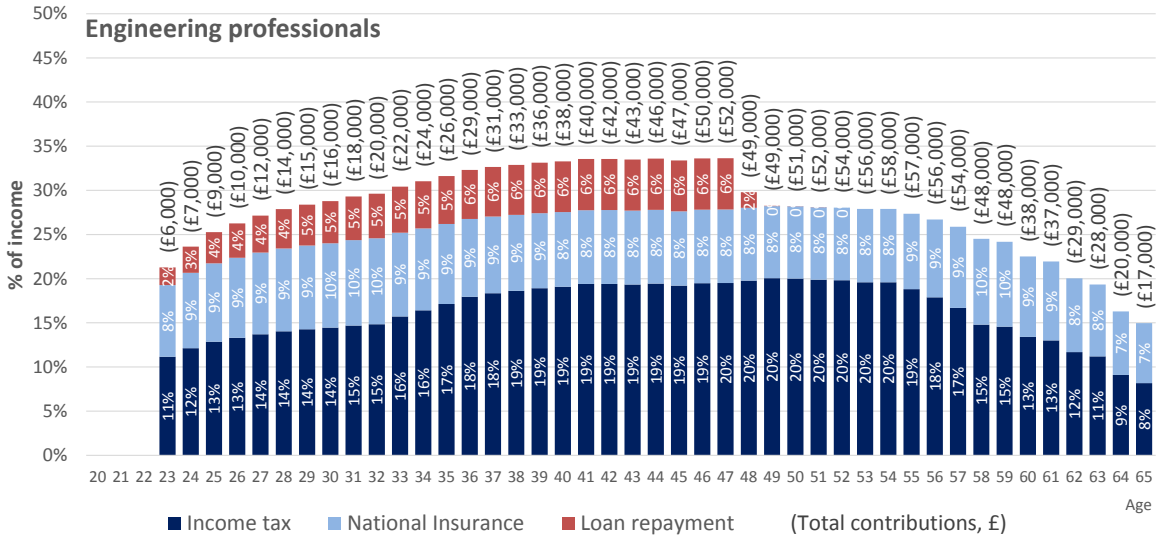


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

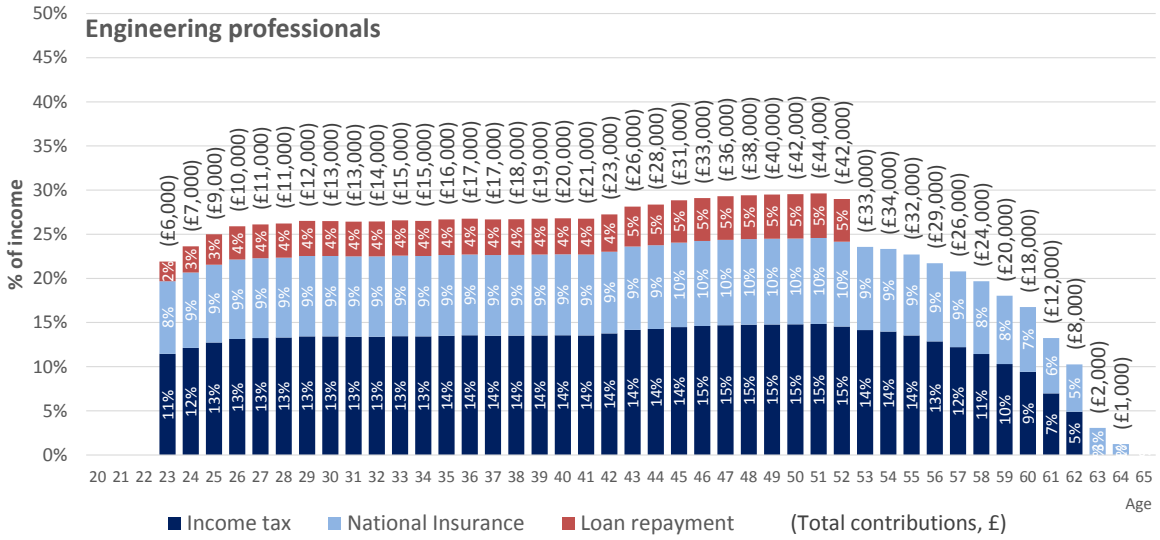
Source: London Economics' analysis

Figure 22 Total tax contributions of engineering professionals as a % of income (and total in £), by gender

Men



Women

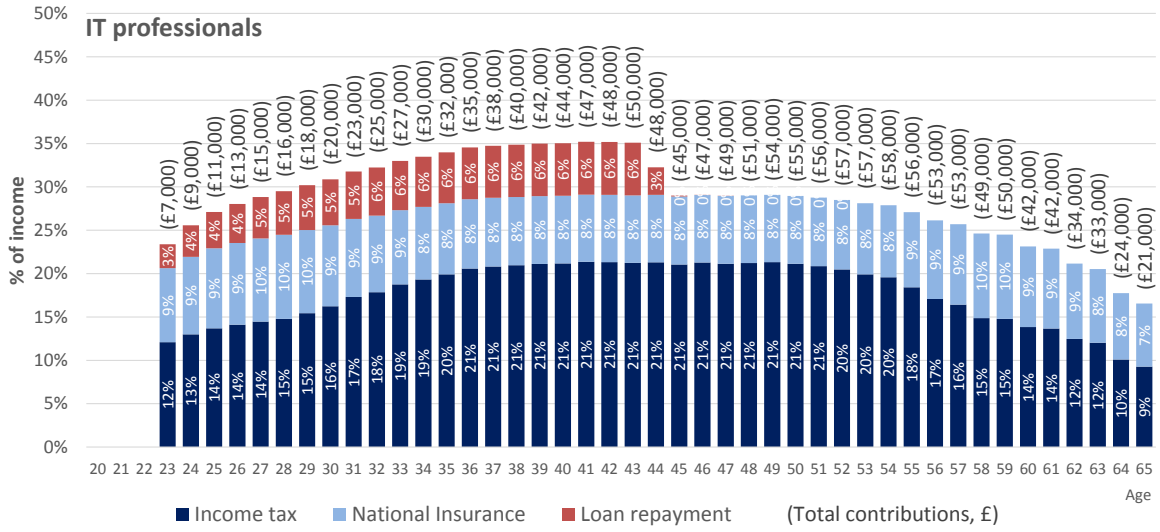


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

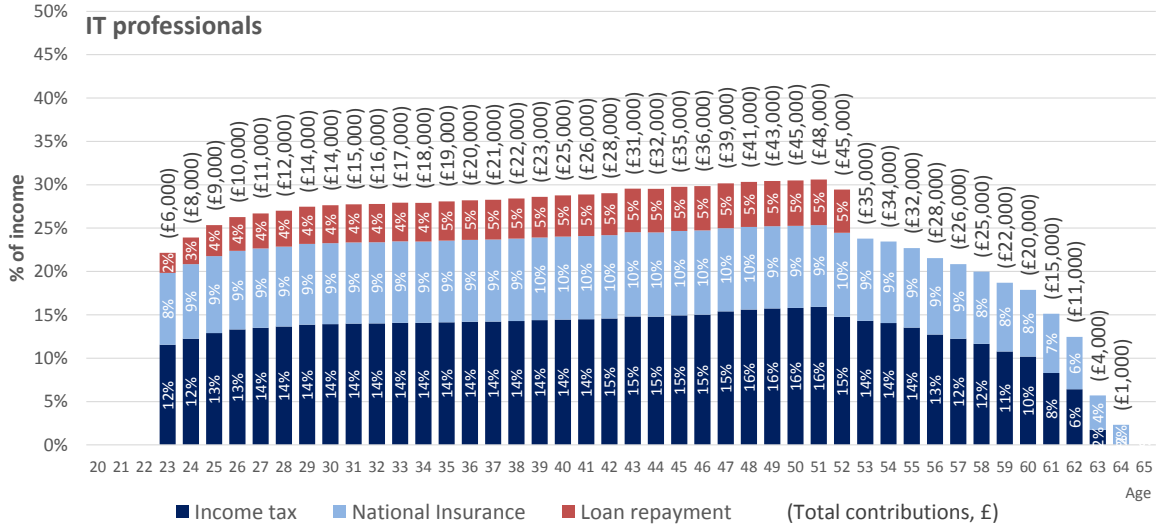
Source: London Economics' analysis

Figure 23 Total tax contributions of IT professionals as a % of income (and total in £), by gender

Men



Women

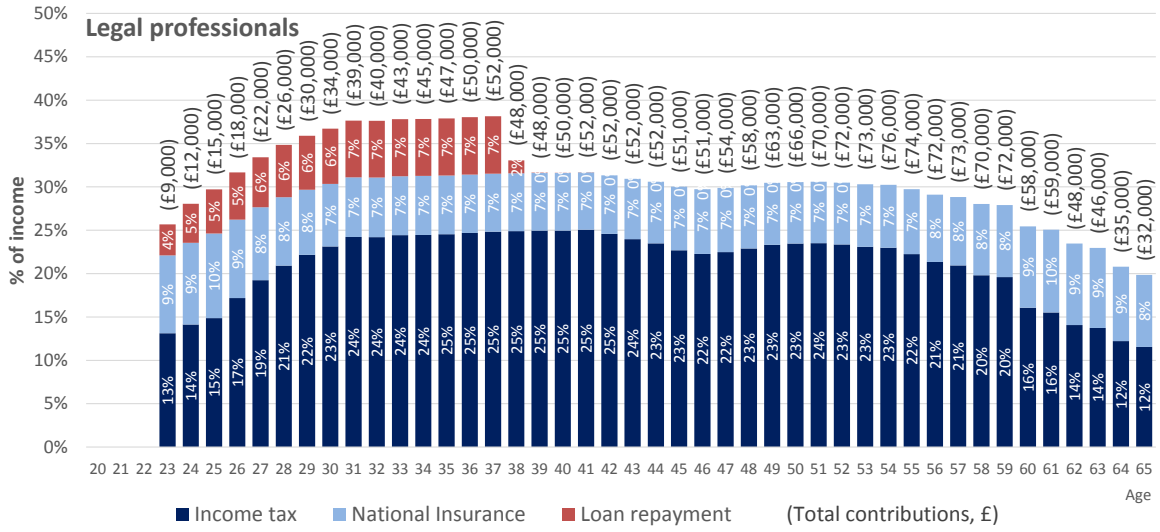


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

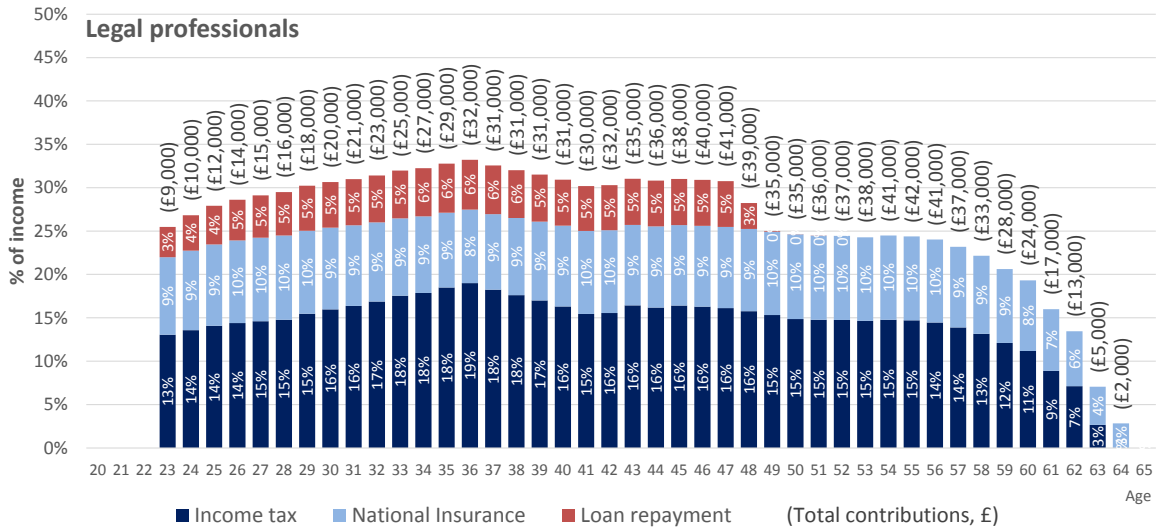
Source: London Economics' analysis

Figure 24 Total tax contributions of legal professionals as a % of income (and total in £), by gender

Men



Women

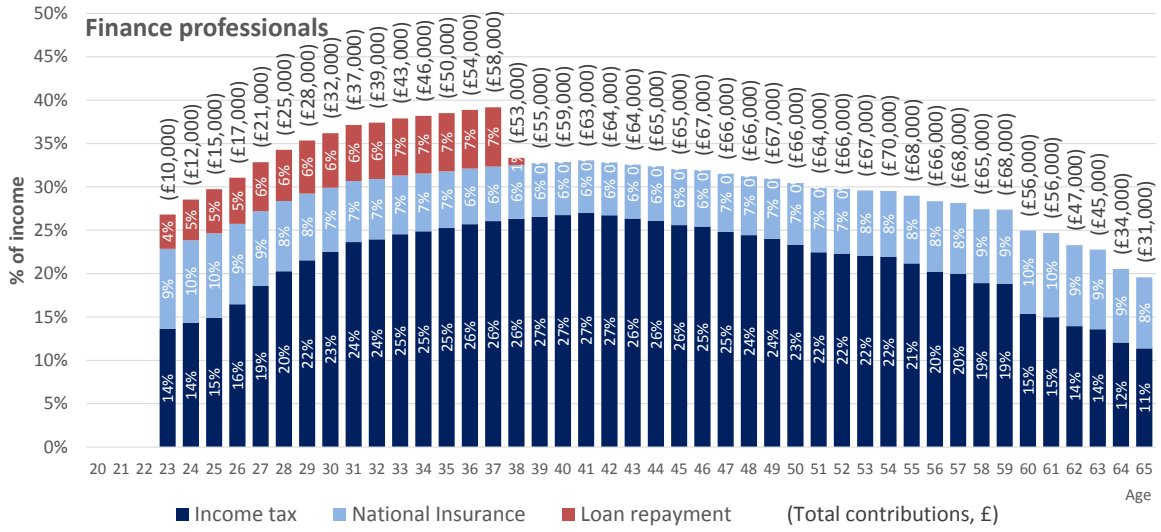


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

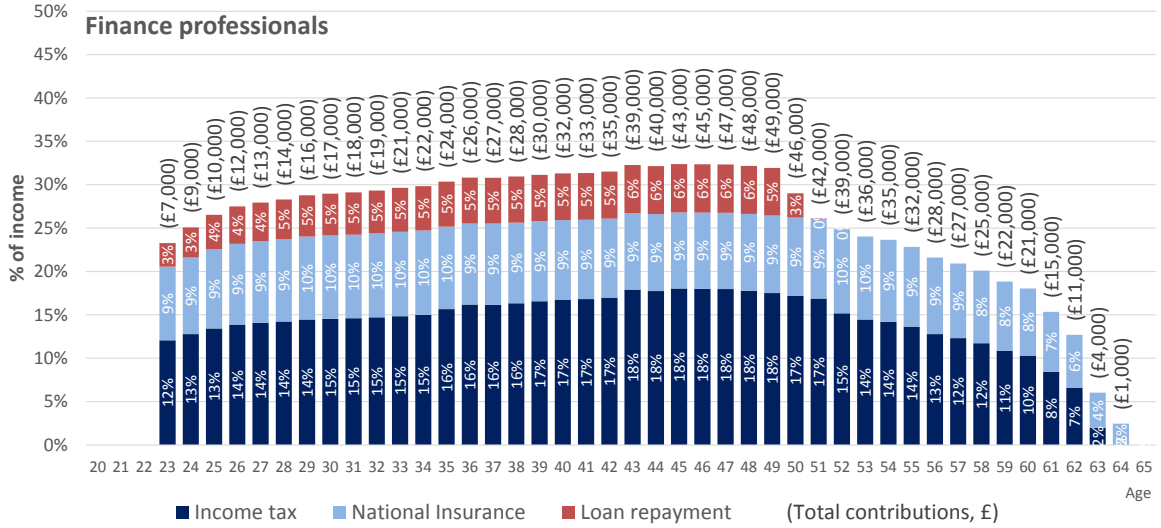
Source: London Economics' analysis

Figure 25 Total tax contributions of finance professionals as a % of income (and total in £), by gender

Men



Women

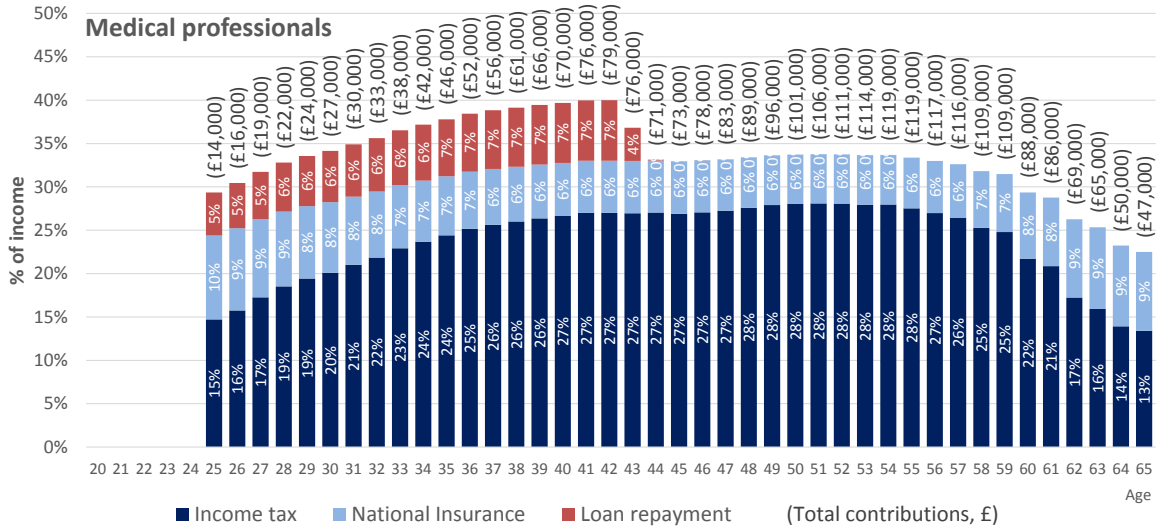


Note: Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

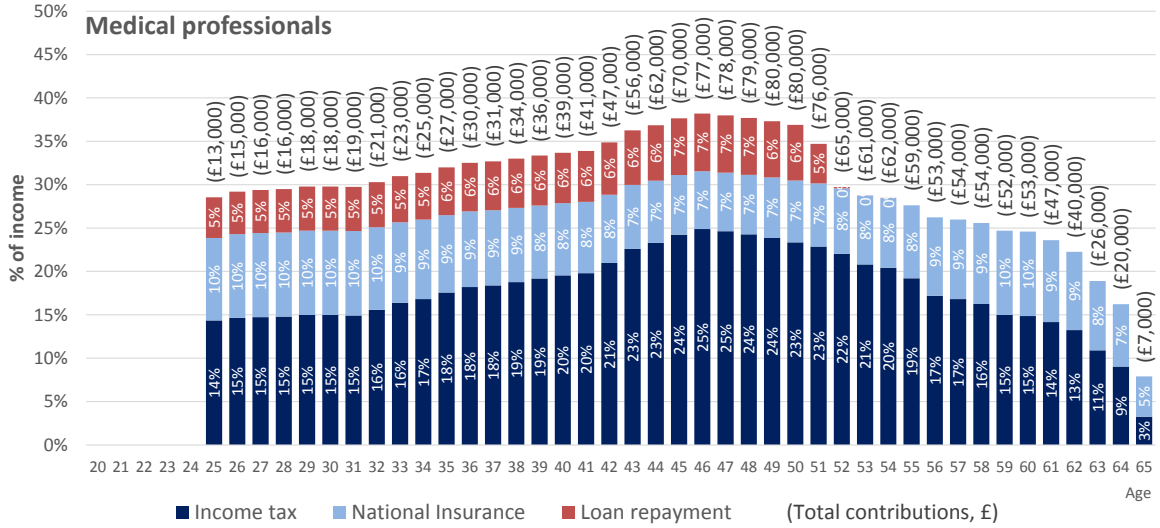
Source: London Economics' analysis

Figure 26 Total tax contributions of medical professionals as a % of income (and total in £), by gender

Men



Women



Note: We have assumed that loan write-off amongst medical professionals occurs after the age of 54 (rather than 52), based on the relatively longer assumed duration of study for individuals in this occupation (see Table 5). Monetary values are presented in current (rather than constant) prices, are *not* discounted to reflect present values, and are rounded to the nearest £1,000.

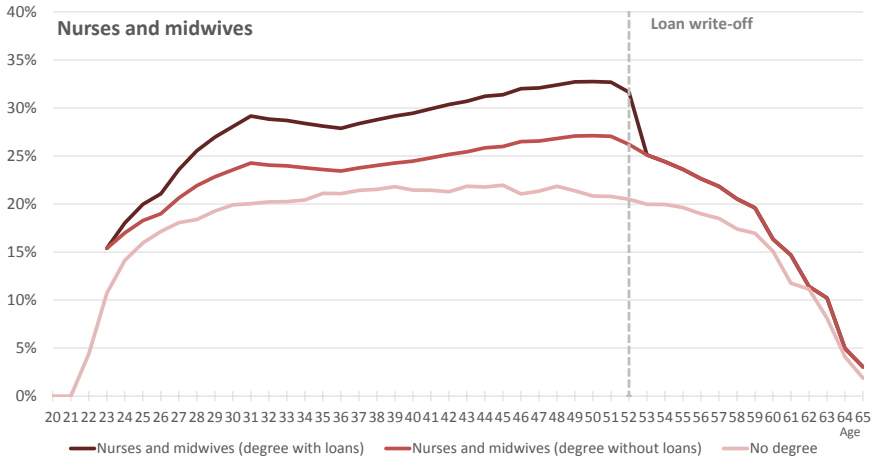
Source: London Economics' analysis

A3.2 Stage 2: Additional findings

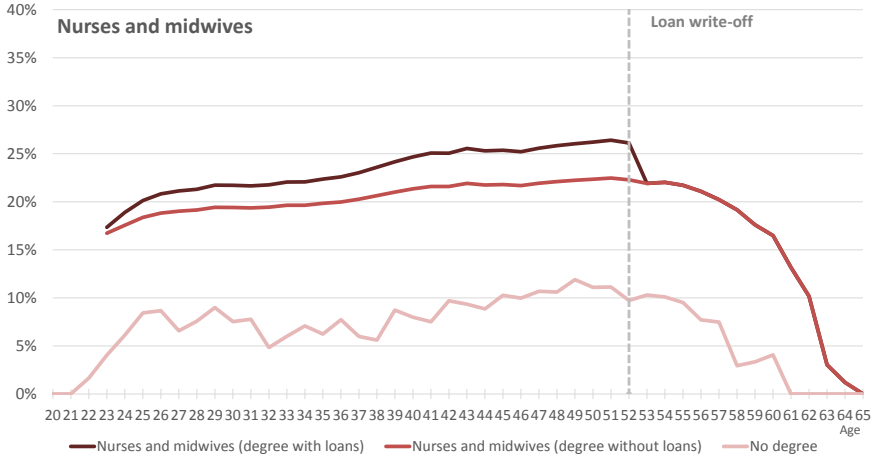
In Figure 27 to Figure 36, we present supplementary information on the average and marginal tax contributions of graduates with and without loans, and individuals without degrees (in possession of Level 3 qualifications), for additional occupations not already presented in 2.2 above. These include nurses and midwives, engineering professionals, IT professionals, finance professionals, and medical professionals.

Figure 27 *Average* tax contributions as a % of income for graduate nurses and midwives with and without loans, and individuals without degrees

Men



Women

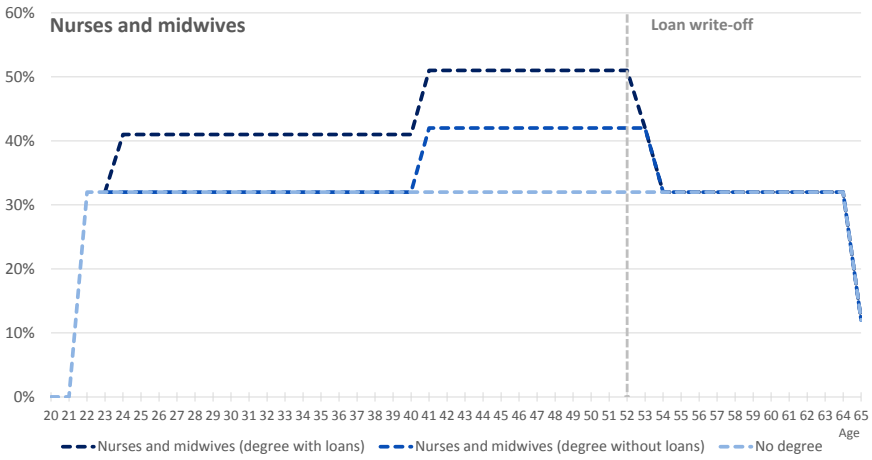


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

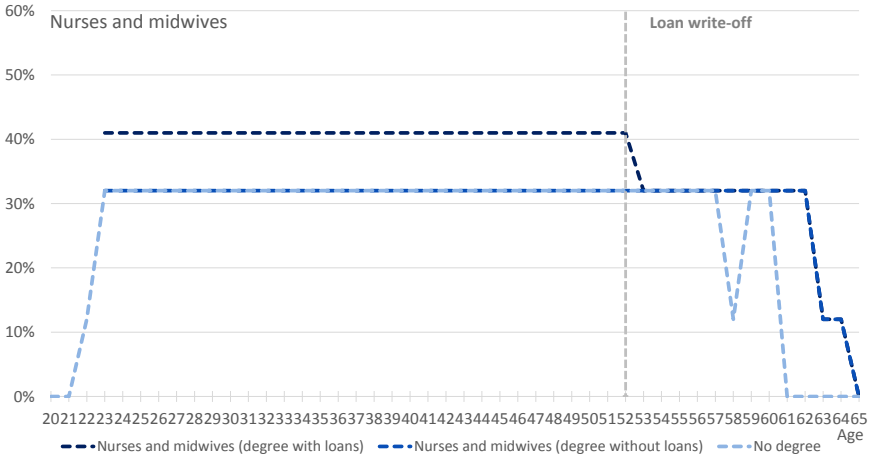
Source: London Economics' analysis

Figure 28 *Marginal* tax contributions as a % of income for graduate nurses and midwives with and without loans, and individuals without degrees

Men



Women

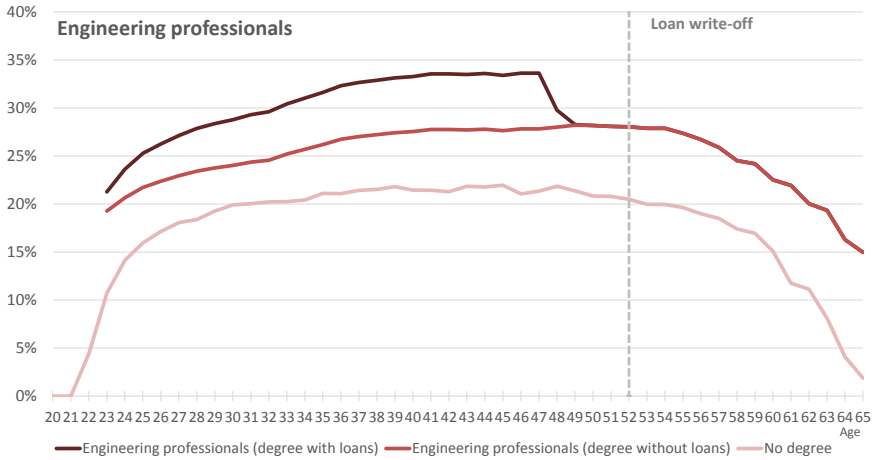


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

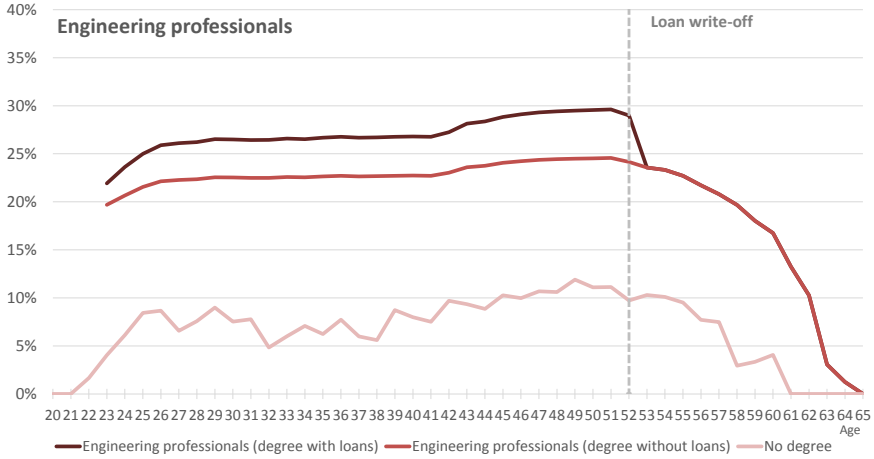
Source: London Economics' analysis

Figure 29 *Average* tax contributions as a % of income for graduate engineering professionals with and without loans, and individuals without degrees

Men



Women

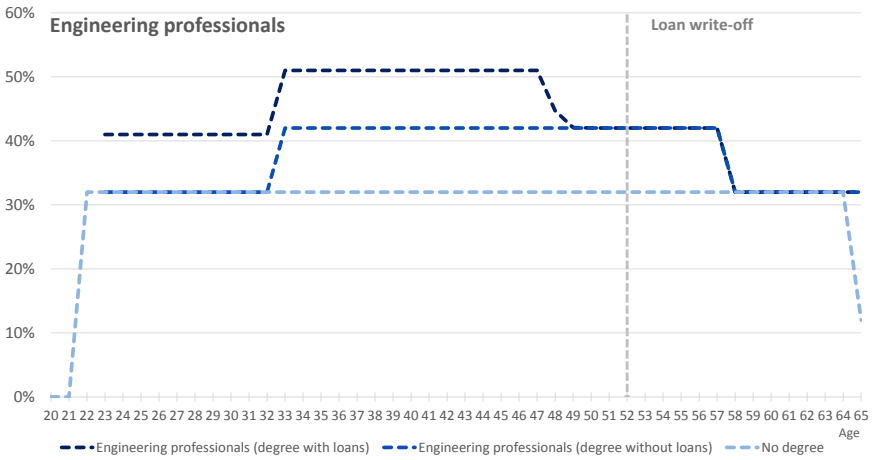


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

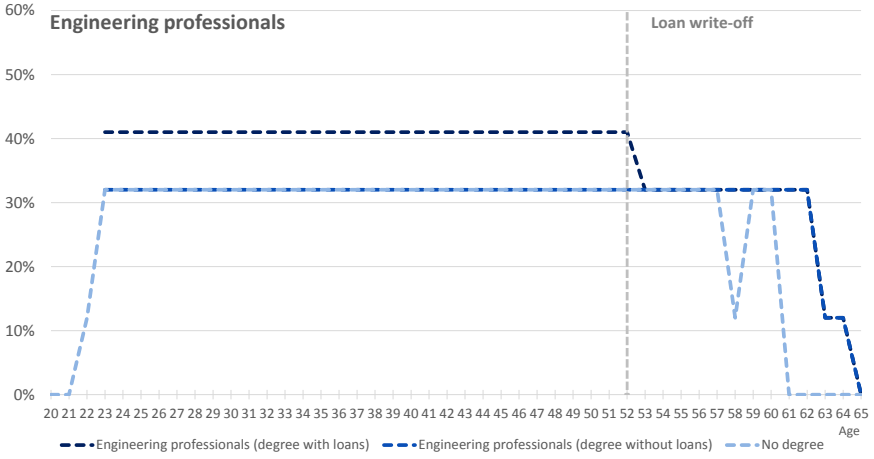
Source: London Economics' analysis

Figure 30 *Marginal* tax contributions as a % of income for graduate engineering professionals with and without loans, and individuals without degrees

Men



Women

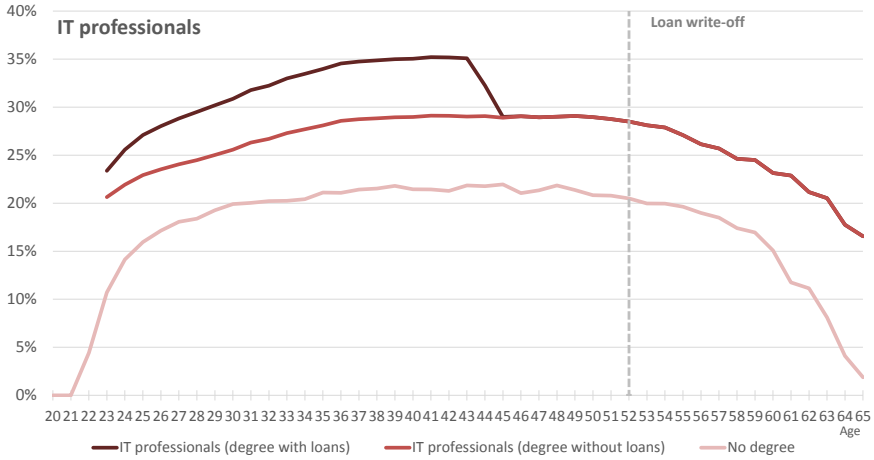


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

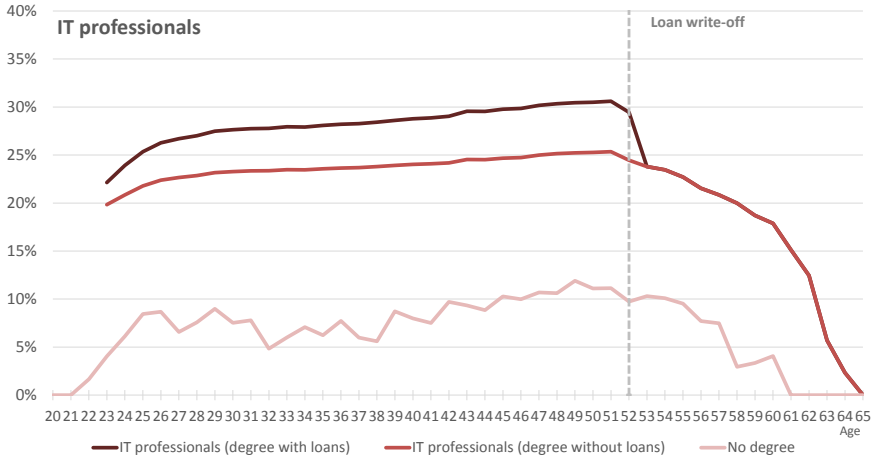
Source: London Economics' analysis

Figure 31 *Average* tax contributions as a % of income for graduate IT professionals with and without loans, and individuals without degrees

Men



Women

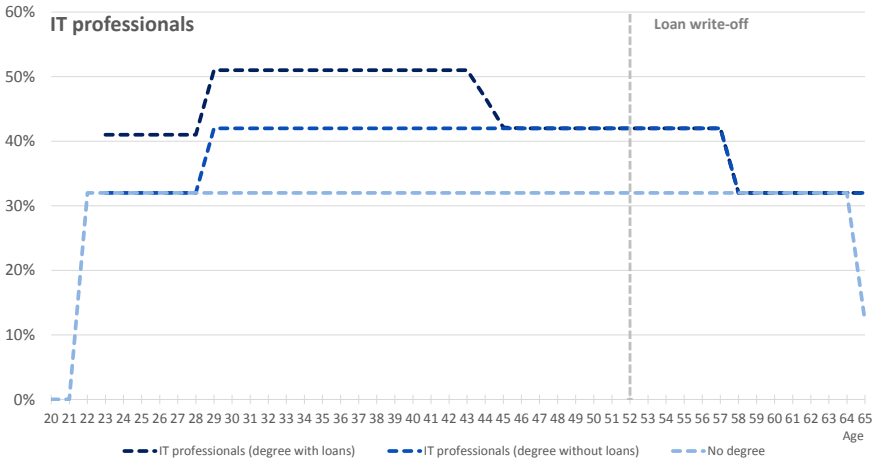


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

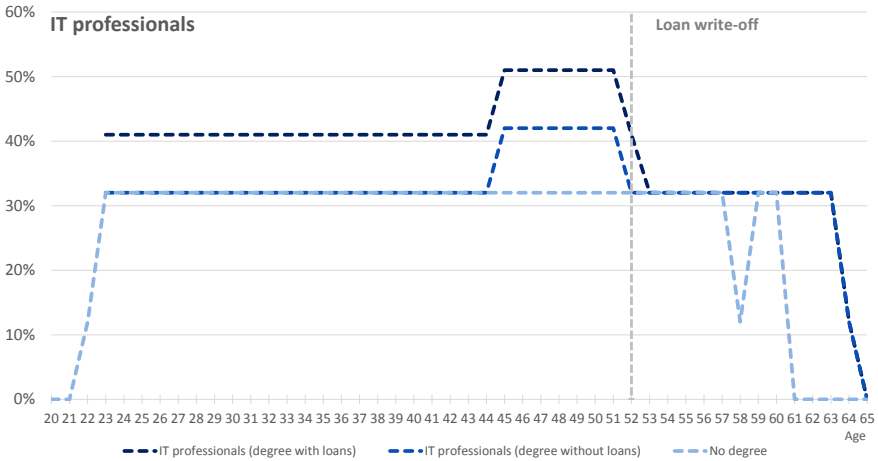
Source: London Economics' analysis

Figure 32 *Marginal* tax contributions as a % of income for graduate IT professionals with and without loans, and individuals without degrees

Men



Women

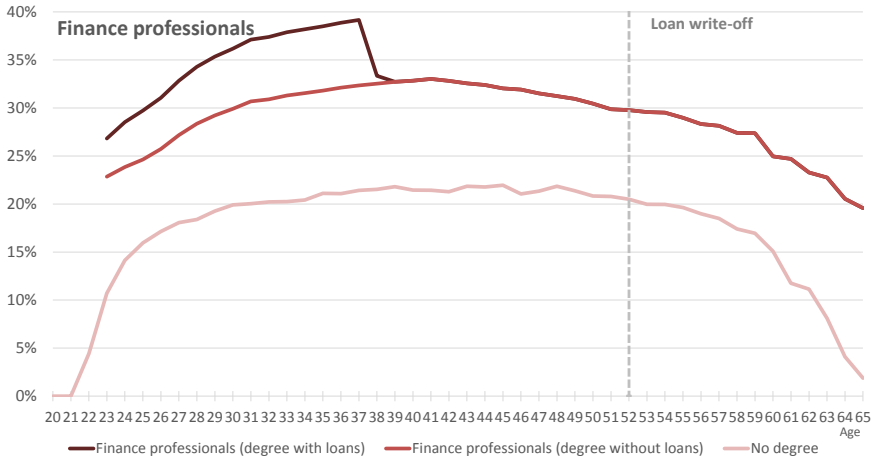


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

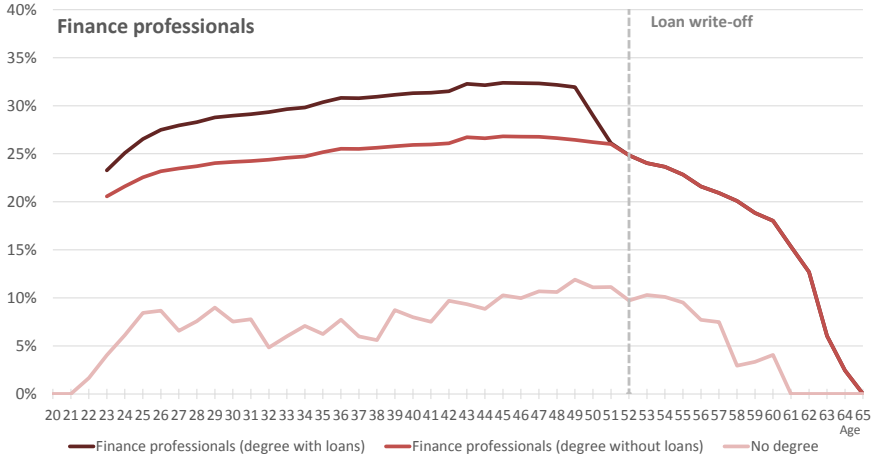
Source: London Economics' analysis

Figure 33 *Average* tax contributions as a % of income for graduate finance professionals with and without loans, and individuals without degrees

Men



Women

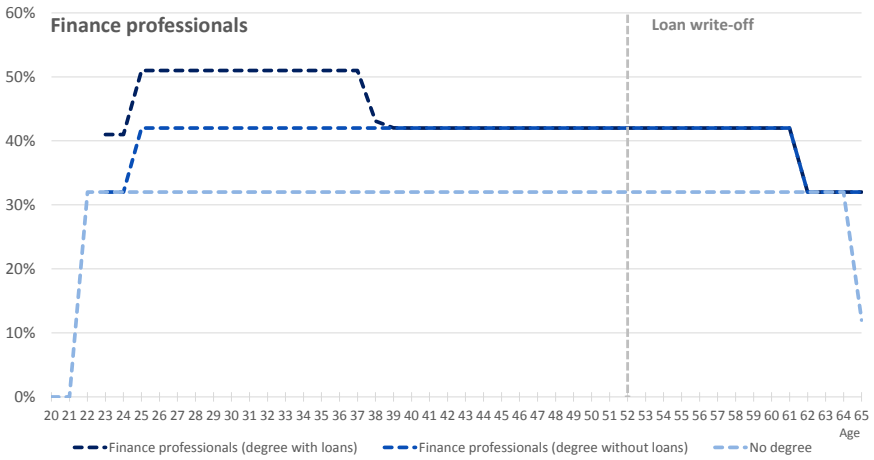


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

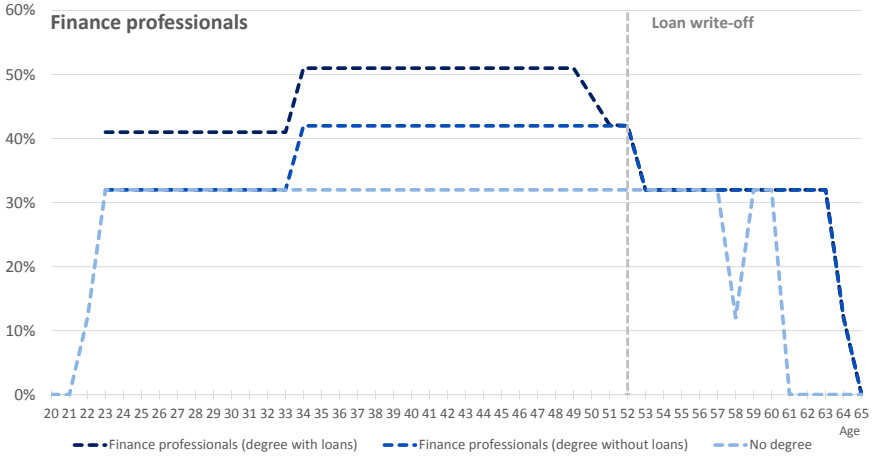
Source: London Economics' analysis

Figure 34 *Marginal* tax contributions as a % of income for graduate finance professionals with and without loans, and individuals without degrees

Men



Women

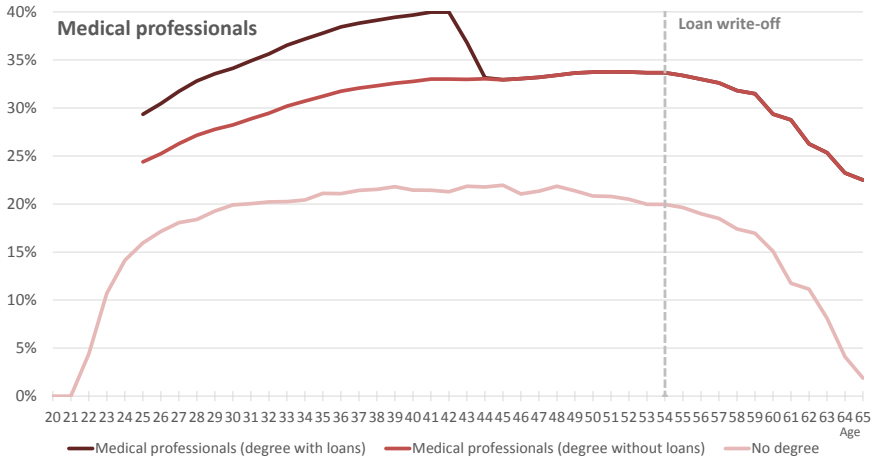


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

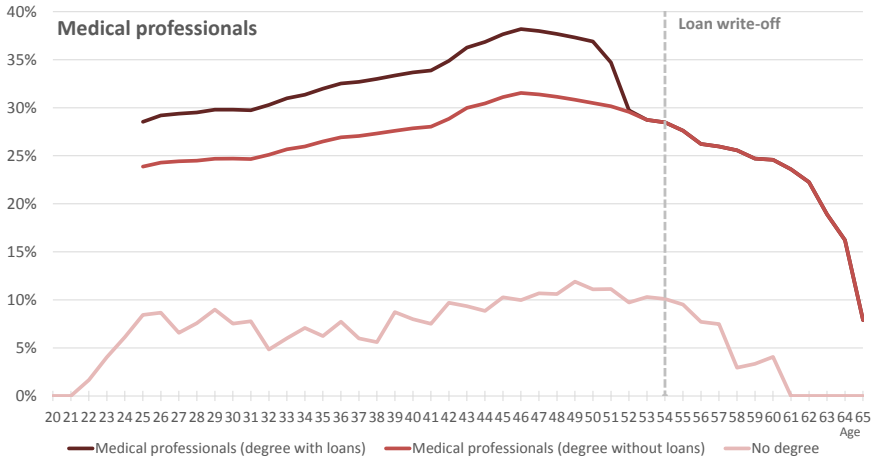
Source: London Economics' analysis

Figure 35 *Average* tax contributions as a % of income for graduate medical professionals with and without loans, and individuals without degrees

Men



Women

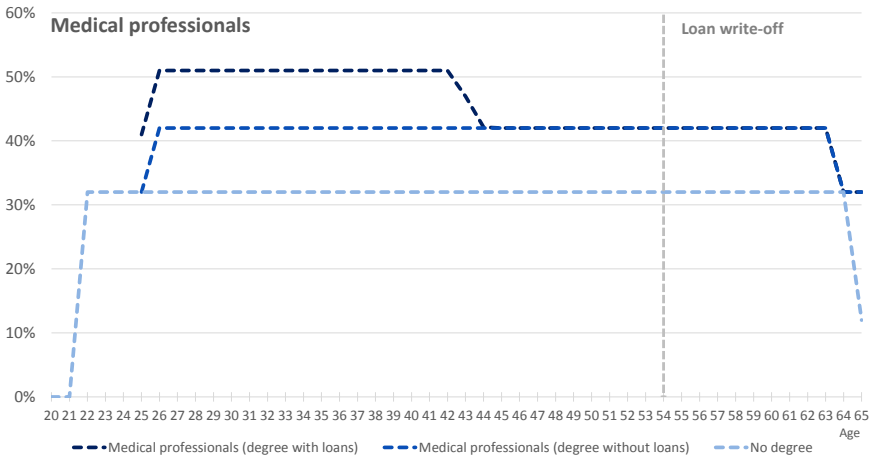


Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

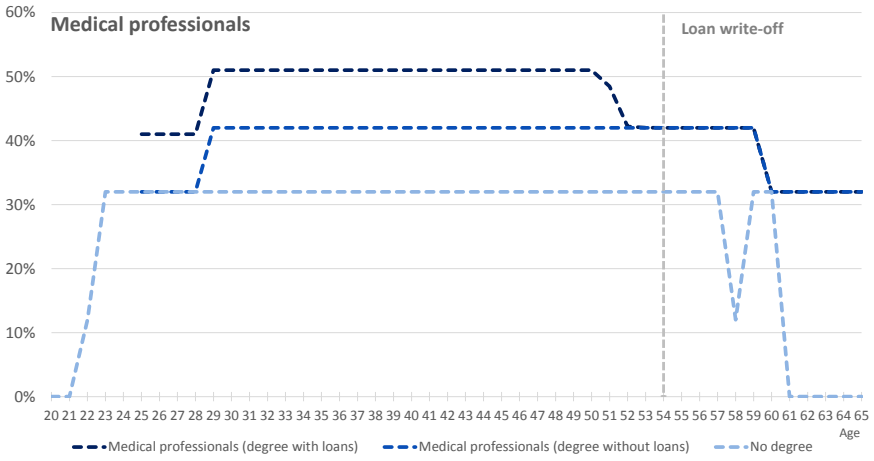
Source: London Economics' analysis

Figure 36 *Marginal* tax contributions as a % of income for graduate medical professionals with and without loans, and individuals without degrees

Men



Women



Note: 'No degree' category is based on median earnings among individuals in possession of Level 3 qualifications as their highest level of attainment.

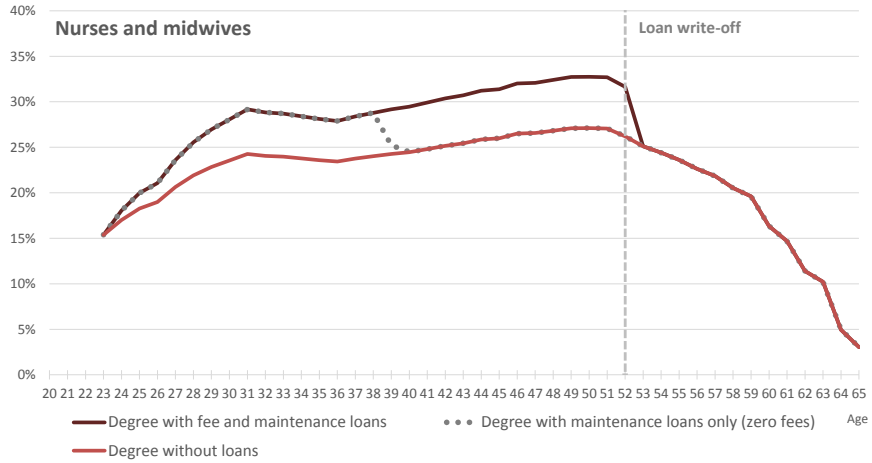
Source: London Economics' analysis

A3.3 Stage 3: Additional findings

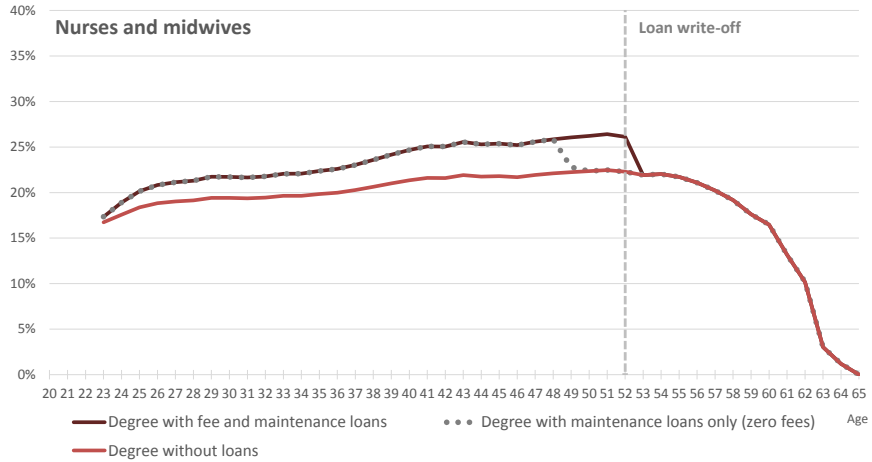
In Figure 37 to Figure 46, we present supplementary information on the average and marginal tax contributions of graduates with both fee and maintenance loans, with maintenance loans only (under the hypothetical scenario of zero fees), and without loans, for additional occupations not already presented in Section 2.3 above. Again, these include nurses and midwives, engineering professionals, IT professionals, finance professionals, and medical professionals.

Figure 37 *Average* tax contributions as a % of income for graduate nurses and midwives with fee and maintenance loans, with maintenance loans only, and without loans

Men



Women

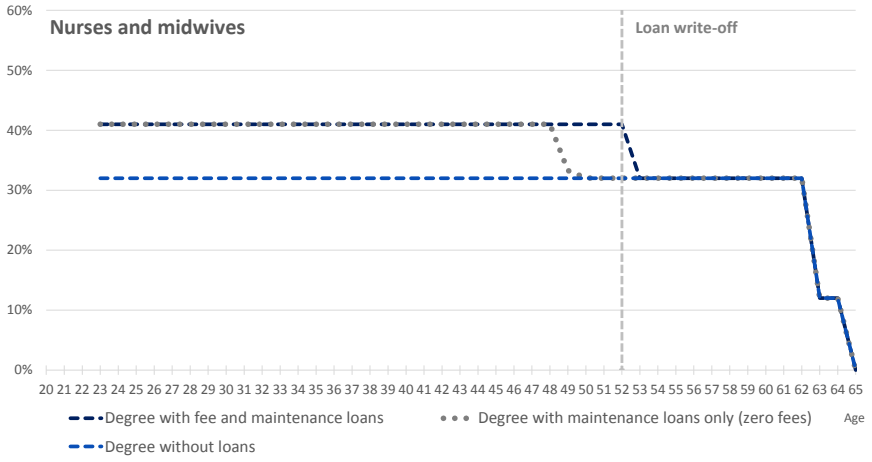


Source: London Economics' analysis

Figure 38 *Marginal* tax contributions as a % of income for graduate nurses and midwives with fee and maintenance loans, with maintenance loans only, and without loans

Men

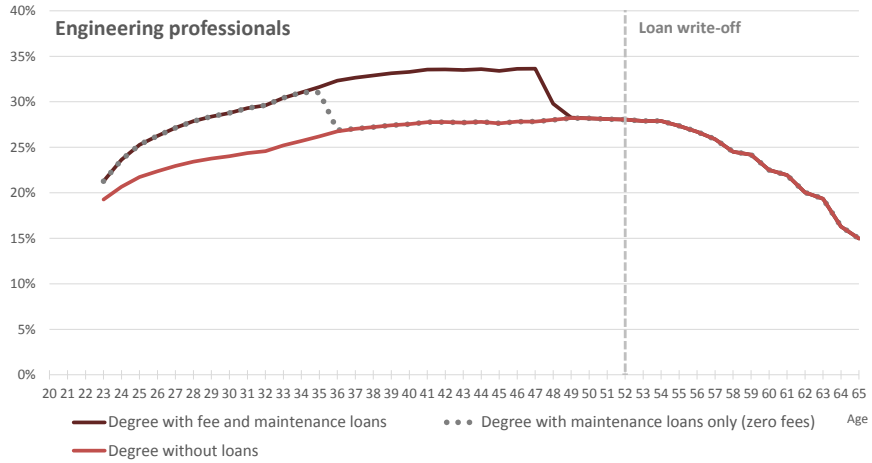
Women



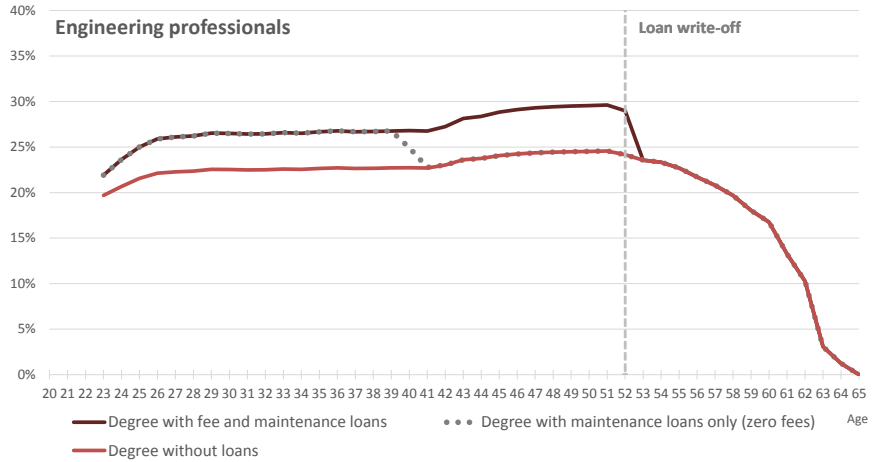
Source: London Economics' analysis

Figure 39 *Average* tax contributions as a % of income for graduate engineering professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



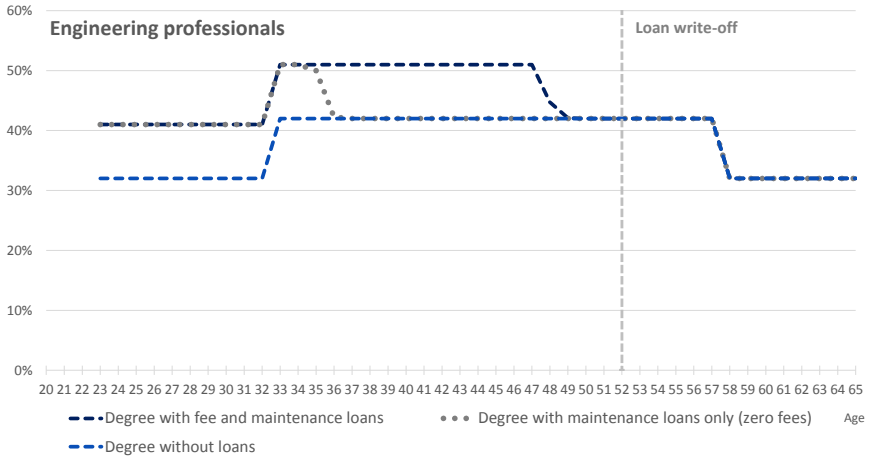
Women



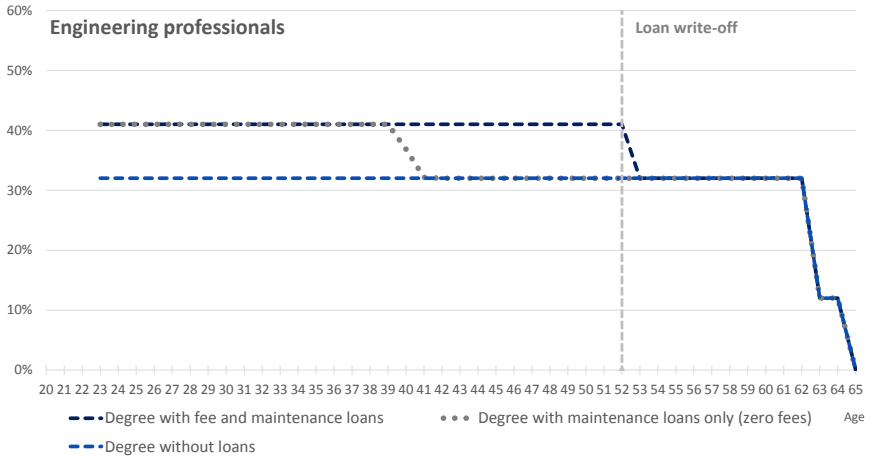
Source: London Economics' analysis

Figure 40 *Marginal* tax contributions as a % of income for graduate engineering professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



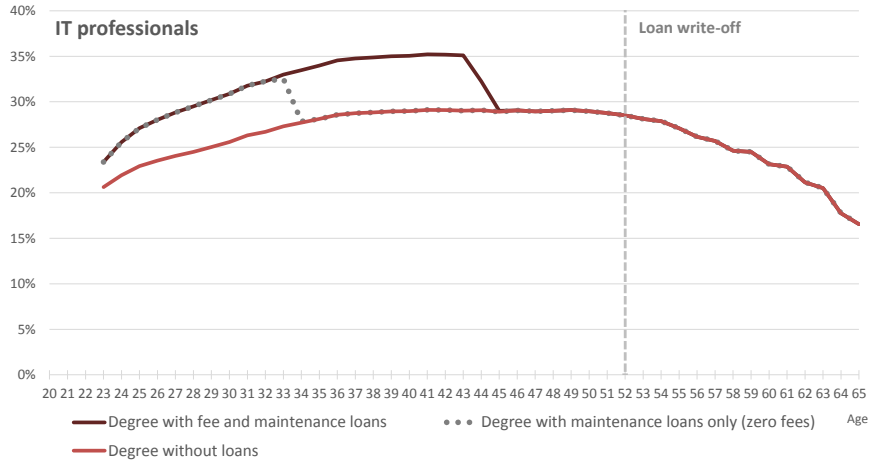
Women



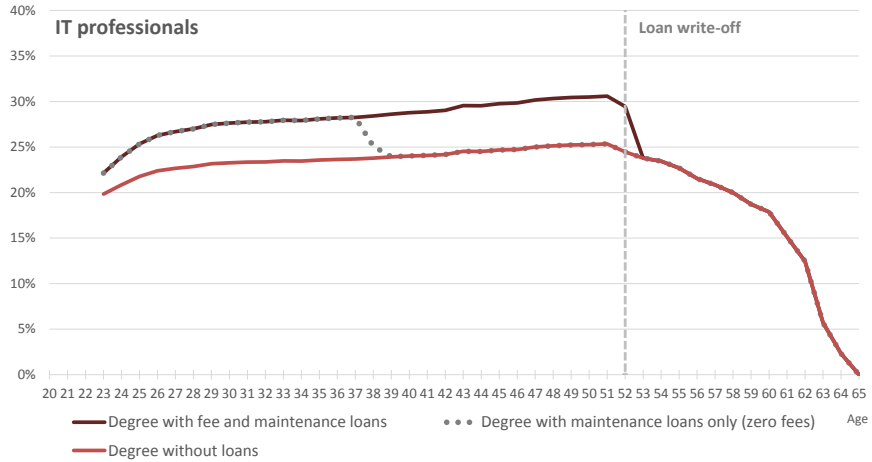
Source: London Economics' analysis

Figure 41 *Average* tax contributions as a % of income for graduate IT professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



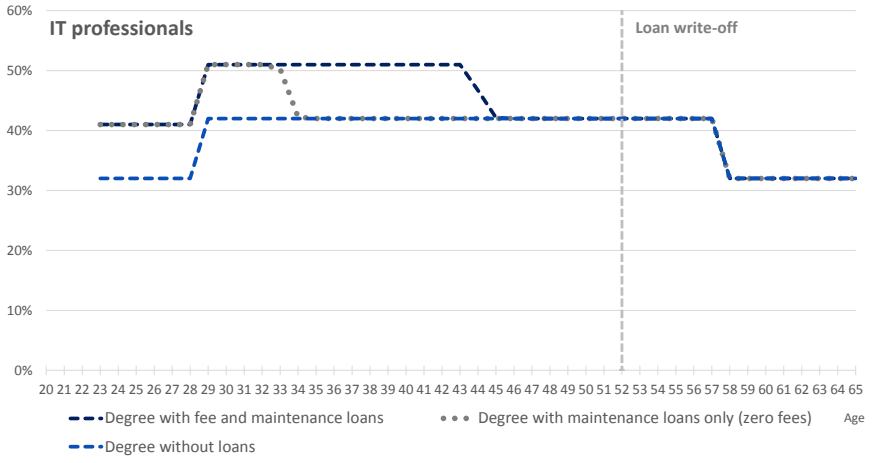
Women



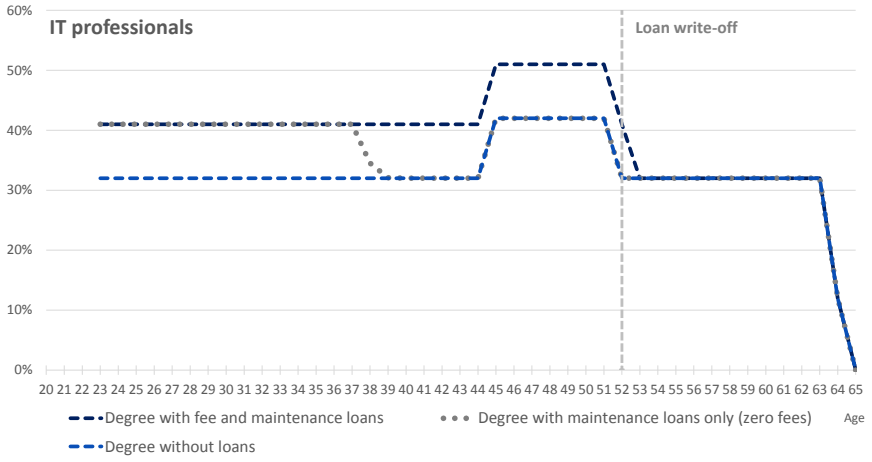
Source: London Economics' analysis

Figure 42 *Marginal* tax contributions as a % of income for graduate IT professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



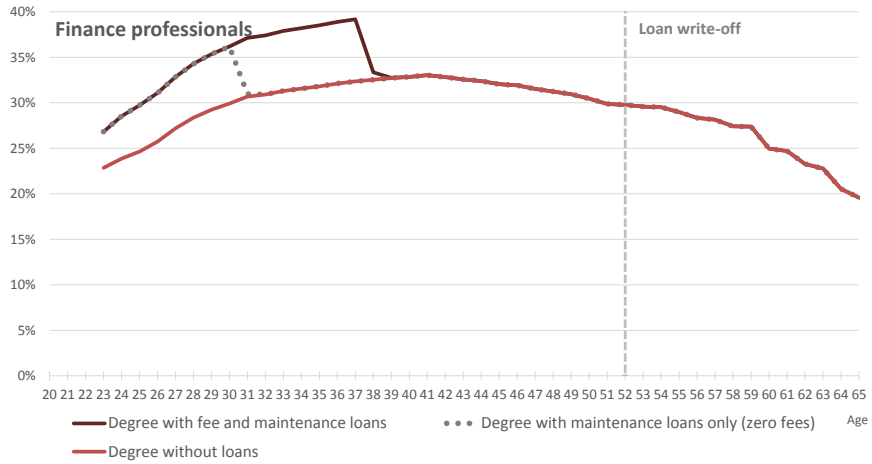
Women



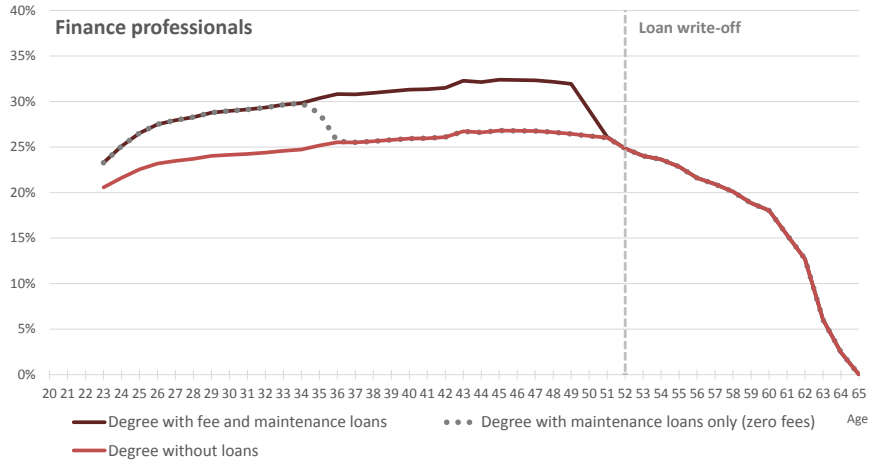
Source: London Economics' analysis

Figure 43 *Average* tax contributions as a % of income for graduate finance professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



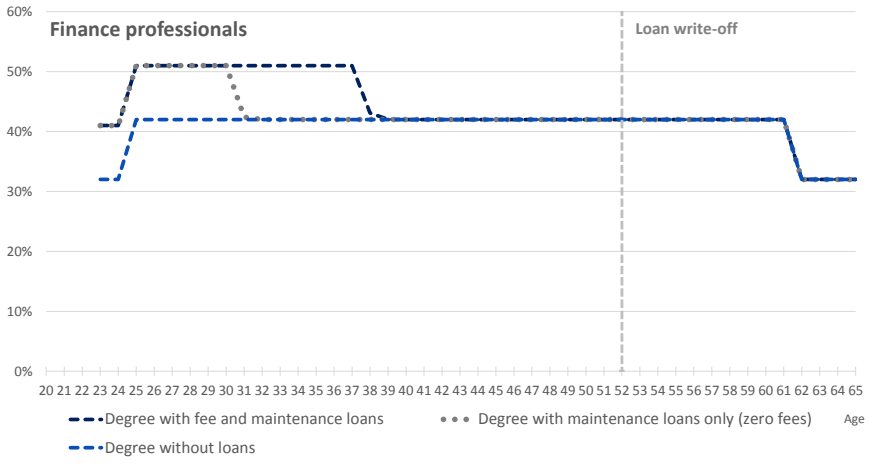
Women



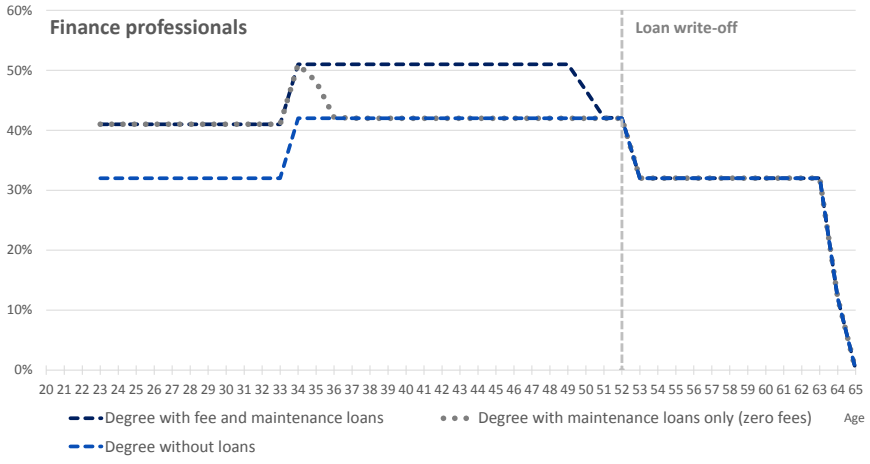
Source: London Economics' analysis

Figure 44 *Marginal* tax contributions as a % of income for graduate finance professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



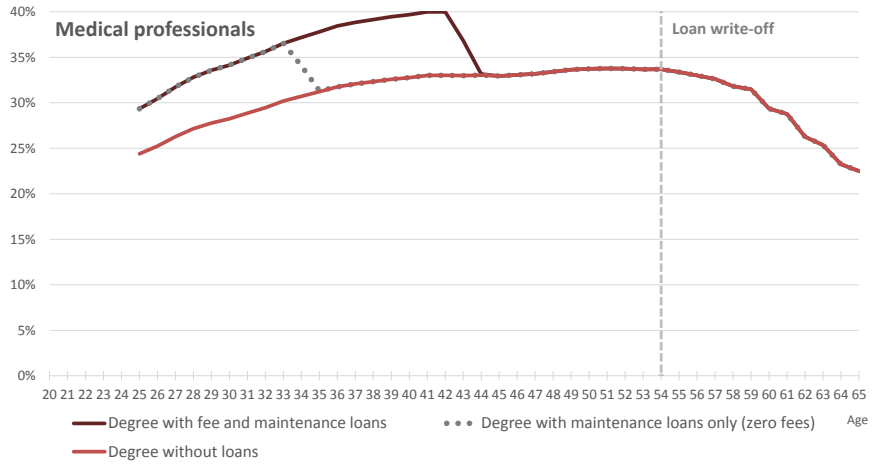
Women



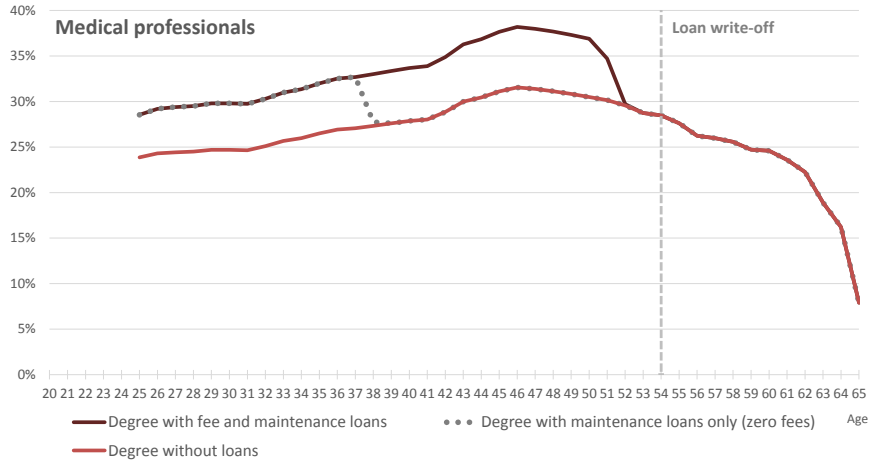
Source: London Economics' analysis

Figure 45 *Average* tax contributions as a % of income for graduate medical professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



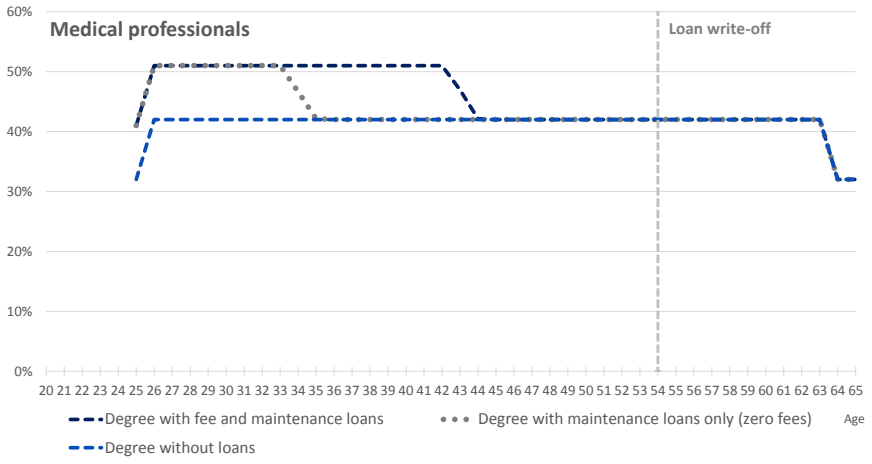
Women



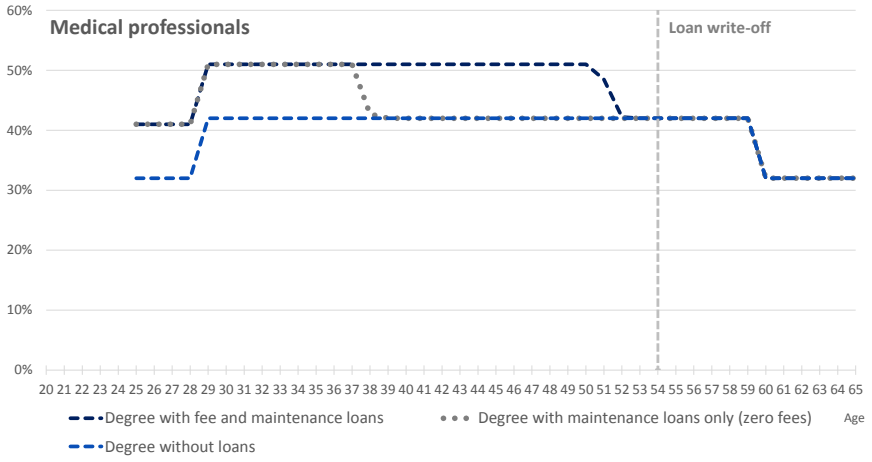
Source: London Economics' analysis

Figure 46 *Marginal* tax contributions as a % of income for graduate medical professionals with fee and maintenance loans, with maintenance loans only, and without loans

Men



Women



Source: London Economics' analysis

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