
# Estimating the public cost of student loans

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# Preface

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# Executive Summary

The UK is currently experiencing a period of considerable fiscal austerity. This has had profound implications for virtually all areas of public spending, including spending on higher education (HE).

One area of government spending on HE that has been relatively less well understood to date is spending on student loans. Student loans result in a long-run cost to the government for two reasons. First, not all loans will be repaid, since the debt is written off under certain circumstances. Second, the loans are (on average) made available at subsidised interest rates – in other words, the interest payable by the borrower is generally lower than the interest the government has to pay on its debt. This means that providing student loans would be costly to the government even if they were all repaid in full.

Estimating the long-run public cost of providing student loans is important. The government needs to have an unbiased estimate of the cost of student loans, and a quantification of the uncertainty around that, if it is to understand the public finance implications of the current HE funding system, its likely financial sustainability, and how the burden of HE funding is shared between the taxpayer and graduates. Were the long-run cost of issuing student loans today to be underestimated, then a future government would have to accept higher-than-expected levels of public sector debt, or offset this by increasing taxes or cutting spending elsewhere.

However, estimating the long-run cost of student loans is inherently difficult. It requires a model to forecast graduate income and repayment behaviour over many decades in the future. The Department for Business, Innovation and Skills (BIS) has such a model, but a recent report from the House of Commons Committee of Public Accounts (2014, p. 3) reported that 'The Department is unable to accurately forecast student loan repayments, and does not have a sufficient understanding of the likely future cost of non-repayment to the taxpayer'. We understand that BIS is in the process of updating its model, and a revised estimate of the public cost of issuing student loans calculated using this model was given by Universities Minister David Willetts in response to a Parliamentary Question on 20 March 2014.[1] However, no details of this model have yet been made publicly available.

In this report, we use our own model of graduate earnings and repayments (described in detail in Chapter 3) to produce an independent estimate of the long-run cost of providing student loans and we describe how this varies across the graduate earnings distribution.[2] We also quantify some of the uncertainty

[1] Source: http://liambyrne.co.uk/university-finance-system-turning-into-a-money-pit-as-rab-charge-hits-45/.

[2] In principle, graduates must make repayments out of unearned income exceeding £2,000 per year. In practice, however, only those who submit self-assessment tax returns make repayments on the basis of unearned income. Given that the number of individuals to whom this applies is

around these estimates and illustrate the impact of potential changes to the terms under which student loans are offered.

## Baseline estimates

- Chapter 4 presents our baseline estimates. We focus on young English-domiciled students entering higher education in 2012 to study full-time for a first degree at universities in England. All of the figures we report are the total cost over the course of the degree and are expressed in real net-present-value (NPV) terms. This means that we take account of inflation by reporting everything in 2014 prices; we also discount future repayments back to 2012 – that is, we account for the fact that future repayments are worth less to the government today than repayments made today.

- Under the assumption that all such students take out the full amount of the loan to which they are entitled and make repayments according to the repayment schedule, our baseline estimates suggest that, for each £1 loaned out to cover the costs of tuition and maintenance, the long-run cost to the government (the government 'subsidy') is 43.3p.

- We estimate that the average loan issued per student over the life of their course is £40,286 in NPV terms in 2014 prices, meaning that the average loan subsidy per student amounts to £17,443. For an annual intake of 300,000 full-time English-domiciled students, that amounts to a total of £5.2 billion.

- The degree of subsidy varies considerably across the distribution of graduate earnings: while the lowest-earning 10% of graduates receive a subsidy of 93% (£36,481 on average), the highest-earning 10% of graduates receive a subsidy of just 1% (£475 on average).

- If we additionally take into account the other ways in which the government subsidises higher education (such as the provision of teaching grants to universities and maintenance grants to low-income students), then the total taxpayer contribution rises to an average £24,592 per student.

- The way in which higher education is funded changed dramatically in September 2012. Teaching grants paid directly to universities were abolished for all but the most expensive subjects, with the cap on tuition fees raised significantly in order to ensure that universities did not lose out.

- We can compare estimates of the average taxpayer contribution per student and the average resources available to universities for teaching per student with estimates for these figures in the absence of the 2012 reforms. Our baseline estimate of the total taxpayer contribution in respect of young English full-time undergraduates enrolling in English universities in 2012 is

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relatively small, together with the challenges of estimating unearned income, this report focuses on repayments made out of earnings only.

only 5% (£1,254 per student) lower than the cost we would estimate for this cohort if the 2012 reforms to HE funding had not been introduced (£25,847 per student).

- While the average total taxpayer contribution has not fallen very much as a result of the reforms, the resources available to universities for teaching have, on average, increased significantly, from £22,143 per student under the previous system to £28,250 per student under the current system. This is because the increase in tuition fees more than outweighed the reduction in teaching grants, and it is the government (rather than universities) that bears the risk that students do not pay back the loans they take out to cover tuition fees.

- The 2012 reforms have also led to considerably greater uncertainty over the total public cost of funding higher education, with the certain cost of teaching grants replaced by the uncertain costs of issuing larger student loans.

## Uncertainties around the long-run cost of student loans

- Estimating the long-run cost of student loans is fraught with uncertainty. Estimates tend to be based on a large number of assumptions, changing any of which is likely to alter the estimated cost, sometimes significantly. In Chapter 5, we illustrate how our estimated cost changes as we make different assumptions about future earnings growth, loan take-up rates, repayment behaviour, student numbers, fee levels and the government's cost of borrowing.

- The assumed future growth rate of earnings has important implications for our estimated cost of student loans. Our baseline assumption is that earnings grow by 1.1% a year in real terms from 2020 onwards (as forecast by the Office for Budget Responsibility (OBR) in its *Fiscal Sustainability Report 2013*). If instead earnings were to remain flat in real terms, the average loan subsidy would be £18,859 (compared with £17,443 in our baseline model) and the proportional loan subsidy would be 46.8p out of every £1 lent out (compared with 43.3p in the baseline scenario). On the other hand, if earnings were to grow by 2% a year in real terms, the average loan subsidy would fall to £16,121 per student or 40.0p per £1 lent out.

- The level of earnings in 2016 also matters, particularly since the repayment threshold for 2016 has already been fixed in cash terms. If the level of earnings in 2016 were 5% below that currently forecast by the OBR (but the growth rate thereafter was as forecast), then the estimated cost would be an average £19,107 per student or 47.4p per £1 lent out.

- Over the past two years, the OBR has revised down its forecasts for earnings growth significantly. Were we to assume a more optimistic path for real earnings in line with the OBR's March 2012 forecasts up to 2016, and its July

2011 forecasts for the long run, we would estimate an average loan subsidy of 34.4p per £1 lent (compared with 43.3p when we use the OBR's December 2013 and July 2013 forecasts for earnings growth).

- Incomplete take-up would in general reduce the estimated total cost of student loan provision to a given intake of students. However, the size of the reduction would depend on the characteristics of individuals who do not take out loans. If all those who do not take out loans come from the top of the graduate earnings distribution, the reduction in cost could be minimal.

- The estimated long-run cost of student loans is also sensitive to the assumptions made about repayment behaviour. Our baseline estimate assumes that all graduates make repayments in line with the repayment schedule. However, there is a risk that individuals do not make the required repayments. This is more likely to be the case among students who move abroad after graduation, since their repayments are not collected automatically through the UK tax system. If, purely as an example, 5% of English graduates made no repayments after graduation, we estimate the average student loan cost would be £18,584 per student or 46.1p per £1 lent out. There is also a risk that graduates will repay their loans faster than necessary, but the scenarios we consider suggest that this makes relatively little difference to the public cost of issuing student loans.

- Both the average cost of a student loan, and the total student loan cost to the government of an intake of students, are potentially sensitive to the number of students. Our baseline model suggests that, on the assumption that the additional students are like the average existing student and go on to become like the average existing graduate, an additional 60,000 students would cost the government £1.0 billion as a result of the loans issued to them over the course of their degrees. However, it seems more likely that these additional students would have lower academic attainment, on average, than existing students, and thus they are unlikely to go on to earn the same, on average, as the existing graduate population. If all the additional students were like graduates in the bottom half of the graduate lifetime earnings distribution, then the additional cost to the government of issuing loans to these additional 60,000 students over the course of their degrees would be £1.7 billion.

- The level of fees is also important for the estimated cost of student loans. Were fees to be £500 higher than currently (in cash terms), we estimate the average loan subsidy would be £18,642 per student. Combined with the cost of teaching and maintenance grants, the total taxpayer contribution would then be £25,791 per student – roughly the same as we estimate would have been the case for this cohort had the 2012 reforms to HE funding not been implemented (£25,847).

- All these figures so far assume that the government's cost of borrowing is 2.2% per year in real terms. If the government were able to borrow more cheaply than this, then the long-run cost of student loans would be lower. For

example, if the government borrowing cost were 1.1% per year in real terms, the average loan subsidy would be £12,434 per student rather than £17,443 per student. Conversely, if the government's borrowing cost turned out to be greater than 2.2%, the cost of providing student loans would be greater.

- It is important to remember that there is not only much uncertainty in estimating the cost of loans issued under the 2012 funding system, but also much uncertainty in estimating the cost of loans under the old funding system. The main uncertainties that could increase the estimated cost of the current system (such as lower earnings growth) would have made the provision of loans under the old system more costly as well. Given this, there is no simple 'tipping point' for the proportionate cost of student loans above which the total taxpayer contribution under the current funding system can be said to be greater than that under the old system.

- Our baseline estimate is that the average total taxpayer contribution in respect of young English full-time undergraduates enrolling in English universities in 2012 is 5% lower than the cost we would estimate for this cohort if the 2012 reforms to HE funding had not been introduced (at £24,592 per student compared with £25,847 per student). However, if we were to assume the more optimistic path for real earnings growth forecast by the OBR in March 2012 and July 2011, we would estimate that the funding reform reduced the total taxpayer contribution by 15%, from £24,709 per student to £21,007 per student.

## Impact of changes to loan terms

- If the government wanted to reduce the student loan subsidy, it could consider changing the terms of loans made to new borrowers in future. In Chapter 6, we illustrate the impact on the estimated public cost of student loans of changes to the repayment rate, the repayment threshold, the interest rate and the repayment period.

- Our estimates show that increasing the repayment rate, reducing the repayment threshold or extending the repayment period would all tend to reduce the loan subsidy, mostly by increasing the repayments made by middle-earning graduates. If the government preferred to adopt a more progressive change in policy, then it could instead choose to raise the interest rates it charges on student loans. This would only affect high-earning graduates who end up repaying their loan in full under the current system; for everyone else, increasing the interest rate would simply increase the amount that they would have written off. It is worth noting, however, that the resultant reduction in the loan subsidy could be significantly reduced if, in response, the highest-earning graduates decided not to take out a loan.

# 1. Introduction

The UK is currently facing a period of considerable fiscal austerity. The recent financial crisis and recession left the government with unsustainably high levels of borrowing, which it is seeking to address by implementing significant cuts to public spending. This has had profound implications for many areas of public service spending, including spending on higher education (HE).

The UK government subsidises the provision of HE in England in a number of ways:[3] first, it provides payments directly to universities to cover research, the teaching of students on 'high-cost' courses such as laboratory-based subjects, and other activities such as those aiming to widen participation; second, it offers grants to undergraduate students from low-income families; and third, it offers loans to undergraduate students to help with the up-front costs of tuition fees and living expenses.

The outlook for spending by the Department for Business, Innovation and Skills (BIS) on the first two of these elements was considered in a previous IFS report funded by Universities UK.[4] However, the public finance implications of the third component – the provision of student loans for undergraduate students – have been much less well understood in the public debate to date.

The provision of student loans is costly to the government – even in the long run – for two reasons. First, under current policy, not all loans will be repaid, since the debt is written off under certain circumstances (including death, permanent disability, and after a certain period of time). Second, the loans are (on average) made available at subsidised interest rates – in other words, the interest payable by the borrower is generally lower than the interest the government has to pay on its debt. This means that providing student loans would be costly to the government even if they were all repaid in full.

Given the amount of money the government is lending to students, even if each loan only cost the government a small proportion of its face value, in the long run this would still add up to a significant total public cost. In 2012–13 alone, the government issued nearly £7.4 billion (in 2014 prices) of student loans, and it is forecast to issue over £10 billion (in 2014 prices) of loans in 2013–14.[5] Therefore, even if each loan only cost the government 1% of the amount lent, that would still amount to £100 million for loans issued in 2013–14.

[3] Higher education is a devolved issue, and is the responsibility of the Scottish Government, Welsh Assembly and Northern Ireland Executive in Scotland, Wales and Northern Ireland respectively. This report focuses on England only. It also focuses on undergraduate students only.

[4] Crawford, Crawford and Jin, 2013.

[5] National Audit Office, 2013a, figure 4.

Unfortunately, estimating the long-run public cost of student loans is very difficult, since it requires a model to forecast graduate income and repayment behaviour over many decades in the future. BIS does have such a model, and has invested in improving its forecasts in recent years, but the House of Commons Committee of Public Accounts (2014, p. 3) reported that 'The Department is unable to accurately forecast student loan repayments, and does not have a sufficient understanding of the likely future cost of non-repayment to the taxpayer'.

Whilst it is difficult, estimating the long-run public cost to the government of providing student loans is important. The government needs an unbiased estimate of the cost of student loans, and a quantification of the uncertainty around that, if it is to properly understand the public finance implications of the current HE funding system, its likely financial sustainability, and how the burden of HE funding is shared between the taxpayer and graduates. Without such knowledge, it is not clear how the government can make informed decisions on policy reforms such as the abolition of the student number cap or the sale of parts of the student loan book.

In this report, we therefore aim to aid such policy discussions by producing an independent estimate of the long-run public cost of providing student loans to young English full-time undergraduates entering university in 2012. We do this by estimating their debt accumulation and constructing our own model of graduate earnings and repayment behaviour over future decades.[6] Crucially, we also illustrate how uncertain this estimate is, by quantifying the sensitivity of our estimate to a number of different assumptions that we have to make in our modelling – including future earnings growth, student numbers, take-up rates, repayment behaviour and the government's cost of borrowing.

We understand that BIS is in the process of updating its model as well, and a revised estimate of the public cost of issuing student loans of 'around 45%' calculated using this model was given by Universities Minister David Willetts in response to a Parliamentary Question on 20 March 2014.[7] However, no details of this model have yet been made publicly available, so we are unable to analyse the differences between our estimates and BIS's.

If the government wanted to reduce the public cost of the student loan system for new borrowers, then it could do so by changing one or more of the terms under which student loans are offered. We go on to use our model to illustrate the impact of changes to different parameters – including the interest rate, the

[6] In principle, graduates have to make student loan repayments out of unearned income if it exceeds £2,000 per year. In practice, however, only those who submit self-assessment tax returns make repayments on the basis of unearned income. Given that the number of individuals to which this applies is relatively small, together with the challenges of estimating unearned income, this report focuses on repayments made out of earnings only. We discuss this, and other assumptions and their implications for our estimated cost, in more detail in Chapter 3.

[7] Source: http://liambyrne.co.uk/university-finance-system-turning-into-a-money-pit-as-rab-charge-hits-45/.

repayment threshold, the repayment rate and the repayment period – on the long-run cost of student loans. Furthermore, we describe how this impact would vary across the graduate earnings distribution. These scenarios are for illustrative purposes only and do not constitute suggestions for how the government should reform the student loan system.

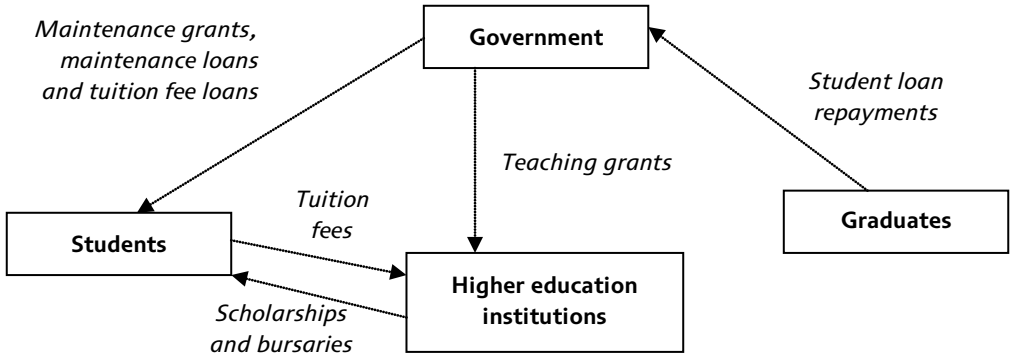
Student loans are, of course, only one aspect of government funding for higher education. To put our results in further context, we therefore also include estimates of the 'total taxpayer contribution' – the cost of student loans, plus the cost of teaching and maintenance grants.

This report proceeds as follows. Chapter 2 briefly describes the current system of student support in England. Chapter 3 describes our methodology for estimating the long-run public cost of student loans, including the key assumptions and limitations. Chapter 4 presents our baseline estimate of the long-run cost to the government of issuing student loans and Chapter 5 discusses some of the uncertainties around this estimate. Chapter 6 analyses the potential impact of changes in the parameters of the student loan system on the public cost of student loans and on the repayments made by graduates. Chapter 7 concludes.

# 2. Higher Education Funding and Student Support in England

The way in which higher education is funded in England is described in Figure 2.1. To cover the costs of teaching undergraduates, universities receive tuition fees from students and teaching grants from the government via the Higher Education Funding Council for England (HEFCE).[8] To help meet their costs whilst at university, students are entitled to loans to cover the up-front costs of tuition fees ('fee loans') and living expenses ('maintenance loans'); students from low-income families also receive support in the form of maintenance grants from the government and scholarships, bursaries or fee waivers from their university.[9]

Figure 2.1. The 2012 HE finance and student support system




Note: Universities also receive grants from the government to fund research and other activities, including work to widen participation.

## 2.1 The 2012 HE finance and student support system

Table 2.1 provides more detail on the system of higher education funding and student support in place in England in 2012.

This system reflects some significant changes compared with its predecessors, particularly in terms of the relative balance between public and private funding. For example, prior to 2012, tuition fees were capped at £3,375 per year, and HEFCE subject-based recurrent teaching grants ('teaching grants' hereafter)

[8] They also receive grants to cover other activities, including research and work to widen participation.

[9] The entitlement criteria for institutional support vary, and may cover students who are not from low-income families as well, such as those with high A-level scores or from low-participation neighbourhoods.

Table 2.1. Components of the HE finance and student support system

| Support | Description |
|---|---|
| HEFCE teaching grants | Funding to universities based on their student numbers in specific subject groups.<br>*In 2012: Only students in clinical years of study and laboratory-based subjects attract HEFCE teaching grants, of £9,804 and £1,483 respectively.* |
| Fee loans | Loans offered to students to cover all or part of the cost of their tuition fees.<br>*In 2012: University tuition fees are capped at £9,000 p.a., so the maximum loan a student could be entitled to would be £9,000 p.a. There is currently no provision for the fee cap to increase in line with inflation.* |
| Maintenance loans | Loans offered to students to help cover living costs.<br>*In 2012: If parental income is less than or equal to £25,000 p.a., the student qualifies for the maximum loan, which is £4,375 if living with parents, £7,675 if living away from home in London, £5,500 if living away from home outside London, and lower if in final year of study. Students lose 50p maintenance loan for every £1 they receive as maintenance grant. The loan is tapered away at a 10% withdrawal rate for household income above £42,875 until it reaches 65% of the maximum amount. All students are entitled to at least 65% of the maximum maintenance loan for their living circumstances.*[a] |
| Maintenance grants | Grants offered to students from low-income households.<br>*In 2012: £3,250 per year if parental income is less than or equal to £25,000 p.a. Tapered away at around an 18% withdrawal rate thereafter. No grant available when parental income exceeds £42,600 p.a.*[a] |
| Bursaries and scholarships | All universities operate some kind of bursary or scholarship scheme. The amount available and eligibility criteria vary across universities. Common criteria include household income, neighbourhood participation rates and A-level attainment. The support may be given as cash, fee waivers or discounts to university services such as accommodation. Very often, prospective students do not know before enrolment how much financial support they will receive.<br>*In 2012: There was also a national scheme in place, known as the National Scholarship Programme. The government allocated £50 million in total to universities for the 2012 cohort. Universities were obliged to match the government contribution. They set their own eligibility criteria, but parental income of less than £25,000 is a criterion required by the government. This scheme has been abolished for undergraduates starting in 2015 and beyond.* |

[a] Figure B.1 in Appendix B illustrates how entitlement to maintenance loans and maintenance grants varies with parental income.

ranged from £2,325 to £13,335 per student per year,[10] depending on the subject. In 2012, teaching grants for students studying most subjects were abolished; only students studying high-cost subjects, such as laboratory-based courses, continued to attract any teaching grant. In place of teaching grants, universities were allowed to increase tuition fees, to up to £9,000 per year.

Taken together, these changes meant that the average amount of funding that universities receive per student from HEFCE over the course of their degree fell from £12,012 (in 2014 prices) for the cohort of students who entered in 2011 to £2,010 for the cohort of students who entered in 2012. Similarly, the amount of fee income universities receive (fees charged minus fee waivers) increased from £11,522 (in 2014 prices) for the 2011 cohort to £27,299 for the 2012 cohort.

The reforms were expected to reduce total public spending on higher education and shift a greater proportion of the cost of obtaining a degree onto students. However, the reduction in public spending will not be as large as the reduction in teaching grants, because the government offers students loans to cover the up-front costs of their tuition fees, and these loans are costly to the government. A comparison of the different sources of HE spending under the 2011 and 2012 funding regimes is provided in Table B.1 in Appendix B and a comparison of the recipients of this spending is provided in Table B.2.

## 2.2 Student loans

Loans were first made available to students in England in 1990 to help with living costs. Since then, they have increased in both scope and value: loans to help with living costs have replaced grants for all but the poorest students, and the government now offers loans to students to cover tuition fees as well. This rapid increase in the value of student loans paid out each year is illustrated in Figure 2.2. The Office for Budget Responsibility (OBR) estimates that, by the end of 2012–13, the issuing of student loans increased public sector net debt by 3.0% of national income.[11]

Fee loans are available to all English and EU students studying for their first degree, but maintenance loans are only available to full-time English students below the age of 60.[12]

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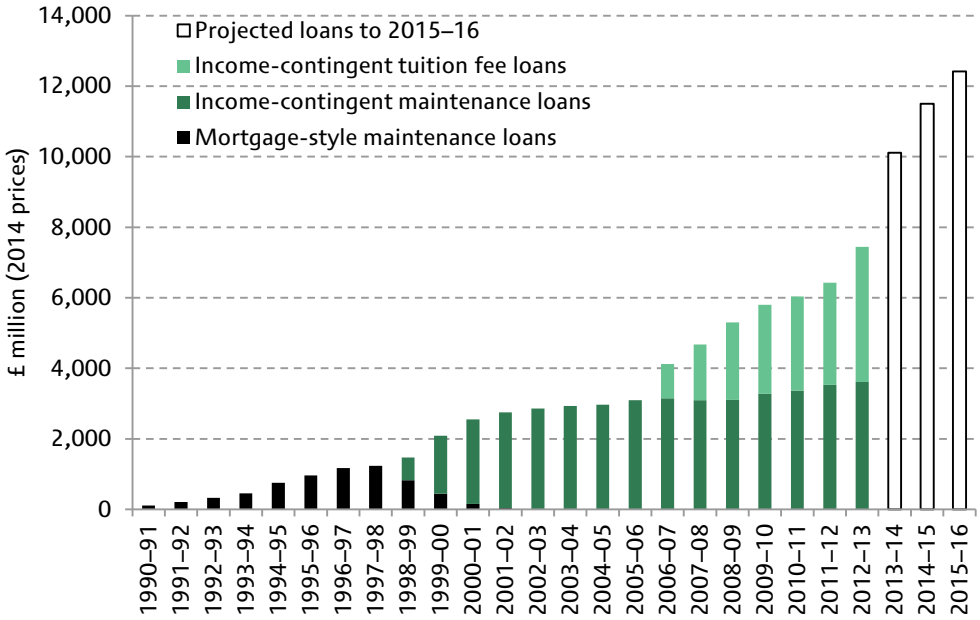
[10] HEFCE gives universities mainstream recurrent teaching grants, which depend on student numbers in specific subjects. HEFCE also gives other grants to universities, which are not explicitly funding for teaching that follows students, so are not included in any figures in this report. In 2012–13, HEFCE teaching grants totalled £3.1 billion, of which £2.5 billion was subject-based teaching grants, which are what our report looks at. Source: 'Recurrent grant and student number controls for 2012-13', March 2012, ref 2012/08, at https://www.hefce.ac.uk/data/year/2012/201208/.

[11] Source: Office for Budget Responsibility, 2013a, para. 3.72.

[12] Students from Wales, Scotland and Northern Ireland receive different grants and loans from their respective governments, which, as in the English system, tend to be more generous to full-time students and students from lower-income households. For example, in 2013, Welsh students get a tuition fee loan of up to £3,575 and a fee grant for the difference between that fee loan and

Figure 2.2. Value of student loans issued each year




Note: Projections for 2013–14 onwards are as of November 2013 and therefore do not include the estimated impact of the removal of the student number cap that was announced in the 2013 Autumn Statement.
Source: National Audit Office analysis of BIS and SLC data. Reproduced from figure 4 of National Audit Office (2013a).

## Loan terms for those enrolling from 2012

From the point at which they are issued until the April after graduation, both tuition fee and maintenance loans are subject to a real interest rate of 3% per year (that is, 3% on top of inflation, as measured by the retail price index (RPI)). After this point, the interest rate payable will vary depending on a graduate's income. Graduates with income below £21,000 (in 2016 prices) face a 0% real interest rate. The real interest rate then increases linearly with income, reaching a maximum of 3% for graduates with income of £41,000 or more (in 2016 prices).

Loans are subject to 'income-contingent' repayment: graduates must repay 9% of gross income above a 'repayment threshold' (£21,000 in 2016 prices). Government calculations assume that this repayment threshold will be increased each year (from 2017 onwards) in line with national average earnings.[13]

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the fee they are actually charged (for example, £5,425 if the fee is £9,000). Scottish students do not pay any fees if they study in Scottish institutions and get a fee loan if they study in other parts of the UK. Northern Irish students get a fee loan wherever they study in the UK. Maintenance loans in all the countries of the UK depend on whether the student lives at home and whether in London (as for English students), and not on whether they study in England, Wales, Scotland or Northern Ireland.

[13] In its impact assessment in 2012, the government assumed that the repayment threshold would be uprated by average earnings under the new system. Source: Department for Business, Innovation and Skills, 2012.

Any remaining student loan debt is written off 30 years after graduation. This is known as the 'repayment period'. Debt is also written off in the event of death or permanent disability (meaning that the individual can never work).

Providing student loans is therefore costly to the government (even in the long run) for two reasons. First, not all loans will be repaid. Second, the loans are (on average) made available at subsidised interest rates – in other words, the interest payable by the borrower is lower than the interest the government has to pay on its debt (currently determined by HM Treasury to be RPI+2.2%).[14] Only graduates earning more than £35,667 per year (in 2016 prices) face a higher interest rate than this on their loan, meaning that graduates with gross annual earnings of less than £35,667 are receiving an 'interest rate subsidy'. This means that providing student loans would be costly to the government even if they were all repaid in full.

## Loan terms for those enrolling in 2011

Before the 2012 funding reforms, student loans were issued on slightly different terms. The interest rate payable on debt was equal to RPI inflation (i.e. there was no real interest rate), the repayment threshold was lower (£15,795 in 2012) and the repayment period was 25 years. Government calculations assume that this repayment threshold will be uprated annually in line with the RPI.[15]

[14] This is the real financial instrument discount rate, which is calculated as the average long-run difference between gilt yields and inflation (currently 2.2%). The sensitivity to the government's cost of borrowing of our estimated long-run cost of providing student loans is investigated in Section 5.6.

[15] The government has legislated the indexation to the RPI from April 2012 to April 2015 (inclusive) and assumes that the repayment threshold for pre-2012 cohorts will be uprated by the RPI every year from April 2015 onwards. Source: Department for Business, Innovation and Skills, 2012.

# 3. Estimating the Long-Run Cost of Student Loans

Estimating the long-run cost to the government of issuing student loans is important: policymakers need to be aware of the financial implications of any policy decisions they make, even if the full effect on the public finances will not occur for some time. However, estimating this long-run cost is difficult, since it requires sophisticated modelling of the uncertain incomes and repayment behaviour of future graduates. This chapter briefly describes our model and the key assumptions that underlie it. A fuller description of our model can be found in Appendix A.

## 3.1 Methodology: the graduate repayments model

In order to estimate the long-run cost to the government of providing student loans to a particular cohort of students, we need to know:

- the value of the loans issued to each individual in that cohort over the course of their degree (i.e. their stock of debt);[16]
- the gross annual income of each individual to whom a loan was issued; this enables us to calculate: (a) the interest rate that graduates face on their loans each year; (b) the amount that they should repay each year; and hence (c) the amount of outstanding debt at the end of the repayment period.

The Student Loans Company (SLC) holds data on both pieces of information for previous cohorts of students, but we do not currently have access to these data for our analysis. Instead, we try to piece together this information from a number of other sources. There are five broad components to our modelling:

- identifying a relevant population of students attending a relevant set of institutions;
- calculating the amount of fee loans and maintenance loans to which these students are entitled;
- simulating the gross annual earnings of a population of graduates over their lifetimes;
- linking the population of students to the simulated lifetime earnings profiles of graduates;
- calculating interest and loan repayments.

Each of these components is discussed in more detail below (and further details can be found in Appendix A).

[16] It is not enough simply to know the total value of the loans issued, because repayments depend on the path of an individual's income over their lifetime, and we need to be able to relate the value of the loan they initially took out to the repayments they would be expected to make.

## Identifying a relevant student population

Our base population of students is taken from the Higher Education Statistics Agency (HESA) data for the cohort entering university to study full-time for a first degree in 2011 (the latest year for which data were available at the time of writing).[17] These data provide us with a census of individuals attending higher education institutions in the UK. These data are matched to data from the National Pupil Database (NPD) – a census of pupils attending schools in England since 2001–02, providing detailed information on their national achievement test scores (including A-level results), together with some information about their family background.[18] Taken together, the linked NPD–HESA data provide us with information on the size and characteristics of a relevant population of students attending a relevant set of institutions.

## Calculating loan entitlement

We combine these data on the family background characteristics of students attending different institutions and courses with information on the fees charged and fee waivers offered by these institutions, in order to calculate the amount of fee loans to which each student would be entitled.[19] We collected information on the fees, fee waivers and other student support schemes offered from individual universities' Access Agreements, their websites and, in some cases, Freedom of Information requests. We focused on the 90 largest universities in England, covering 95% of all full-time undergraduates attending universities in England.[20]

Entitlement to maintenance loans varies according to family income. We use the thresholds and taper rates as announced for 2012 and 2013, and assume these are fixed in nominal terms in subsequent years for the 2012 cohort.

## Simulating graduate earnings

Simulating the gross annual earnings of a population of graduates over their lifetimes is vital because we will use gross annual earnings to calculate the interest rate that graduates face on their loans and the amount that they should

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[17] The fact that we must rely on data from 2011 rather than 2012 means that we must assume that the composition of students in 2012 did not differ significantly from the composition in 2011. This applies both to the overall characteristics of the student population and to the distribution of students across institutions and subjects.

[18] We use NPD–HESA data in preference to HESA data alone because they provide more detailed information about the family background characteristics and prior attainment of the students, which is vital for calculating loan entitlement.

[19] Fees can vary by institution and subject. We assume nominal fees are fixed once a student starts a course. Given that most students faced fees of the maximum £9,000 in 2012, this is not a particularly strong assumption. Entitlement to fee waivers varies by family background characteristics (particularly income) and prior attainment. Fee waivers also vary across years within a course.

[20] Source: number of full-time undergraduates in HESA table '2012/13 students by institution' at http://www.hesa.ac.uk/content/view/1897/239/.

repay each year. In principle, graduates have to make student loan repayments out of unearned income totalling more than £2,000 per year. In practice, however, most repayments are collected via the PAYE system (based on earnings) and repayments made out of other types of income (such as income from investments or savings) are only collected from individuals who submit self-assessment tax returns. Since this represents a small group of people and there is much difficulty associated with simulating unearned income, our modelling focuses on repayments made on the basis of earnings only.

There are three steps in our model to estimate profiles of graduate earnings. First, we estimate a rich statistical model of employment status and earnings dynamics using data from the British Household Panel Survey (BHPS) from 1991 to 2008. This model describes how current employment status and earnings are affected by past employment status, unemployment duration and previous earnings; in other words, it enables us to simulate how employment status and earnings evolve from a given starting point. We allow these relationships to be different for men and women and for graduates and postgraduates. We use this model to produce a large number of lifetime earnings profiles for male and female graduates and postgraduates.

Second, to ensure that these profiles match the observed distribution of graduate earnings (both in terms of how unequal earnings across graduates are at a particular age and in terms of how earnings vary over the life cycle for particular graduates), we match these profiles to the observed distribution of graduate earnings from the Labour Force Survey (LFS) between 1992 and 2012, separately for male and female graduates and postgraduates.

Finally, to ensure that our profiles match the average salaries of recent cohorts of graduates, we scale all earnings such that the average earnings of 25- to 30-year-old graduates match those observed in the LFS in 2012. Thus, while the age–earnings profile and earnings inequality are based on LFS data over a longer period, the absolute level of earnings is informed by what young people were earning in 2012. We then apply OBR forecasts and assumptions about future economy-wide earnings growth to these adjusted profiles, to ensure that the evolution of future earnings matches that assumed by the Office for Budget Responsibility.

## Linking students to simulated graduate earnings

Linking our population of students to our simulated profiles of lifetime earnings among graduates enables us to link the debts with which each student graduates and the earnings (and consequent loan repayments) that they go on to make. We can then calculate the interest rate they will be charged, as well as how much of their loan they will repay and how much will be written off. Both of these elements are vital in calculating the loan subsidy that students receive, and hence the long-run cost to the government of providing student loans.

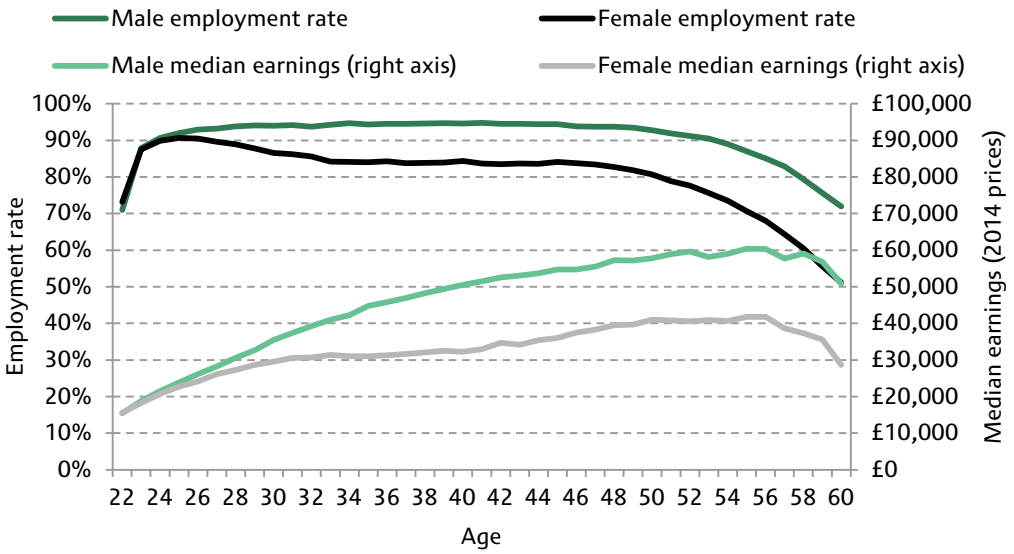
Very few characteristics appear in both our model of graduate earnings and our baseline NPD–HESA population, so to improve the linkage we make use of a third

data set: the Destination of Leavers from Higher Education (DLHE) data. This data set provides information on what individuals are doing six months after graduation (including earnings if they are in work) and is designed to be a census of those leaving university in a particular year. Clearly, we do not have access to data for the 2012 cohort (or even the 2011 cohort whose NPD–HESA data we use). Instead, we use data on the cohort of individuals who left university in 2006–07 to provide us with a proxy for the distribution of initial earnings by gender, institution, subject and socio-economic background.

For each individual in our NPD–HESA population, we draw a value of initial earnings from the relevant distribution, which we then use in conjunction with information on gender, socio-economic background and whether the individual obtained a postgraduate degree in order to select an appropriate lifetime earnings profile, ensuring that the distributions of earnings imposed above (from the LFS) are preserved in this step.

Given that we have allocated a lifetime earnings profile to each individual in our sample, we can look at the implied employment rates and average earnings across our sample of graduates at each age, as illustrated in Figure 3.1. Male graduate employment rates are above 90% between ages 24 and 53, declining from age 49 as some individuals start to retire. Female graduate employment rates are somewhat lower at all ages after age 22. Among those in work, male and female median earnings are similar until around age 30, when the real growth rate of median female earnings slows. Both male and female median earnings decline from around the mid-50s as those graduates who start to retire are disproportionately higher earners.

## Figure 3.1. Employment rate and median annual earnings (if in work) for graduates




Source: IFS graduate repayments model.

### Calculating interest and loan repayments

Once we have selected lifetime earnings profiles for each individual in our initial population, we calculate the interest rate charged and the value of student loan repayments made (according to the repayment schedule – i.e. 9% of income above the repayment threshold, with no evasion and no early repayment) in each year on the basis of individuals' gross annual earnings. At the end of the repayment period (30 years after graduation under the 2012 system), we can calculate not only what proportion of outstanding loans has to be written off, but also how much the recipients have benefited from being lent money at a rate that is lower than the government's cost of borrowing. We refer to these benefits collectively as the 'long-run cost to the government of issuing student loans' or the 'loan subsidy'.[21]

## 3.2 Key assumptions and limitations of our model

### Population of interest

The population of undergraduate students for which we estimate the long-run cost of issuing student loans is the population of young English-domiciled students who entered one of the 90 largest higher education institutions in England in 2012 to study full-time for a first degree.[22] This group is likely to hold a majority of the student loans issued by the government to first-year students in 2012, but it is important to acknowledge its limitations.[23]

To use our estimates to describe the total cost to the government of providing loans to the entire student population, one would have to assume that the average loan subsidy for part-time students, mature students, non-English-domiciled students, English-domiciled students studying in institutions outside

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[21] This figure is often referred to as the 'RAB' (resource accounting and budgeting) charge. We do not refer to this figure as the RAB charge in our report, as our estimates refer to a particular subset of a single cohort only (English-domiciled students from the 2012 cohort) and do not take into account any of the costs associated with the existing student loan book. Our understanding is that the government's most recently announced RAB charge of around 45% refers to loans issued under the new loan system only (i.e. it does not reflect the costs associated with the existing loan book), but is calculated over multiple cohorts and across all students to whom loans are issued this year. The government's RAB charge and our 'loan subsidy' are therefore not directly comparable.

[22] By young students, we mean students whose eligibility for maintenance grants and loans is means tested on their parents' income rather than their own, which requires the student to be under 25.

[23] In 2012–13, 596,525 UK/EU students started undergraduate courses in the UK. Of these, 28,800 were EU students and 185,240 were UK part-time undergraduates. Part-time and EU students are not eligible for maintenance loans, so they account for a smaller proportion of the total value of loans made. Out of the 382,485 full-time UK undergraduates in UK universities, 304,690 were English-domiciled and in English universities. (Source: tables 2 and 4 of HESA, Statistical First Release 197, http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=3103&Itemid=161). It is not clear how many of them were too old to be included in our NPD–HESA base population. In 2011–12, 23% of full-time undergraduates in the UK were aged 21+ according to HESA (source: http://www.hesa.ac.uk/dox/performanceIndicators/1112_S49X/t1b_1112.xls). In DLHE, we observe 15% of undergraduates completing at age 27+.

England and future cohorts of students was the same as the subsidy that we estimate for young English full-time undergraduates studying in English institutions. We describe in more detail below why it seems unlikely that this would be a sensible assumption to make in each case.

Students from other countries in the UK face different fee and loan arrangements from English-domiciled students. For example, the Scottish government covers tuition fees for eligible Scottish students in universities in Scotland and gives them a loan to pay their tuition fees if they study in other parts of the UK. Thus, our estimates of loan subsidies are unlikely to be a good proxy for the cost of student loans to the devolved administrations.[24] English students studying at institutions elsewhere in the UK are likely to differ from those studying at English institutions in two main ways: they may be charged different fees, on average, from those studying at English universities; and their average maintenance loans are also likely to differ from the average in England, as they would live away from home and would not be in London.

Part-time and EU students are entitled to fee loans but not maintenance loans or grants. Assuming they experience the same distribution of future earnings and exhibit the same repayment behaviour as full-time English students, this means that offering loans to these students would cost the taxpayer relatively less than offering loans to full-time students. However, it is not clear whether these students would have similar earnings or demonstrate similar repayment behaviour to full-time English students. The repayment behaviour of EU students who leave the UK after graduation is one area of particular uncertainty, since their repayments cannot be collected through the tax system – the Student Loans Company is responsible for collecting repayments directly. The National Audit Office (2013a, figure 7) estimated that, as of March 2013, 43% of EU graduates were in arrears or could not have their liability for repayments calculated due to a lack of earnings information (compared with 14% of English borrowers). In Section 5.3, we assess the sensitivity of our estimate of the loan subsidy to assumptions about the earnings and repayment behaviour of EU students.

Our analysis excludes mature students. There are two key differences to consider when thinking about loan subsidies for mature students compared with younger students:

- *Their entitlement to grants and loans*. Mature students are means-tested (for maintenance grants and loans and fee waivers) on the basis of their own family income, rather than their parents' income; to the extent that mature

[24] From the point of view of the UK taxpayer, the cost of lending to Scottish, Welsh or Northern Irish students is met from within the budgets of the relevant devolved administration. However, these budgets are set according to the 'Barnett formula' – a formula that is designed to apply the same per-head change in 'comparable' English spending to Scotland, Wales and Northern Ireland. Therefore an increase in the long-run public cost of providing student loans to English students would also increase the grant allocated to the devolved administrations. (For more information on the Barnett formula, see Crawford et al. (2011).)

students have lower income while studying, they would qualify for more grants and loans.

- *Their earnings and repayment behaviour after graduation*. Mature students' earnings may be higher than young graduates' (for example, they may be able to secure higher earnings following graduation as a result of their greater prior work experience) or lower (for example, if mature students tend to graduate with lower grades or from less-high-status institutions, on average). Further, mature graduates may work for fewer years between graduation and retirement. If their earnings were similar to those of younger graduates, then their total income (and hence repayments) over the 30-year repayment period might be lower than that of younger graduates; but again this depends on how the earnings of mature graduates compare with those of younger graduates.

Our model estimates the public cost of student loans issued to one particular cohort: those entering higher education in 2012. The cost of issuing student loans to subsequent cohorts would be expected to differ from that for the 2012 cohort for many reasons, such as different fee levels and different earnings. Assuming that the average levels of fees, maintenance loans and grants are kept constant in real terms, and that real earnings growth is positive, then a future cohort will look exactly like the 2012 cohort except that their earnings and the repayment threshold will be at higher levels in real terms. This means that their annual repayments will also be proportionally higher, and hence fewer people will have a proportion of their debt written off. Thus, future cohorts would have a lower loan subsidy than the 2012 cohort under these assumptions. However, future cohorts could face different fees or a different student support system. For example, if fees were to increase faster than inflation in future, then debt at graduation for future cohorts may be greater than for the 2012 cohort, which could reduce the proportion of debts paid off and increase the public subsidy of the loans issued.

Our analysis focuses on the 90 largest universities in England, covering 95% of all full-time undergraduates. As the universities in England that we do not cover are smaller and typically less research-intensive than those that we do, it may be reasonable to assume that they charge lower fees, on average, than those in our sample. Indeed, our model produces higher average net fees in 2012 and 2013 than the average fee loan taken out by English students in English universities.[25] The fact that we are omitting potentially lower-fee institutions may be one reason. Another is that we assume that if universities offer students a choice between fee waivers and other cash benefits as part of their bursary and scholarship programmes, students take the cash benefits in preference to the fee

[25] For example, in 2012, we calculate average net fees to be £8,270, higher than the £7,680 average fee loan taken out by English students in English universities (source: Student Loans Company, 2013, table 4B(i)). Similarly, in 2013, we calculate average net fees to be £8,488 compared with the SLC figure of £8,230 for the average fee loan (source: Student Loans Company, 2013, table 4B(iii)).

waivers; but this might not be the case – for example, if students are debt averse. Alternatively, loan take-up could be lowest amongst those taking the most expensive courses. To the extent that we have overestimated average loans, we would tend to overestimate the loan subsidy in absolute as well as proportional terms.

## Other assumptions

There are a number of other key assumptions that underlie our modelling. These are summarised in Table 3.1. The sensitivity of our results to alternative assumptions about graduate earnings growth is illustrated in Section 5.1. Intuitively, the faster earnings grow for future graduates, the more they will repay and hence the lower the cost to the government of providing student loans.

Our baseline model assumes that the take-up of loans and repayment compliance are both 100%. The likely consequences of lower loan take-up rates depend on which types of graduates choose not to take out loans; we explore the implications of various assumptions in Section 5.2. Similarly, Section 5.3 shows the extent to which repayments could fall or rise (and the long-run cost of student loans rise or fall) if graduates did not repay entirely according to schedule.

In addition, our model assumes zero dropout from higher education. In reality, 5.7% of students who started their degree in 2011 did not continue into their second year, and HESA estimates that only around 80% will go on to complete

### Table 3.1. Main assumptions in our baseline graduate earnings and repayments model

| Parameter | Assumption | Robustness check |
|---|---|---|
| Average graduate earnings growth | In line with the OBR forecast for average economy-wide earnings growth from the 2013 *Fiscal Sustainability Report* and December 2013 *Economic Outlook*; specifically, 12.3% nominal earnings growth between 2012 and 2016, an average of 0.5% per year real earnings growth from 2016 to 2020, and 1.1% per year real earnings growth from 2020 onwards | Section 5.1 |
| Loan take-up rate | 100% for maintenance and tuition fee loans | Section 5.2 |
| Dropout rates | 0% | – |
| Repayment compliance | 100% | Section 5.3 |
| Unearned income | All graduates have low unearned income (below £2,000 p.a.) so that only their earnings count towards their student loan repayments | – |

their qualification within 15 years.[26] Dropouts are likely to earn less, on average, than graduates. However, if they drop out before their final year, they would also accumulate less debt. Thus, while they are likely to repay less, they are also likely to have borrowed less; it is therefore ambiguous how the average cost to the government of loans for those who drop out would compare with our baseline estimate.

[26] Source: Tables T3a_1213 and T5_1213 at http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2064&Itemid=141.

# 4. Estimates of the Long-Run Cost of Student Loans

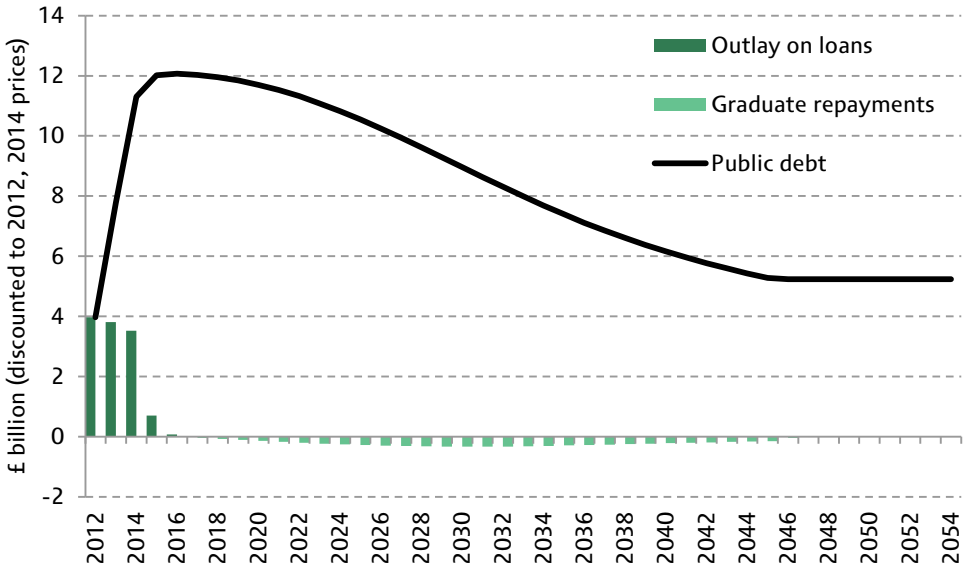
Using the model of graduate earnings and repayments described in Chapter 3, we can estimate the long-run cost to the government of issuing student loans for a cohort of students enrolling in 2012. All of the figures for this estimated cost (and for the estimated cost of grants and the total taxpayer contribution) are quoted as the *total* cost for this cohort – i.e. the total over the three, four or five years of their degree – rather than an *annual* cost. In addition, all figures (unless otherwise stated) are in real terms (2014 prices) and presented in 'net present value' (NPV) terms, discounting back to 2012 using a real discount rate of 2.2%. This discounting takes account of the fact that loans made in future cost the government less than loans of the same real value made today (since the government itself incurs interest payments on the borrowing it needs to do to make loans to students) and repayments made in future are worth less to the government than the same real repayments made today (since, by the same token, funds received today could be used to reduce debt and therefore reduce debt interest payments in future).

Under the baseline assumptions discussed in Chapter 3, we estimate that the average loan subsidy per student amounts to £17,443. The average loan issued per student over the life of their course is £40,286 and therefore the long-run public cost of issuing student loans is 43.3p per £1 loaned out (or 43.3%). For an annual intake of 300,000 young full-time English-domiciled students,[27] that would amount to a total cost of loan subsidies of £5.2 billion.

The profile of this public cost arising from student loans is illustrated in Figure 4.1 for our simulated cohort entering university in 2012. Loans are issued each year that the students are studying; primarily this is 2012 to 2014 (since most of our sample study three-year courses), but some loans would also be issued in 2015 and 2016. The annual total value of loans issued (in real, discounted terms) falls between 2012 and 2014 both because fees are assumed to be fixed in nominal terms over the course of a degree (the tuition fee cap is fixed in nominal terms) and because loans issued in future years are less costly to the government than loans issued in 2012. (As described in Chapter 3, we assume there are no dropouts from university and so the nominal value of loans made is the same in 2013 and 2014 as in 2012.) Public debt increases sharply as these loans are issued.

[27] In 2012–13, 304,690 full-time first-year undergraduate England-domiciled students enrolled at higher education institutions in England. Source: table 4 of HESA, Statistical First Release 197, http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=3103&Itemid=161.

Figure 4.1. Profile of loan outlay, graduate repayments and public debt




Graduates undertaking three-year courses starting in 2012 will become liable to start making repayments in April 2016. Public debt (in real, discounted terms) actually increases until 2017 – since the additional loans made to students on courses that last longer than three years are greater than the early repayments made by graduates – but from then on the repayments received result in a reduction in the outstanding public debt. Total annual repayments by graduates increase as graduate earnings increase, but peak at the start of the 2030s, as high-earning graduates reach the point of having paid off their loans and cease making repayments.

By 2048, all repayments from the cohort of students that entered university in 2012 will have ceased as graduates reach the end of the repayment period. At this point, there will be no further reduction in the debt accumulated in respect of the loans issued to this cohort. As mentioned previously, this outstanding debt – in other words, the long-run cost of issuing student loans to a cohort of 300,000 full-time English-domiciled students entering English universities in 2012 – would amount to £5.2 billion.

The long-run public cost of the government providing student loans arises from two sources: the first is that not all loans are fully repaid; the second is that borrowers benefit from an average interest rate that is lower than the government's cost of borrowing. Our estimates suggest that 60% of the loan subsidy arises from the fact that not all loans are repaid in full,[28] while the remaining 40% can be attributed to the fact that some borrowers are charged an interest rate that is lower than the government's cost of borrowing at some points during the repayment period.

[28] Crawford and Jin (2014) estimate that nearly three-quarters of graduates will not repay their loan in full under the 2012 system with the existing interest rates.

Table 4.1. Long-run public cost of student loans, by graduate lifetime earnings

| | Average loan subsidy | | | Total taxpayer contribution per student |
|---|---|---|---|---|
| | *Total* | | *Of which: debt write-off* | |
| **All graduates** | 43.3% | £17,443 | £10,472 | £24,592 |
| *By lifetime earnings decile:* | | | | |
| 1 (lowest earners) | 93.0% | £36,481 | £20,093 | £44,229 |
| 2 | 82.1% | £32,414 | £18,824 | £39,654 |
| 3 | 72.5% | £28,759 | £17,341 | £35,847 |
| 4 | 60.7% | £24,215 | £15,173 | £31,014 |
| 5 | 48.6% | £19,504 | £12,620 | £26,441 |
| 6 | 36.2% | £14,561 | £9,561 | £21,437 |
| 7 | 24.9% | £10,069 | £6,519 | £17,074 |
| 8 | 13.6% | £5,520 | £3,282 | £12,626 |
| 9 | 5.9% | £2,421 | £1,174 | £9,709 |
| 10 (highest earners) | 1.1% | £475 | £128 | £7,877 |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. 'Total taxpayer contribution' includes maintenance grants, the National Scholarship Programme, HEFCE teaching grants and the subsidy on student loans. It does not include other government spending on higher education such as capital grants, research grants and grants for 'widening participation'.
Source: IFS graduate repayments model.

The cost to the government of providing student loans varies across graduates. Table 4.1 describes how the public subsidy differs for individuals at different points in the graduate lifetime earnings distribution. Among the lowest-earning 10% of graduates, the public cost of student loans is estimated to be 93.0% (£36,481 per student); the majority (55% of this) is expected to arise from debt write-offs rather than interest rate subsidies.

Among the highest-earning 10% of graduates, on the other hand, the public cost of student loans is a mere 1.1% (£475 per student). About a quarter of this subsidy is estimated to arise from the fact that not all of the top 10% of earners will repay their debt in full – we estimate that 98% will do so.[29] More importantly, despite their high lifetime earnings, most of these individuals are still estimated to spend some time accruing interest on their loan at less than the government's cost of borrowing. In particular, this tends to be the case early in their working lives. For example, 99% are expected to be charged a real interest rate below 2.2% during their first year of repayment and 85% during their fifth year of repayment.

[29] A small minority of graduates in the top decile of lifetime earnings will not repay their debt in full. These people tend to have studied for more than three years, have repaid a large proportion of their debt, and have very high earnings in their 50s after their student debt is written off (and moderately high earnings before that).

If we are interested in estimating the overall public cost of higher education, it is important to bear in mind that the subsidy on student loans is only one aspect of government spending on higher education. The government also spends money directly on students in the form of teaching and maintenance grants and through the NSP.[30] On average, these grants cost £7,149 per student over the life of their course, with a small amount of variation across graduates with different lifetime earnings.[31]

The final column of Table 4.1 adds the loan subsidy and government support via per-student grants together and illustrates how this 'total taxpayer contribution per student' varies across the graduate earnings distribution. The total taxpayer contribution is £24,592 per student on average but it varies considerably: among the lowest-earning 10% of graduates the average total taxpayer contribution is £44,229, while among the highest-earning 10% of graduates the average contribution is £7,877. Most of this difference arises from the differential cost of providing student loans to individuals with different lifetime earnings. For a cohort of 300,000 young English full-time undergraduate students, at an average taxpayer contribution of £24,592, the total public cost of higher education is estimated to be £7.4 billion.[32]

The sensitivity of our estimates to the main assumptions made in the model is discussed in Chapter 5. BIS also estimates the long-run cost to the government of issuing student loans using its own model of graduate earnings and repayments. Its most recently announced estimate of the loan subsidy is 'around 45%' (compared with our estimate of 43.3%).[33] Unfortunately, the specific assumptions underlying BIS's new estimate have not yet been made public, and so we are not able to judge the sensitivity of our model to the specific assumptions made in BIS's most recent modelling. We discuss the key differences between our modelling approach and BIS's in Section A.2 of Appendix A, although we are hampered in this by the lack of publicly available information on its new modelling strategy.

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[30] The government also spends money on higher education that is not allocated on a per-student basis, including on research grants, capital grants and grants for 'widening participation'. Our figures for the average cost of grants and for total taxpayer contribution per student do not include this spending.

[31] The average cost is slightly higher among those in the lowest lifetime earnings deciles (who are more likely to have come from lower-income households and therefore are more likely to qualify for maintenance grants) and among those in the highest earnings deciles (who are less likely to have qualified for grants, but are more likely to have studied high-cost subjects such as medicine and science, which attract teaching grants).

[32] The average course length for our sample is 3.23 years, and so an average total taxpayer contribution of £24,592 over the course of a degree would equate to roughly £7,600 per year per student. This is slightly more than the average spent per secondary school pupil in 2012–13 – around £6,000 (in 2014 prices) (source: table 2 in 'Main tables: SFR 54/2013' at https://www.gov.uk/government/publications/la-and-school-expenditure-financial-year-2012-to-2013).

[33] Universities Minister David Willetts revealed this new estimate in response to a Parliamentary Question on 20 March 2014 (source: http://liambyrne.co.uk/university-finance-system-turning-into-a-money-pit-as-rab-charge-hits-45/).

## 4.1 Comparing the pre- and post-2012 funding regimes

It is worth noting that, at £24,592 per student, our baseline estimate of the total taxpayer contribution to higher education in respect of young English full-time undergraduates enrolling in English universities in 2012 is only 5% (£1,254 per student) lower than the cost we would estimate if the 2012 reforms to HE funding had not been introduced (£25,847 per student). As shown in Table B.1 in Appendix B, the taxpayer savings from lower teaching grants due to the reform are largely offset by increased spending on loan subsidies.

This is not to say that the 2012 reform has definitely failed to save significant amounts of money for the taxpayer. First, it should be remembered that our estimates do not cover all students to whom loans are issued. In particular, we do not cover part-time or non-English-domiciled students. The effect of the reforms on these groups will depend on whether the reduction in teaching grants is offset by the higher loan costs for these students.

Second, there is not only much uncertainty in estimating the cost of loans issued under the 2012 funding system, but also much uncertainty in estimating the cost of loans under the old funding system. Estimates of the level of the proportionate loan subsidy (RAB charge) beyond which the 2012 system would be more expensive than the 2011 system – such as the widely cited finding by London Economics (2014, p. 2) that 'if the estimated RAB charge ... increases beyond 48.6%, the economic cost of the 2012–13 higher education reforms will exceed the 2010–11 system'[34] – rely on estimates of the 2012-system RAB charge increasing while the 2011-system RAB charge does not. In reality, the main uncertainties that could increase the estimated cost of the current system (such as lower future earnings growth and the avoidance of repayments) would have made the provision of loans under the old system more costly as well.

For example, Table B.3 in Appendix B shows that if a randomly selected 10% of graduates cannot be traced for the collection of loan repayments under the 2012 system, the estimated loan subsidy would be 49% and the average taxpayer contribution would be £26,893. While that is higher than the estimated cost of £25,847 per student for the 2011 system assuming perfect compliance, it is still lower than the cost of the 2011 system (£27,365) under a similar assumption about the proportion and type of graduates who cannot be traced (i.e. the cost of the 2012 system would be lower than the cost of the 2011 system, even though the estimated loan subsidy under the new system is greater than 48.6%). Arguably, only future fee levels would have an impact on the cost of the current

[34] Cited by, for example, the *Guardian* ('Student fees policy likely to cost more than the system it replaced', 21 March 2014, http://www.theguardian.com/education/2014/mar/21/student-fees-policy-costing-more) and the BBC ('Student loans face timebomb, says Labour', 24 March 2014, http://www.bbc.co.uk/news/uk-politics-26705164).

system but not the old one; we explore the implications of changes in fees in Section 5.5.

Even if there were to be no change in the total taxpayer contribution in respect of young English full-time undergraduates enrolling in English universities, the post-2012 funding regime has other consequences that might be deemed desirable by the government. Teaching grants count as 'spending' in the government accounts and therefore contribute to annual government borrowing, while student loans count as a 'financial transaction' and affect debt but not borrowing.[35] The change in the balance of HE funding from grants to loan subsidies therefore resulted in a significant reduction in HE 'spending' and hence government borrowing at a time when this was high on the government's agenda – but at the expense of significantly greater uncertainty over the total public cost of higher education: certain spending on teaching grants in the short term has been replaced by uncertain spending on student loans in the long term.

While the estimated total taxpayer contribution to higher education has fallen slightly, the funds available to universities for teaching have significantly increased, from £22,143 per student under the previous system to £28,250 per student under the current system.[36] This is because the increase in tuition fees more than outweighed the reduction in teaching grants, and it is the government (rather than universities) that bears the risk that students do not pay back the loans they take out to cover tuition fees. This will also be the case for the groups of students that we do not include in our analysis.

The main effect of the 2012 reform was therefore to increase the funds available to universities for teaching by increasing the contributions made by students but also to increase the uncertainty over the total taxpayer contribution to higher education.

[35] Changes in public sector net debt (PSND) are driven by the public sector net cash requirement (PSNCR), which is the sum of public sector net borrowing (PSNB) and the flow of financial transactions (and some accounting adjustments and one-off factors).

[36] There have, however, been reductions in other areas of higher education spending since 2012, such as capital grants.

# 5. Uncertainties around the Long-Run Cost of Student Loans

The long-run public cost of student loans is very uncertain. As described in Chapter 3, to estimate this cost requires many assumptions to be made, not just about the take-up of loans, but also about the earnings and repayment behaviour of graduates decades from now. It is important to acknowledge this uncertainty, and quantify it, in order to fully appreciate the potential effect of current policy on the public finances. In this chapter, we discuss the main sources of uncertainty and illustrate the impact that different assumptions would have on our estimate of the public cost of student loans.

## 5.1 Graduate earnings growth

Perhaps the greatest uncertainty for the government over the future cost of student loans is the future growth rate of graduate earnings. Our baseline model uses the Office for Budget Responsibility's forecasts for average earnings growth from its 2013 *Fiscal Sustainability Report*; this assumes a long-run real growth rate of 1.1% per year from 2020 onwards, after a period of slower growth (detailed in Table 3.1). Table 5.1 illustrates how our estimate of the long-run public cost of student loans would change were we to make alternative assumptions about the real growth rate of graduate earnings from 2020 onwards.[37] Additionally, Table B.4 in Appendix B shows the sensitivities of average grants spending and the combined taxpayer contribution to future graduate earnings and other uncertain factors.

If real graduate earnings growth turned out to be 2% per year from 2020 rather than 1.1% per year, the estimated public cost of student loans would fall from £17,443 per student to £16,121 per student (a decline in the subsidy from 43.3% to 40.0%). This is because loans would be paid off more quickly and a greater proportion of loans would be paid off completely. On the other hand, if graduate earnings were not to increase at all in real terms in future, the estimated subsidy would increase from 43.3% to 46.8% – increasing the average public cost per student to £18,859. Future earnings growth uncertainty therefore has important implications for the public cost of student loans – the long-run cost of providing

[37] Figure B.2 in Appendix B illustrates the real growth rate of average graduate earnings over the past two decades. Over the 10 years 1993 to 2003, average graduate earnings grew by an average 0.9% per year in real terms. Given the decline in real earnings associated with the recent financial crisis and recession, average graduate earnings actually declined over the period 1993 to 2012 – equivalent to an average 0.2% decline per year over the 19 years. The real growth in average graduate earnings in recent decades has therefore been lower than the 1.1% a year real average earnings growth assumed by the OBR for the long run. However, this lack of growth in average earnings might be due to changes in the composition of graduates: as more individuals obtain degrees, the average quality of degrees may have declined. This would mean that the growth in the raw average may understate the earnings growth experienced by any individual graduate, which is what is more relevant for our model of graduate earnings and repayments.

Table 5.1. Sensitivity of estimated long-run public cost of student loans to real earnings growth assumption

| Real earnings growth assumption | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| –1% per year | 51.6% | £20,806 | £6,242m |
| 0% per year | 46.8% | £18,859 | £5,658m |
| 1% per year | 43.7% | £17,596 | £5,279m |
| Baseline (1.1% per year) | 43.3% | £17,443 | £5,233m |
| 2% per year | 40.0% | £16,121 | £4,836m |
| 3% per year | 36.7% | £14,795 | £4,439m |

Note: Alternative earnings growth rate assumptions apply from 2020 onwards. In each scenario, we use the OBR forecasts for earnings growth between 2016 and 2020 from the 2013 *Fiscal Sustainability Report*. Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

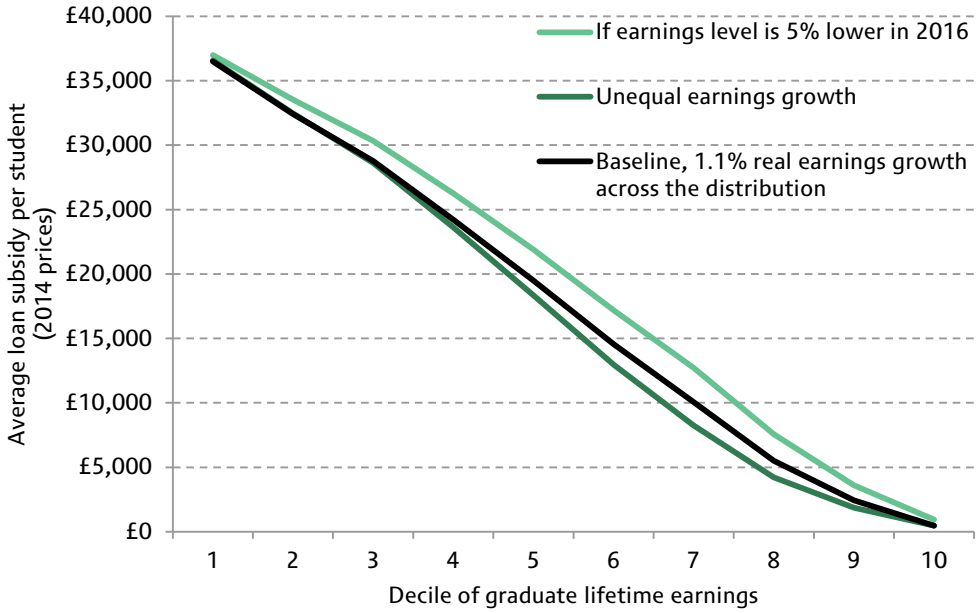
loans to an intake of 300,000 students would differ by £821 million depending on whether future earnings growth was 2% per year or 0% per year.

Figure 5.1 illustrates how the estimated loan subsidy at different points in the graduate earnings distribution is affected by the assumed earnings growth rate. Most of the potential saving to the taxpayer from higher earnings growth (and most of the potential cost from lower earnings growth) would come from graduates in the middle 80% of the distribution. This is because most of the highest-earning graduates already repay their debt in full, so higher earnings growth would only marginally affect their annual repayments, their interest rate

Figure 5.1. Sensitivity of the distribution of average loan subsidy by graduate earnings to real earnings growth assumption


Source: IFS graduate repayments model.

Figure 5.2. Sensitivity of the distribution of average loan subsidy by graduate earnings to additional earnings assumptions




Source: IFS graduate repayments model.

and therefore their total repayment. On the other hand, the lowest-earning graduates often spend time out of work or earning some way below the repayment threshold, so higher or lower earnings growth would not significantly change their estimated repayments either.

It is, of course, not just earnings growth that matters for repayments, but also the *level* of earnings in 2016 (from which earnings in subsequent years are assumed to grow) and the distribution of earnings growth.

The level of earnings in 2016 is particularly important because, unlike slower earnings growth after 2016, slower earnings growth before 2016 would not result in a lower repayment threshold (as the 2016 level has already been fixed). This risk has been highlighted by the Higher Education Policy Institute.[38] For example, if the level of earnings in 2016 was 5% below that currently forecast by the OBR (but the growth rate thereafter the same as is currently forecast), then the average long-run cost of student loans across our simulated population would be 47.4% (£19,107 per student) rather than 43.3%. Most of the higher loan subsidies would be among graduates in the middle 80% of the distribution, as seen in Figure 5.2.

In addition, changes to the distribution of earnings – such as an increase in inequality as a result of differential growth rates across the earnings distribution – may have a noticeable impact on the overall loan subsidy, even holding the average growth rate constant. As an example, assuming that the growth rate of

[38] Thompson and Bekhradnia, 2013.

real earnings is positively correlated with earnings, we get an average loan subsidy of 41.5% (£16,737 per student), slightly lower than the baseline estimate.[39] This is due to significantly higher repayments from mid-to-higher earners who do not earn enough under the baseline scenario to repay their loans in full. As shown in Figure 5.2, those in the fifth to eighth deciles of the graduate lifetime earnings distribution would receive a clearly lower average subsidy under this scenario than in the baseline case.

Over the past two years, the OBR has revised down its forecasts for real earnings growth significantly. In March 2012, the OBR forecast a nominal increase in average earnings of 18.8% between 2012 and 2016, which compares with 12.3% in its December 2013 forecasts.[40] In July 2011 it forecast average real earnings growth of 1.5% per year in the long run, while in July 2013 it forecast real earnings growth of an average 0.5% per year between 2016 and 2020 and 1.1% per year in the long run.[41] Were we to estimate the cost of student loans using the assumption that average earnings would grow in line with the OBR's March 2012 forecasts up to 2016, and its July 2011 forecasts for the long run, we would predict a loan subsidy of 34.4p per £1 lent out. This compares with the loan subsidy of 43.3p we estimate when we assume real earnings grow in line with the OBR's December 2013 and July 2013 forecasts.

What happens to graduate earnings over the next 30 years therefore matters hugely for the estimated long-run cost of student loans. Furthermore, the future path of graduate earnings also has significant implications for the estimated change in the total taxpayer contribution to HE as a result of the 2012 reforms. As described in Section 4.1, under our baseline assumptions we estimate that the total taxpayer contribution to HE in respect of young English full-time undergraduates enrolling in English universities in 2012 is only 5% (£1,254 per student) lower than the cost we would estimate if the 2012 reforms to HE funding had not been introduced (at £24,592 per student compared with £25,847 per student). However, if we were to make the more optimistic assumption that average earnings would grow in line with the OBR's March 2012 forecasts up to 2016, and its July 2011 forecasts for the long run, we would estimate that the total taxpayer contribution to HE would fall by 15% as a result of the 2012 reforms – from £24,709 per student to £21,007 per student.

## 5.2 Loan take-up

Another source of uncertainty for the government is individual behaviour. For example, student loans are offered to all students but might not be taken up by

[39] Specifically, we assume the macroeconomic growth rate of real earnings is [1.1+0.02($x$–50)] percentage points for the $x^{th}$ percentile of the cross-sectional distribution from 2020 onwards. Under this scenario, the growth in median earnings is the same as under the baseline scenario, the 90$^{th}$ percentile grows at 1.9% a year and the 10$^{th}$ percentile at 0.3% a year.

[40] Source: Office for Budget Responsibility, 2012 and 2013b.

[41] Source: Office for Budget Responsibility, 2011 and 2013a.

all. The Student Loans Company estimates that in 2011–12, 12.5% of all students eligible for maintenance loans did not take one and 13.0% of eligible English students did not take out a fee loan.[42] These non-take-up rates were substantially lower than in 2009–10 and 2010–11, and it is plausible that non-take-up rates were even lower for the 2012 cohort, who faced higher fees. However, in addition to complete non-take-up, some students may also borrow a lower amount than they are entitled to. For example, some students may just take the non-means-tested amount of maintenance loan, even though they could potentially get more if they submitted household income information. This may partly explain why our estimate of the average maintenance loan in 2012 (£4,145) is higher than the SLC figure of £3,980.[43]

If those who do not take out student loans are similar to those who do, then the average loan subsidy would not be affected. Table 5.2 shows that if a randomly selected 13% of students decide not to take out loans, then the total cost of issuing loans to a given intake of students would simply be 13% lower (at £4.55 billion for an intake of 300,000 students, rather than £5.23 billion).

However, if those who do not take out loans are in some way different from those who do, then this non-take-up would affect the average loan subsidy. For example, suppose the top-earning 10% of graduates did not take out a student loan. Then Table 5.2 shows that our estimate of the average loan subsidy would be 48.2% for the loans that are taken out (£19,329 per loan, or an average of £17,396 across all students). This would result in a total cost of £5.22 billion for an intake of 300,000 students. This is virtually unchanged from the total cost estimated using the baseline assumptions in our model because, as shown in

### Table 5.2. Sensitivity of estimated long-run public cost of student loans to take-up rates

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (100% take-up) | 43.3% | £17,443 (£17,443 per student) | £5,233m |
| Random 13% of students do not take out loans | 43.3% | £17,443 (£15,175 per student) | £4,553m |
| Top-earning 10% do not take out loans | 48.2% | £19,329 (£17,396 per student) | £5,219m |

Note: 'Average loan subsidy' is averaged across students who take out a loan (rather than all students). The 'per student' figures average across all students (regardless of whether they take out a loan). Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

[42] The statistics relate to students in public providers of higher education. Source: Student Loans Company, 2013, tables 4A(i) and 4B(ii).

[43] £3,980 is the average value of maintenance loan given to full-time English students entering public providers of HE in 2012–13. Source: Student Loans Company, 2013, table 4A(i).

Figure 5.2, the top-earning 10% of graduates receive little loan subsidy on average.

## 5.3 Repayment behaviour

The long-run cost of student loans will also be affected by individuals' repayment behaviour. While income-contingent student loans are supposed to be repaid at a certain rate (for the cohort we model: 9% of income above £21,000 in 2016 prices), some graduates may be able to avoid repaying their student loan even when they have income above the repayment threshold. Graduates can also choose to make additional repayments or pay off their loan completely at any time.[44]

The impact of graduates repaying their loans faster than required on the long-run public cost of issuing student loans depends on *which* graduates choose to overpay on their repayments and *when* they choose to do so.

Suppose, for example, that a representative 10% subgroup of graduates repaid their student loans at a rate of 20% of earnings above the repayment threshold, rather than 9%. For the majority of graduates who would have some debt written off after 30 years under the baseline model, making early repayments merely reduces the amount that will be written off, which is beneficial to the government rather than the graduate. Under such a scenario, we estimate that the average loan subsidy would be £17,081, slightly lower than the £17,443 estimate under the baseline, as shown in Table 5.3. This would generate a total saving of £109 million for a cohort of 300,000 students.

The story is quite different if the early repayments come from a specific type of graduate. Now suppose the top 10% of earners repaid 20% of earnings above the repayment threshold. As discussed in Chapter 4, under our baseline model, this group on average still enjoys a loan subsidy because its members tend to pay interest rates below the government's cost of borrowing when they are young. Early repayment allows these graduates to reduce their outstanding debt at a time when they are still being charged a real interest rate below 2.2%. These individuals would thus repay less, on average, under the scenario of early repayment than estimated in our baseline model. Table 5.3 shows that the average loan subsidy would increase slightly if the highest earners repay early, from £17,443 per student to £17,512. Across the top-earning 10% of graduates, the average loan subsidy would increase from £475 to £1,166, all of which would come from receiving a higher interest rate subsidy.

[44] In general, early repayments are not financially optimal from the graduate's perspective. The majority of graduates are expected to have some of their debt written off after 30 years, so making repayments of greater than the required 9% of income above the repayment threshold would simply serve to reduce the amount of debt that they have written off. Early repayments are only in the graduate's financial interests if the graduate expects to repay the loan in full *and* if the interest rate payable on the loan is greater than that which could be received on savings. However, some graduates may still overpay – for example, if they do not understand the financial incentives, or if they are debt averse, or if they are socially motivated to repay their loan.

Table 5.3. Sensitivity of estimated long-run public cost of student loans to repayment behaviour

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (repay as per rules) | 43.3% | £17,443 | £5,233m |
| Random 10% repay faster than necessary | 42.4% | £17,081 | £5,124m |
| Top earning 10% repay faster than necessary | 43.5% | £17,512 | £5,254m |
| 5% of graduates cannot be traced after graduation | 46.1% | £18,584 | £5,575m |

Note: In the early repayment scenarios, we assume the faster repayers pay 20% rather than 9% of their earnings above the repayment threshold until clearing the debt. Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

On the other hand, there is the risk that individuals do not make student loan repayments even if their income is above the relevant repayment threshold. This is more likely to be the case among EU students and English students who move abroad after graduation than among those who remain in the UK to work (who have repayments deducted at source through HMRC's PAYE system). To give a sense of how costly the evasion of graduate loan repayments could be, we estimate a scenario in which 5% of graduates in our sample (i.e. young full-time English-domiciled students studying at universities in England) cannot be traced at all by HMRC or the Student Loans Company after graduation. It should be stressed that this is not an estimate of the prevalence of repayment avoidance either now or in future – it is simply intended to help quantify the effect such uncertainty might have on the public cost of issuing student loans. With only 95% compliance, the average loan subsidy would be around £18,584 per student. This would increase the cost of offering student loans to an intake of 300,000 students from £5.2 billion to £5.6 billion.

EU students who study at higher education institutions in England are entitled to tuition fee loans in the same way as English-domiciled students. They are not, however, eligible for maintenance loans or grants; therefore the average loan made to an EU student is lower than that made to an English student. On the other hand, it is likely to be more difficult to secure repayment of the loans from EU students, since these individuals may be more likely to leave the UK after graduation.

Table 5.4 gives a sense of the potential cost to the UK government of providing tuition fee loans to EU students at English higher education institutions under certain assumptions. If EU students were 'like' English students in all respects except their lack of entitlement to maintenance grants and loans, then our model would suggest that the average loan subsidy across EU students would be 33.3% (£9,090 per EU student). This is lower than the average across English students

Table 5.4. Sensitivity of estimated long-run public cost of student loans made to EU students

| | Average loan subsidy | | Total loan subsidy for intake of 18,000 students |
|---|---|---|---|
| Baseline English students | 43.3% | £17,443 | £314m |
| EU students similar to English ones except for eligibility to maintenance grants and loans | 33.3% | £9,090 (per EU student) | £164m |
| Random 50% of EU graduates cannot be traced after graduation | 66.7% | £18,197 (per EU student) | £328m |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

because the accumulated debt on graduation is lower and therefore the average write-off is smaller. For an intake of 18,000 EU students, this would cost the government £164 million in total.[45]

Of course, EU students may not be like English students. For example, if they earn more than English graduates, on average, then the estimate above may overstate the cost to the UK government of providing tuition fee loans to them. On the other hand, repayment compliance may be lower among EU students, who are more likely to move abroad after graduation. If we consider a (perhaps extreme) scenario in which a random 50% of EU students cannot be traced at all after graduation and therefore make no repayments on their loans, the average loan subsidy would be £18,197 per EU student. For an intake of 18,000 EU students, that would represent a total cost to the UK government of £328 million.

## 5.4 Student numbers

One important parameter that will be more uncertain in future than it has been in the recent past is the number of students who go to university. In the 2013 Autumn Statement, the government announced its intention to abolish controls on student numbers by 2015–16. The Treasury estimated that this will result in an additional 60,000 students entering higher education each year.[46]

[45] In 2012–13, 17,875 EU students enrolled on full-time undergraduate first-year courses in English higher education institutions. Source: table 2a of HESA, Statistical First Release 197, http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=3103&Itemid=161.

[46] Source: HM Treasury, 2013b, para. 1.202. This estimate is not far off what might be regarded as the 'excess demand' for higher education implied by the latest application and acceptance figures: 79.8% of 18-year-old UK-domiciled applicants were accepted by institutions in 2013 (source: UCAS, 2013, table 6); assuming English-domiciled 18-year-olds have the same acceptance rate, an intake of 300,000 corresponds to about 376,000 applications and an excess of around 76,000. However, this estimate may represent an upper bound on the increase in student numbers that may result from abolishing the cap. First, some rejected applicants may reapply and enter university in a subsequent year, and others may not have sufficient academic credentials to

Table 5.5. The uncertain impact of student number increases on the long-run public cost of student loans

| If the extra students are similar to ... | Average loan subsidy per extra student | Total loan subsidy for extra 60,000 students | Total taxpayer contribution for extra 60,000 students |
|---|---|---|---|
| ... the current student and graduate population | £17,443 | £1,047m | £1,476m |
| ... the bottom 25% of graduate lifetime earners | £33,514 | £2,011m | £2,455m |
| ... the bottom 50% of graduate lifetime earners | £28,275 | £1,697m | £2,126m |
| ... the bottom 75% of graduate lifetime earners | £22,564 | £1,354m | £1,780m |
| ... those from bottom 25% of household income | £17,888 | £1,073m | £1,896m |
| ... those from bottom 50% of household income | £17,739 | £1,064m | £1,788m |
| ... those from bottom 75% of household income | £18,114 | £1,087m | £1,615m |

Note: 'Total taxpayer contribution' includes maintenance grants, HEFCE teaching grants, the National Scholarship Programme and the average loan subsidy. Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

The impact of increasing student numbers on the public cost of providing student loans will depend on the characteristics of those extra students. For example, if they all go on to be relatively low-earning graduates, then the cost to the government would be greater than if they all go on to be relatively high-earning graduates, since they would pay off their student loans more slowly and are less likely to pay them off completely. The implications of a number of potential scenarios are illustrated in Table 5.5.

Assuming there are 60,000 extra young English-domiciled individuals who would go to university full-time in the absence of student number controls and who, on average, have characteristics similar to the existing student and graduate population, our estimate of the proportional loan subsidy would not change. The increase in the total cost of loan subsidies would simply be 60,000 times £17,443, i.e. £1.0 billion. Taking into account the cost of additional teaching and maintenance grants over the course of these students' degrees, the increase in the total taxpayer contribution to the higher education of this cohort of students would be £1.5 billion.

If the extra students go on to have earnings profiles similar to the bottom half of graduate earners instead of the whole population of graduates, however, the average loan subsidy across these individuals would be £28,275 – much higher than the £17,443 average estimated for the current student population. For an additional 60,000 students, this would result in an increase in the total cost of loan subsidies of £1.7 billion. Taking into account the cost of additional teaching

enter higher education at all. Second, universities may have a view on how many students they can admit without sacrificing quality and therefore may adjust their admissions criteria accordingly. In other words, supply may not rise sufficiently to accommodate all of the current unmet demand.

and maintenance grants over the course of these students' degrees, the total taxpayer contribution would increase by £2.1 billion. If the extra students go on to earn higher wages than this then the cost would be lower, but conversely if they earned lower wages then the cost would be even higher. While it is hard to predict where in the earnings distribution any extra graduates would end up, given that they are likely to have lower academic attainment, on average, than the existing student population, it seems likely that they would, on average, go on to earn less than the existing graduate population.

The composition of any additional students would also have implications for the average taxpayer contribution in terms of teaching and maintenance grants.[47] For example, if the extra students come from the bottom half of the household income distribution, they will on average get a slightly smaller maintenance loan and a much bigger maintenance grant than the current student population. In this scenario, we estimate that the average taxpayer contribution made via grants would be £12,059 compared with an average of £7,149 across the existing student population. For an extra 60,000 students, the increase in grants would be £724 million (in 2014 prices).

In addition, because graduates from lower-income families tend to earn less on average (all else being equal), they would also repay a smaller proportion of their loans on average. The estimated average loan subsidy in this scenario would be slightly higher than under our baseline scenario (at £17,739 rather than £17,443). The total taxpayer contribution for each additional student in this scenario is therefore estimated to be significantly greater than the average across the existing student population: £29,798 compared with £24,592. An increase of 60,000 students at this average cost would result in an increase in government spending on the university education of this cohort of £1.8 billion (compared with £1.5 billion if the extra students were, on average, similar to existing students).

In the 2013 Autumn Statement, the government estimated that the cost of providing grants to an additional 60,000 students would be £720 million in 2018–19 (around £600 million in 2014 prices) and that the cost of issuing student loans to an additional 60,000 students would be £700 million in 2018–19 (around £600 million in 2014 prices).[48] Discussions with BIS analysts suggest that these estimates assume that additional students will come from lower-income households than the existing student population but will have the same proportional loan subsidy as the existing graduate population.

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[47] And the National Scholarship Programme (NSP) in our model, which is for the cohort who started university in 2012. Undergraduates starting in 2015 or beyond will not benefit from the NSP. This is unlikely to significantly bias our estimates of the public cost of higher education, however, because the average amount received per student from the NSP is relatively small, at £198 in 2012 (2014 prices).

[48] Source: HM Treasury, 2013b, para. 1.203.

Since the Autumn Statement, BIS has revised up its estimate of the proportional loan subsidy from 36% to 45%, which would increase the government's estimated cost of providing loans to these additional students to almost £800 million in 2014 prices and increase the total taxpayer contribution to about £1.5 billion. Our estimates and those made by the government are not completely comparable, for a number of reasons. For example, our model assumes complete take-up and no dropouts whereas BIS's model uses historical rates of loan non-take-up and dropouts. Our estimate of the total loan outlay is therefore likely to be higher than the reality. But there are also reasons why BIS's estimated loan subsidy might be an underestimate for these graduates. For example, it assumes that the additional graduates will have earnings that are similar to those of existing graduates, but, as we have illustrated above, lower-than-average earnings for those additional students could increase the cost considerably.

## 5.5 Fee levels

The level of fees has very important implications for the long-run public cost of student loans, although it is less of an 'uncertainty' from the point of view of the government. Since students can take out a loan for the full cost of their tuition fees, an increase in the level of those fees will lead to an increase in the value of student loans issued. Intuitively, this would also lead to an increase in the long-run public cost of student loans, since, without any changes being made to the repayment terms, a smaller proportion of loans will be paid off completely before the end of the repayment period.

Our estimates suggest that, in 2012, around 60% of students faced the maximum £9,000 tuition fee (50% after fee waivers). If all students faced the maximum fee (£9,000 in cash terms before fee waivers), we estimate that the average loan subsidy would be £18,320 per student, almost £1,000 higher than our baseline estimate, as shown in Table 5.6. Had all fees been £7,500 (the average assumed by the government in 2011[49]), the average cost of loan subsidies would be £14,851 per student, 15% lower than our baseline estimate.

Table 5.6 also illustrates the impact of an increase in fees (including raising the fee cap where necessary) on our estimated long-run public cost of student loans, assuming that the terms under which loans are offered remain unchanged (i.e. that the repayment threshold, rate and period and the interest rate charged are all unchanged). These figures are included for illustrative purposes only and do not constitute suggestions for changes that the government should make.

If fees were to increase in line with the RPI each year, we estimate that the average loan subsidy for the 2012 cohort would be slightly higher than under our baseline scenario, at 44.1% or £18,215 per student. If fees were increased somewhat more dramatically – by £1,000 per year (in cash terms) – then the average loan subsidy is estimated to increase to 46.0% or £20,161 per student.

[49] Source: Department for Business, Innovation and Skills, 2011, p. 54.

Table 5.6. Sensitivity of estimated long-run public cost of student loans to fee levels

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (nominal fees constant over course) | 43.3% | £17,443 | £5,233m |
| All fees at £9,000[a] | 44.2% | £18,320 | £5,496m |
| All fees at £7,500[a] | 40.6% | £14,851 | £4,455m |
| Fees increase in line with RPI over course | 44.1% | £18,215 | £5,465m |
| Fees £3,000 higher but constant over course[b] | 50.1% | £25,070 | £7,521m |
| Fees increase by £1,000 per year over course[b] | 46.0% | £20,161 | £6,048m |
| Fees £500 higher but constant over course[b] | 44.5% | £18,642 | £5,593m |

[a] These scenarios set the gross fees charged by all institutions at £9,000/£7,500 in cash terms. Fee waivers offered to some students by some institutions mean that the net fees payable by some individuals will be lower than this level.
[b] These scenarios set nominal annual gross fees to be higher than the actual levels by the respective amounts.
Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

Alternatively, if the fee cap were increased to £12,000, and all fees were £3,000 (in cash terms) higher than their current levels (but constant over time), the estimated subsidy is even greater – at 50.1% or £25,070 per student.

This illustrates an important point: increasing tuition fees to increase the resources available to universities would not just increase the cost to private individuals, but also increase the public cost, as it would increase the public subsidy on student loans. While the 2012 reforms to the higher education funding system reduced total public spending on HE (we estimate by £1,254, on average, per young full-time English student enrolling at an English institution in 2012), this effect could be unwound by future increases in fees and student loans. We estimate that if all fees were £500 higher (in cash terms) than their current levels, the average loan subsidy would be £18,642 per student. Taking into account teaching grants and maintenance grants, the total taxpayer contribution would be £25,791 per student – essentially the same as we estimate the total taxpayer contribution would be for these students had the 2012 reforms to the funding system not been implemented (£25,847 per student).

## 5.6 Government borrowing cost

All of the figures on the long-run public cost of student loans described in this report are *discounted* back to 2012. This is to take account of the fact that the government has to borrow in order to make loans available to students, and

borrowing is costly to the government. For the purposes of costing student loans (a 'financial instrument'), HM Treasury has decided that a real discount rate of 2.2% per year (i.e. RPI+2.2%) should currently be used.[50]

The choice of discount rate has significant implications for the estimated cost of providing student loans. If government borrowing were more costly than 2.2% per year (i.e. a higher discount rate were used), then the public debt from student loans would accrue greater interest, and would fall less quickly as graduate repayments are made, than was illustrated in Figure 4.1. The level of debt would be higher at the point repayments cease, and therefore the long-run public cost of the loans issued would be higher. Conversely, if the government's borrowing cost were lower than 2.2% per year (i.e. a lower discount rate were used), then the loan subsidy would be lower.

The Treasury's chosen 2.2% discount rate is based on the historical difference between gilt yields and inflation, and is often referred to as the government's long-run cost of borrowing. However, others have argued that a different discount rate should be used to evaluate the cost of student loans. Shephard (2013), for example, has argued that student loans are essentially an inflation-linked asset (since the interest rate payable on student loans is greater than or equal to the rate of inflation), and therefore the relevant cost of government borrowing should be the yield on *index-linked* gilts. This is lower than the difference between gilt yields and inflation because of the 'risk premium' – investors are prepared to accept a lower rate of return on index-linked gilts in return for protection from the risk that inflation is higher than expected. The median of the yields on longer-maturity index-linked bonds over the past 13 years has been around 1.1% (real).

If we discounted the outlay on student loans and the repayments received from graduates by 1.1% per year rather than 2.2% per year, then the estimated long-run cost of providing student loans would be £12,434 per student rather than £17,443, as shown in Table 5.7. The estimated proportional loan subsidy would

### Table 5.7. Sensitivity of estimated long-run public cost of student loans to the government's cost of borrowing

| Government cost of borrowing (discount rate) | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (2.2%) | 43.3% | £17,443 | £5,233m |
| 1.1% | 30.5% | £12,434 | £3,730m |
| 3.5% | 55.0% | £21,839 | £6,552m |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

[50] HM Treasury, 2013a, para. 1.22.9.

fall from 43.3% to 30.5%, and the estimated total cost for an intake of 300,000 students would fall from £5.2 billion to £3.7 billion.

It is worth pointing out, however, that the Debt Management Office (DMO) – the body responsible for issuing gilts to fund UK government borrowing – does not issue particular gilts to pay for particular elements of government spending or particular government loans. Therefore the benefit of the inflation-linked nature of student loan debt as an asset would only be realised in a lower government borrowing cost if the DMO chose to issue an increasing proportion of gilts as index-linked gilts.

Prior to 2005–06, the real financial instrument discount rate was set at 3.5% rather than 2.2% (since average gilt rates used to be higher). If a 3.5% discount rate were still used to value student loans, then the estimated long-run public cost of student loans would be £21,839 per student (55.0%).

# 6. The Impact of Potential Reforms

If the government wanted to reduce the public cost of student loans, it could do so by changing one or more of the parameters of the student loan system for new borrowers. In this chapter, we illustrate how changes to the repayment rate, the repayment threshold, the interest rate and the repayment period could affect the public cost of student loans. For each potential policy reform, we also show how the student loan subsidy would vary at different points of the graduate lifetime earnings distribution. Table B.5 in Appendix B shows how the total taxpayer contribution (also taking into account spending on teaching and maintenance grants) would be affected by these changes.

## 6.1 Changing the repayment rate

If the government wanted to recover more repayments from graduates, one way in which it could do so would be to increase the repayment rate. Under the 2012 system, graduates repay 9% of income above a repayment threshold of £21,000 (in 2016 prices).

If this rate were increased to 12%, then most graduates would repay more every year and we estimate that the average loan subsidy would fall to £14,342 – a saving of roughly £3,000 per student compared with the current system (see Table 6.1). If the repayment rate were increased further, say to 15%, then the saving would be even larger. We estimate that a 15% repayment rate would reduce the loan subsidy to 30.9% (£12,454 per student). With a 15% repayment rate, the total cost of providing loans to an intake of 300,000 students would fall from £5.2 billion to £3.7 billion in 2014 prices.

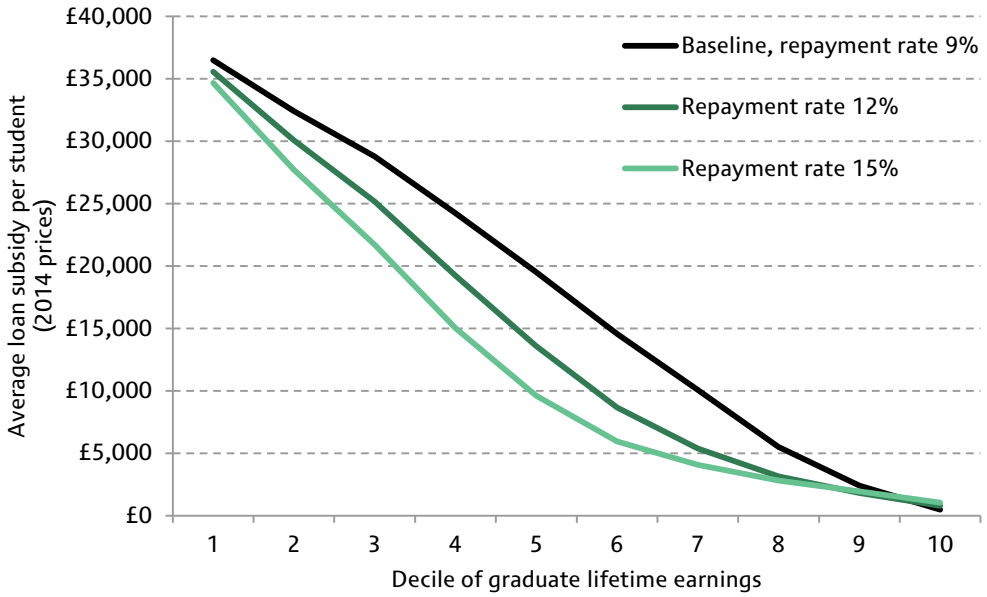
Increasing the repayment rate would, however, have different consequences at different parts of the earnings distribution. For high-earning graduates who expect to repay in full under the current system, an increase in the repayment rate would mean that they pay off their debt faster. For the very-highest-earning graduates, this would in fact reduce their total repayments, on average, because they would now repay a larger proportion of their debt before they earn enough to be liable for higher interest rates.

### Table 6.1. Estimated long-run public cost of student loans by repayment rate

| Repayment rate | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (9%) | 43.3% | £17,443 | £5,233m |
| 12% | 35.6% | £14,342 | £4,302m |
| 15% | 30.9% | £12,454 | £3,736m |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

Figure 6.1. Loan subsidy by graduate lifetime earnings and repayment rate




Source: IFS graduate repayments model.

In contrast, lower- and middle-earning graduates expect to have some of their debt written off under the current system. Therefore a higher repayment rate will increase their annual repayments and reduce the amount of debt that is written off at the end of the repayment period. (For those who do not repay in full, the repayment rate just acts like an additional income tax – regardless of their level of debt, they pay a set percentage of their earnings above the threshold for 30 years.) As illustrated in Figure 6.1, the effect of increasing the repayment rate to 12% is smallest for the lowest-earning graduates (who rarely earn above the repayment threshold) and the highest-earning graduates. It is largest for those in the fifth decile, whose loan subsidy would be £5,912 lower. Increasing the repayment rate by another 3 percentage points to 15% would yield more savings, though not as much as generated by the first 3 percentage point increase. For example, the average loan subsidy in the fifth decile would be £9,903 lower than the baseline and £3,991 lower than in the 12% scenario. This is because more graduates repay in full when the repayment rate is 12% than when it is 9%, and therefore it becomes harder to extract savings by a further increase in the repayment rate. In other words, the estimated reduction in the cost of loans from each percentage point increase in the repayment rate decreases in size as the repayment rate increases.

## 6.2 Changing the repayment threshold

Another policy change that could potentially reduce the public cost of issuing student loans would be to reduce the repayment threshold. Under the current system, the 2012 cohort will repay 9% of their income above £21,000 in 2016, with government calculations assuming that the repayment threshold will go up

in line with average earnings thereafter. This means that for any given level of income, every £1 reduction in the repayment threshold would lead to a 9p increase in repayments per graduate (until the debt is cleared).

If the government were to reduce the repayment threshold from £21,000 to £18,000 in 2016 (in cash terms), annual repayments would be £270 higher for those earning above £21,000 in 2016. A threshold of £18,000 is close to the level at which it would be without the 2012 reform.[51] If the threshold were increased in line with average earnings from this new lower level, Table 6.2 shows that we estimate the average loan subsidy to be 36.9% (£14,850 per student) rather than 43.3% (£17,443 per student) under our baseline model.

Another way to reduce the repayment threshold over time would be to link it to inflation rather than average earnings, as average earnings tend to grow faster than prices in the long term. Assuming that the RPI increases by 3.3% per year and that average earnings increase by 1.1% more than the RPI each year, uprating the threshold by the RPI rather than earnings would reduce the threshold in 2040 by around 20%. We estimate that, on average, this change would reduce the loan subsidy to 37.5% (£15,126 per student). If the government were to uprate the repayment threshold by 2% a year (the Bank of England's medium-term target for annual increases in the consumer price index)

### Table 6.2. Estimated long-run public cost of student loans by repayment thresholds

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (threshold £21,000 in 2016 and uprated by average earnings) | 43.3% | £17,443 | £5,233m |
| Threshold £18,000 in 2016 and uprated by average earnings | 36.9% | £14,850 | £4,455m |
| Threshold £21,000 in 2016 and uprated by RPI | 37.5% | £15,126 | £4,538m |
| Threshold £21,000 in 2016 and uprated by 2% a year | 31.1% | £12,511 | £3,753m |

Note: Average earnings are assumed to increase by 1.1% per year faster than the RPI in the long run. The uprating rules are applied to both the repayment threshold (above which 9% of income is payable) and the higher threshold (above which the maximum interest rate is charged). Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

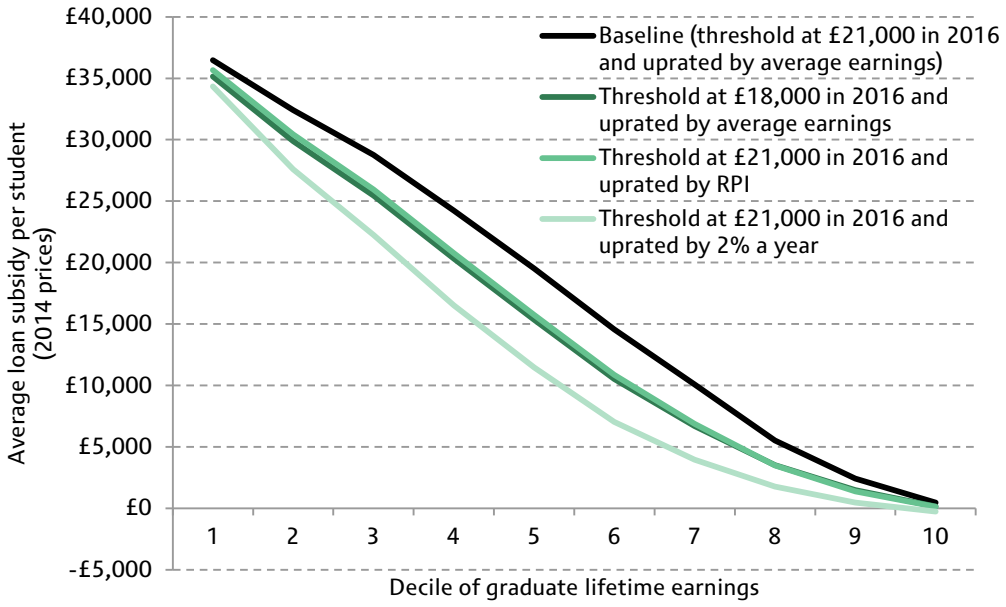
[51] The repayment threshold was £15,795 in 2012. The government has legislated for the threshold to increase in line with the RPI between 2012 and 2015, and assumes that it will continue to do so from 2015 onwards. Allowing an annual increase of 3.3% (the assumed RPI inflation rate and the average increase forecasted by the OBR for the period) would bring it to £17,985 in 2016.

rather than 4.4% per year, then the loan subsidy would fall to £12,511 in NPV terms, or 31p out of every £1 lent.

Reducing the repayment threshold, either directly or through slower uprating, would again have a differential impact across the graduate earnings distribution. In contrast to the policy of increasing the repayment rate, reducing the repayment threshold would not increase the average loan subsidy for the highest-earning graduates, since reducing the repayment threshold reduces their debt at a slower rate than increasing the repayment rate,[52] meaning that under this potential policy change they would repay a smaller proportion of their debt before they earn enough to be liable for higher interest rates.

A lower repayment threshold will affect low earners only if they earn above the new threshold. Moreover, if their earnings are between the thresholds, their annual repayments are affected less in absolute terms than those of people earning just above the old threshold. Thus, it will again be graduates in the middle 80% of the earnings distribution who will see their loan subsidy reduced to the greatest extent (i.e. whose loan repayments would increase the most). This is illustrated in Figure 6.2.

## Figure 6.2. Loan subsidy by graduate lifetime earnings and repayment threshold




Source: IFS graduate repayments model.

[52] For these individuals, 9% of £21,000 minus the new lower repayment threshold would, in general, be less than some percentage (the difference between the old and new repayment rates) of income minus £21,000.

## 6.3 Changing the interest rate

Under the current system, student loans are subject to a real interest rate of 3% (relative to the RPI) whilst an individual is studying and a real interest rate of between 0% and 3% from the April after graduation. Graduates with incomes at or below £21,000 (in 2016 prices) would face a real interest rate of 0%, with the rate increasing linearly to 3% for graduates earning £41,000 or more.

Here we consider the impact of changes to the interest rate on repayments and the average loan subsidy. It should be noted from the outset, however, that the potential impact of a change in the interest rate is perhaps more limited than might be expected, since only those who expect to pay off their debt in full (or who are close to that point) would be affected. For those who expect to have some debt written off under the current system (who simply repay 9% of their income above the threshold every year for 30 years), an increase in the interest rate would simply increase the amount of debt written off at the end of the repayment period, while a decrease would reduce it.

Table 6.3. Impact of changing interest rates on the estimated long-run public cost of student loans

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (real interest rate of 3% while studying, 0–3% after graduation) | 43.3% | £17,443 | £5,233m |
| Zero real interest rate while studying | 45.1% | £18,151 | £5,445m |
| Zero real interest rate after graduation | 50.5% | £20,331 | £6,099m |
| Real interest rate 0–5% after graduation | 38.6% | £15,557 | £4,667m |
| Real interest rate 3% after graduation | 39.5% | £15,918 | £4,776m |
| Same interest rates as in baseline, but top 10% of earners do not take out loans | 48.2% | £19,329 (£17,396 per student) | £5,219m |
| Real interest rate 0–5% after graduation and top 10% of earners do not take out loans | 45.3% | £18,186 (£16,367 per student) | £4,910m |
| Real interest rate 3% after graduation and top 10% of earners do not take out loans | 45.6% | £18,287 (£16,458 per student) | £4,938m |

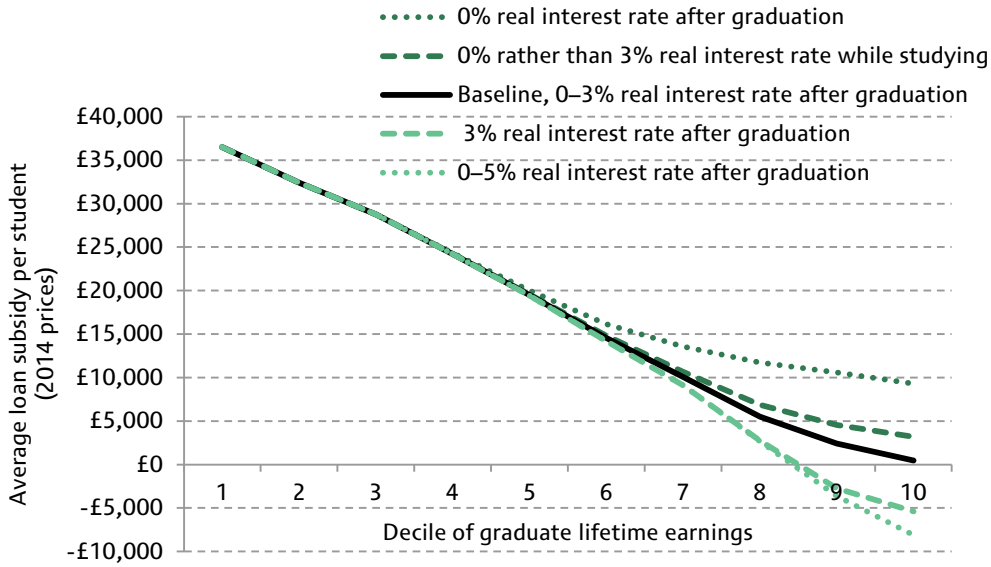
Note: Average loan subsidy in the bottom panel is calculated across students who take out a loan (rather than all students). The 'per student' figures average across all students (regardless of whether they take out a loan). Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

If the government were to reduce the real interest rate to 0% for the period while studying, all students would graduate with a lower accumulated stock of debt and thus would have less to repay over the course of their working lives. Table 6.3 shows that this would increase the average loan subsidy to 45.1% (£18,151 per student) compared with 43.3% (£17,443 per student) under the current system. (Table B.6 in Appendix B splits the loan subsidy into that arising from debt write-offs and that arising from the interest rate subsidy, and illustrates how changing the interest rate charged would affect these two components of the cost.) If the government were to reduce the real interest rate during the repayment period to zero for all graduates, then the interest paid by those who clear their debt before the end of the repayment period would be lower than under our baseline scenario, thus meaning that they would repay less in total. This would increase the average loan subsidy to 50.5% (£20,331 per student).

If, on the other hand, the government wanted to reduce spending on loan subsidies, it might consider increasing the interest rate charged. If the government were to set the maximum real interest rate at 5% instead of 3%, those graduates who repay in full would repay more; the average loan subsidy would therefore be reduced to 38.6% (£15,557 per student), almost £2,000 lower than the baseline. Similarly, if all graduates were charged a real interest rate of 3% (irrespective of their earnings), the average loan subsidy would fall to 39.5% (£15,918 per student).

Of course, as should be clear from the discussion above, the distributional consequences of changing the interest rate would be very different from the distributional consequences of changing the repayment rate or threshold. Figure 6.3 shows that increasing the interest rate would reduce the loan subsidy by more on average for higher earners than for lower earners, since these

## Figure 6.3. Loan subsidy across graduate earnings distribution by interest rate




Source: IFS graduate repayments model.

individuals are more likely to pay off their debt in full. Increasing the maximum real interest rate to 5%, or charging a 3% real interest rate to all graduates, would mean that the top-earning 20% of graduates would receive no loan subsidy on average – the government would actually make money out of providing student loans to these individuals.

It is important to note, however, that all these figures assume 100% loan take-up and repayment in line with the system rules. If prospective high earners decide not to take out a loan, or choose to repay more quickly than necessary in order to avoid the higher interest rate, then the gain to the government of issuing student loans to these individuals would be reduced. Such behavioural responses could therefore significantly reduce the overall savings that higher interest rates might generate.

To provide some sense of the potential importance of this effect, suppose that the maximum interest rate were increased to 5%, but in response the top-earning 10% of graduates decided not to take out loans (see the bottom panel of Table 6.3). In this case, the estimated average loan subsidy would be 45.3% (£18,186 per loan), or an average £16,367 across all students, rather than the £15,557 estimated when there is no behavioural response. The saving relative to the baseline will be 43% lower in this scenario than if all loans are taken up. For an intake of 300,000 students, this would mean that the increase in interest rates would only reduce the cost of providing student loans to £4.9 billion, rather than £4.7 billion. The figures would be very similar if a 3% real interest rate were charged to all graduates and the 10% highest earners decided not to take out a loan.

## 6.4 Changing the repayment period

The final parameter that we consider is the length of the repayment period. Under the current system, any outstanding student loan debt is written off 30 years after the student graduates. The longer the repayment period, the fewer loans will be written off and therefore the more repayments will be made.

If the repayment period were increased from 30 to 35 years, we estimate that the average loan subsidy would be reduced from £17,443 per student (43.3%) to £15,691 per student (38.9%), as shown in Table 6.4. If, on the other hand, the government were to return to the 25-year repayment period that was in place before the 2012 reforms, the average long-run cost of student loans would be increased to 50.4%, or £20,297 per student (£2,854 more per student than under the current system).

Like reducing the repayment threshold, increasing the repayment period would have little impact on the average loan subsidy to many high-earning graduates, who would expect to pay off their debt within the current 30-year repayment period. However, as shown in Figure 6.4, increasing the repayment period would reduce the average loan subsidy for graduates in the middle of the lifetime earnings distribution, as they would repay more of their loans and hence have

less written off at the end of a longer repayment period. (Graduates at the bottom of the lifetime earnings distribution are also relatively less likely to be affected since, if they do not earn more than the repayment threshold, they will not repay their student loan regardless of the length of the repayment period.)

## Table 6.4. Estimated long-run public cost of student loans by write-off period

| | Average loan subsidy | | Total loan subsidy for intake of 300,000 students |
|---|---|---|---|
| Baseline (write off after 30 years) | 43.3% | £17,443 | £5,233m |
| Write off after 25 years | 50.4% | £20,297 | £6,089m |
| Write off after 35 years | 38.9% | £15,691 | £4,707m |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

## Figure 6.4. Loan subsidy across graduate earnings distribution by repayment period


Source: IFS graduate repayments model.

# 7. Conclusion

The UK is currently experiencing a period of considerable fiscal austerity, which has affected virtually all areas of public spending, including spending on higher education (HE). The provision of student loans carries a significant public cost – due to debt write-offs and the subsidised interest rates charged to borrowers (on average) – but the public finance implications of this are still often not well understood.

Estimating this long-run public cost of student loans is inherently difficult. It depends on the repayments that will be made by graduates for decades to come – which can only be estimated by making a large number of assumptions about the future.

However, an appreciation of the cost of providing student loans, and the uncertainty around that, is essential for policymakers. The government needs unbiased estimates of these if it is to properly understand the public finance implications of the current HE funding system, its likely financial sustainability, and how the burden of HE funding is shared between the taxpayer and graduates. Were the long-run cost of issuing student loans today to be underestimated, then a future government would have to accept higher-than-expected levels of public sector debt (as loan repayments would not reduce debt as much as expected) or offset this by increasing taxes or cutting spending (which would reduce borrowing and therefore the addition to debt).

In this report, we have produced our own independent estimate of the long-run cost to the government of providing student loans to young English full-time undergraduates enrolling at English institutions in 2012, using the best data available to us. Under the assumption that all such students take out the full loan to which they are entitled and repay according to the repayment schedule, our baseline estimate is that each £1 of loans issued will cost the government 43.3p in the long run. Around 60% of this 'government subsidy' arises because some loans will never be repaid in full, while 40% arises because, on average, loans are offered at an interest rate below the government's long-run cost of borrowing. We estimate that the average loan issued per student over the life of their course is £40,286, and thus that the average loan subsidy amounts to £17,443 per student. For an intake of 300,000 students, this would amount to a total cost to the government of £5.2 billion.

If all students take up the loans to which they are entitled and there are no dropouts from university, then the cost to the government of higher education in respect of young English undergraduates in English universities is, on average, only £1,254 lower under the 2012 funding system than under the previous system. The fall in government spending on teaching grants for these students is almost entirely offset by the long-run cost associated with providing them with larger loans to cover their increased tuition fees. Furthermore, we estimate that if

all fees were to increase by £500, then the average cost per student under the two systems would be roughly equivalent.

However, it should be emphasised that these baseline estimates are highly uncertain. They are based on a large number of assumptions, changing any of which would alter the estimated cost, sometimes significantly. Quantifying these uncertainties provides some sense of the magnitude by which the long-run cost of issuing student loans may be overestimated or underestimated. This report has illustrated the extent to which our estimated cost changes as we make different assumptions about future earnings growth, student numbers, fee levels, loan take-up rates, repayment behaviour and the government's cost of borrowing. For example, looking at scenarios of future earnings growth ranging from RPI–1% to RPI+3%, we have produced estimates of the average cost of the student loans issued over the course of an undergraduate's degree that range from 36.7p to 51.6p per £1 of loan issued, or £14,795 to £20,806 per student. For an intake of 300,000 students, this would represent a total cost to the government of between £4.4 billion and £6.2 billion.

This uncertainty makes it even more important that the potential cost of student loans is estimated in as transparent a way as possible. The 2012 reforms have increased the uncertainty over the long-run public cost of higher education by replacing the certain costs of teaching grants with the uncertain costs associated with student loans. It is only by explicitly acknowledging and quantifying these uncertainties that the relative merits of potential future policy reforms can be effectively debated.

# Appendix A. Methodology

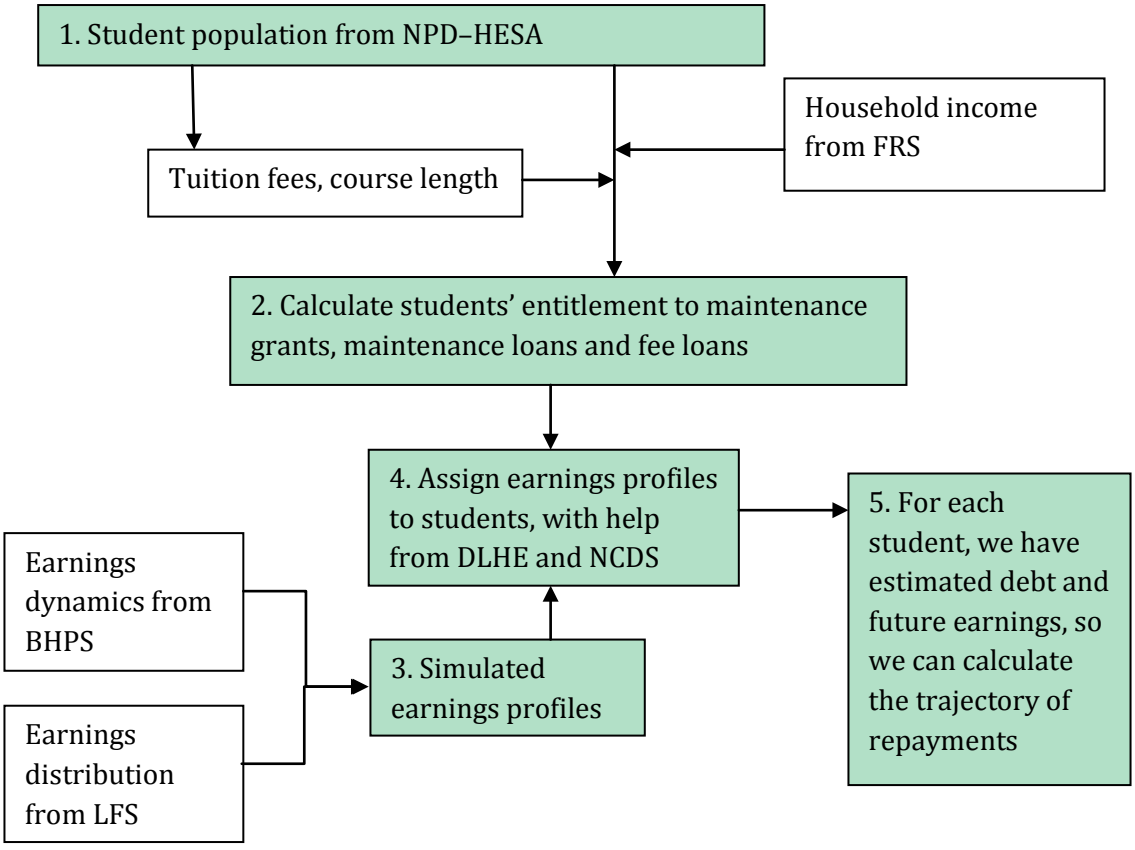
This appendix provides more detail on the graduate repayments model used to generate the results in this report. Section A.1 provides additional detail on the model and data sources, while Section A.2 describes some of the key differences between our model and what we know about the model that BIS has used to produce its latest estimates of the long-run public cost of providing student loans.

## A.1 The IFS graduate repayments model

The overall structure of the IFS graduate repayments model is illustrated in Figure A.1.

There are five main steps. First, we select a relevant population of students going to universities in England. Second, we make use of various sources of information in order to calculate each student's entitlement to loans and grants. Third, we

Figure A.1. Overall structure of the IFS graduate repayments model




Note: 'NPD–HESA' is the Higher Education Statistics Agency data linked to the National Pupil Database. 'FRS' is the Family Resources Survey. 'BHPS' is the British Household Panel Survey. 'LFS' is the Labour Force Survey. 'DLHE' is the Destination of Leavers from Higher Education data. 'NCDS' is the National Child Development Study (the 1958 birth cohort).

simulate 10,000 profiles of earnings from ages 22 to 60 separately for male and female graduates and postgraduates. Fourth, we assign to each student a profile of simulated earnings – this step is the most challenging and we use two additional data sets to help bridge the gap between what we know about students and what we know about graduates. Finally, we calculate annual repayments for each individual, given their stock of debt on graduation and earnings in adulthood. Each of these stages is described in more detail below.

## 1. Identifying a relevant student population

We start with the Higher Education Statistics Agency (HESA) data for the cohort entering UK universities in 2011. These data are matched to the National Pupil Database (NPD), a census of pupils attending schools in England since 2001–02. The linked NPD–HESA data provide us with detailed information about English-domiciled students entering university in the UK.

It is from this data set – together with information on maintenance loan entitlement criteria, plus information on fees, fee waivers and other student support available from individual institutions – that we calculate the maintenance and fee loans (and maintenance grants) to which students are entitled in each year. To calculate entitlements we require:

- information about the fees charged by each institution for each course, plus details of the fee waivers to which students with particular characteristics would be entitled (to calculate fee loans in each year);
- information about the income of the students' parents (to calculate entitlement to maintenance grants and loans, and fee waivers, in each year);
- information about other characteristics that are relevant for calculating fee waivers, including Key Stage 5 attainment and neighbourhood deprivation;
- information about course length (so that we know over how many years to calculate the above information).

The HESA element of the data provides information on institution attended and subject studied for everyone who goes to university in the NPD–HESA data. We impute course length using the modal value for someone studying a particular course at a particular university, and restrict attention to courses of between three and five years in length. Separately, we collect data on the fee and student support entitlements at the 90 largest HE institutions in England (covering 95% of full-time undergraduate students in English institutions) and merge these into the data.

The NPD element of the data provides Key Stage 4 and 5 scores for all those who took the relevant exams.[53] For those who attended state schools, it also includes information on a range of demographic and family background characteristics,

[53] Key Stage 5 scores are only available for individuals who took A levels. To impute equivalent information for those who sat other types of qualifications, we make predictions on the basis of gender, Key Stage 4 results, year of Key Stage 4 exams and which university they go to.

including free school meal (FSM) eligibility, plus an individual's home postcode at age 16. This enables us to merge in various neighbourhood indicators, including the Income Deprivation Affecting Children Index (IDACI) and the Index of Multiple Deprivation (IMD),[54] as well as historical information on average higher education participation rates (POLAR2 quintiles).[55]

The key determinant of how much grant and loan each student is entitled to is the household income of their parents. Unfortunately, we do not observe parental income directly in the NPD–HESA data, so we must impute it on the basis of information that we do observe. We do this in three stages:

1. First, we combine, using polychoric principal component analysis, FSM eligibility at age 16 with a series of local area measures merged in on the basis of home postcode at age 16 to create an index of socio-economic status (SES). The area-level measures we use are IMD score, ACORN type[56] and three census measures – specifically, the proportion of individuals in an area:

   a. who work in higher or lower managerial or professional occupations;
   b. whose highest educational qualification is National Qualifications Framework (NQF) level 3 or above;
   c. who own (either outright or through a mortgage) their home.[57]

   For anyone for whom this SES index is missing (including all those who attended a private school at age 16), we randomly assign them a score from the 10% highest scores (representing the 10% least deprived state school students) if they are recorded as not being eligible for free school meals or if FSM eligibility is missing (as it is for all students in private schools at age 16), or a score from the whole distribution if they are recorded as being eligible for free school meals at age 16.[58] Previous IFS research has shown that this index provides a reasonable proxy for family income.[59]

2. We estimate the relevant distribution of household income using a separate data set: the Family Resources Survey (FRS). We focus on data from 2007 to

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[54] These are both available at Super Output Area level (each SOA contains approximately 700 households). For details, see http://webarchive.nationalarchives.gov.uk/20120919132719/www.communities.gov.uk/communities/research/indicesdeprivation/deprivation10/.

[55] For details, see http://webarchive.nationalarchives.gov.uk/20120118171947/http://www.hefce.ac.uk/widen/polar/polar2/.

[56] This is a summary measure based on financial holdings and property information, available at the postcode level (approximately 15 households). See http://acorn.caci.co.uk/ for more details.

[57] These measures are available at the Output Area level (each OA contains approximately 150 households).

[58] The number of individuals for whom our SES index is missing but for whom we observe FSM eligibility is very small. In practice, therefore, the vast majority of students with missing SES information are assumed to sit near the top of the distribution.

[59] See Chowdry et al. (2013).

2011, select families in which young people were in higher education and look at the taxable income of their parents.[60] We deduct allowances (for other dependent children) from their taxable income to get the 'household residual income', which is the basis for means testing student grant and loan entitlements.

3. We then assign to each student in our NPD–HESA data a ranking of parental income in the first year of their course by generating a random variable (the ranking of parental income) that has a correlation of 0.9 with the percentile of our SES index calculated above. We convert this resultant parental income ranking into percentiles, and assign individuals the parental income associated with that percentile from the FRS. For means testing in subsequent years, we assume the student's nominal household income grows at the same rate as average earnings.[61]

It is worth noting that, for our purposes, it is important that the overall distribution of household income is correct, but less important that our imputed household income is close to actual income for every individual.

## 2. Calculating loan and grant entitlements

For each student, we calculate the amount of government maintenance grant and loan for which they qualify. This is determined by the student's parents' income (calculated above) and the income schedules of grants and loans as announced by the government (assuming that all the thresholds and taper rates stay constant in nominal terms in academic years after 2012–13).

The amount of maintenance loan also depends on whether the student lives away from home and on whether they live in London. We know from the NPD–HESA data whether the student goes to university in London, but we do not observe whether the student lives at home. We therefore randomly allocate 20% of students at universities outside of London, and 32% of students at London universities, to live at home. These proportions are informed by historical statistics.[62]

For each student, we also calculate the amount of fee loan to which they are entitled. To do this, we need to know both the level of fees at their university for the course they are studying and the fee waiver for which the student may be eligible. We collected information on HE institutions' fees and fee waivers, and

[60] All financial variables are converted into 2010–11 levels using relevant indices (for example, the average earnings index for earnings), since the 2010–11 financial year was the basis of the means test for the 2012 cohort of students. This analysis was conducted by Robert Joyce at IFS, who kindly provided us with the resulting percentiles. The FRS data were made available by the Department for Work and Pensions, which bears no responsibility for the interpretation of the data in this report.

[61] Source: Office for Budget Responsibility, 2013b, supplementary economy table 1.4.

[62] The proportions are reported in HEFCE (2009, table 24). Taking into account the fact that some students live at home reduces our estimate of the average maintenance loan by about 8%.

other student support schemes offered, for the 90 largest institutions in England from universities' Access Agreements, their websites and, in some cases, Freedom of Information requests.

Many universities offer fee waivers and cash support on the basis of income and Key Stage 5 attainment; others use criteria such as coming from a disadvantaged neighbourhood. For each individual, we assign fee waivers and cash support according to the rules of the institution that they attend. For example, this may involve ranking students according to their parental income and awarding financial support to the poorest 100 with AAB grades at A level.[63]

Some financial support schemes allow students to choose between a fee waiver and cash support (for example, discounts on accommodation) of a given amount. In such cases, we assume that all students choose the latter because that provides an up-front benefit, whereas a fee waiver would make no financial difference to someone who does not repay their student loan in full in future.

We also assume that all students take up the maximum maintenance grants, maintenance loans and fee loans to which they are entitled (with the last assumed to cover the full amount of the fees, net of any fee waivers, that they are charged).

As well as calculating the grants and loans to which students would be entitled, we calculate the government's spending on each student via HEFCE teaching grants. These grants depend on the 'price group' of the course, which we do not observe. For example, price group B is 'laboratory-based science, engineering and technology'; while we observe which students study science, we do not know whether the course is 'laboratory-based'. Thus, when using subject to assign price group, we align the frequency of price groups to student numbers published by HEFCE.[64]

## 3. Simulating earnings profiles

Simulating the gross annual earnings of a population of graduates over their lifetimes is vital because we will use gross annual earnings to calculate the interest rate that graduates face on their loans and the amount that they should repay each year. In principle, graduates have to make student loan repayments out of unearned income totalling more than £2,000 per year. In practice, most repayments are collected via the PAYE system (based on earnings) and repayments made out of other types of income (such as income from investments or savings) are only collected from individuals who submit self-assessment tax

[63] A detailed description of the student support system in place for the 2012 cohort is available in Chowdry et al. (2012). Updated analysis for more recent cohorts is due to be published in an IFS briefing note later this year.

[64] We do this so that the split of students by price groups in our final data matches that for HEFCE fundables in 2011. Source: 'Student numbers from HESES and HEIFES (March 2012)' at http://www.hefce.ac.uk/data/year/2012/studentnumbersfromhesesandheifesmarch2012/.

returns. However, since this represents a small group of people and it would be very difficult to simulate unearned income (for example, from savings and investments), our modelling focuses on repayments made on the basis of earnings only.

There are three steps in our approach to estimating profiles of graduate earnings.

First, we estimate a rich statistical model of employment status and earnings dynamics using data from the British Household Panel Survey (BHPS) from 1991 to 2008. We do so separately for male and female graduates and postgraduates, as these individuals may have very different employment and earnings trajectories. For those in work (defined as having annual earnings of at least £1,000), we assume the log of annual earnings is determined by observable characteristics (for example, age and ethnicity), an individual fixed effect, an individual-specific linear age trend, a persistent shock (first-order autoregressive) and a transitory shock (first-order moving average).[65] The model is very flexible and allows the variance of all these components to vary with the worker's age.

At the same time, we estimate employment dynamics: the probability of job loss is estimated using a probit model of age and current earnings; the probability of the currently unemployed finding a job is estimated using a probit model of age and unemployment duration; and their earnings upon re-entry depend on age, unemployment duration and their previous earnings. The mathematical structure of this model has been published in Dearden et al. (2010, appendix).

Our aim is to produce 10,000 individual earnings profiles from ages 22 to 60 for each gender and education group (graduate or postgraduate). Starting from a set of initial employment rates, we apply the dynamic effects and variances of the shocks estimated above to produce the required profiles. For each gender, the initial employment rate is set at the level observed amongst undergraduates in the 2006–07 Destination of Leavers from Higher Education (DLHE) data.[66,67]

The second step is to ensure that these profiles match the observed distribution of graduate earnings (both in terms of how unequal earnings across graduates are in a particular year and in terms of how earnings vary over the life cycle for

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[65] Self-employed graduates are included in this model, as long as they meet the earnings criteria.

[66] These data are designed to be a census of graduates six months after graduation, including information on their employment status (and earnings if they are in work); for more details, see http://www.hefce.ac.uk/whatwedo/lt/publicinfo/dlhe/. We use data on the cohort graduating in 2006–07 (as opposed to a later cohort) in order to minimise the potential effects of the recession on the employment rates of graduates. (Implicitly, we are assuming that employment rates in 2016 will be closer to those in 2007 than to those in the intervening years.)

[67] We set the same initial employment rates for both undergraduates and postgraduates (at 82% for men and 85% for women). The initial employment rate for postgraduates would be close to zero in reality because they would be studying rather than working, but as employment is positively correlated over time in our model, that would give postgraduates too low an employment rate in their twenties. We have experimented with different settings of initial employment rates for postgraduates and the results are not sensitive to this choice.

particular graduates), we match these profiles to the observed distribution of graduate earnings from the Labour Force Survey (LFS), separately by gender and education group.

To do this, we calculate a range of percentiles of log real earnings observed in the LFS (using data between 1992 and 2012) for each age–gender–education group.[68] Then for each simulated earnings profile estimated in the first step, we calculate its rank at each age in the relevant distribution (i.e. among other profiles for individuals of the same gender and education group) and assign to it the log real earnings level from the corresponding percentile in the LFS.[69] This process of aligning the distribution of earnings profiles to the LFS helps us to better approximate the cross-sectional inequality of earnings, the sex differentials, the wage premium of postgraduate degrees and the life-cycle earnings profile. Note that the *employment* dynamics estimated from the BHPS are not affected at all by this matching of *earnings* to the LFS.

Finally, to ensure that our profiles match the average salaries of recent cohorts of graduates, we scale all earnings (of all individuals at all ages) such that average non-zero earnings among 25- to 30-year-olds of each gender equal the level observed in the LFS in 2012. Thus, the absolute level of earnings is informed by what young people were earning in 2012 rather than by what graduates of all sorts were earning in the past two decades, whereas the shape of earnings over age and earnings inequality are still based on the longer-term observations. Since 2016 is the first year of repayment for individuals who started three-year courses in 2012, we uprate earnings using the Office for Budget Responsibility (OBR) forecasts for average earnings growth between 2012 and 2016. For earnings after age 22, we further apply the OBR forecasts of earnings growth between 2016 and that age.[70]

## 4. Assigning earnings profiles to students

The most challenging step in our modelling is assigning an earnings profile to each student in our population. To do so, we must find some way of linking the information on our base population of students and our simulated profiles of graduate lifetime earnings. These data sets have very few covariates in common,

[68] For example, we calculate the 1st, 2nd, 3rd, 4th, 5th, 10th, 15th, 20th, 25th, 30th, 35th, 40th, 45th, 50th, 55th, 60th, 65th, 70th, 75th, 80th, 85th, 90th, 95th and 99th percentiles of log real earnings for men aged 22 with an undergraduate degree, for men aged 22 with a postgraduate degree, for women aged 22 with an undergraduate degree, for women aged 22 with a postgraduate degree, for men aged 23 with an undergraduate degree, and so on. We do not observe self-employment earnings in the LFS, so we assume that self-employed graduates have the same earnings distribution as employed graduates in the same age–gender–education group.

[69] We use linear interpolation if the rank is between percentiles.

[70] Alternative earnings growth assumptions, and the impact that these have on our estimated long-run public cost of student loans, are described in Section 5.1.

so we make use of two additional data sets to facilitate this assignment: the DLHE data and the National Child Development Study (NCDS).[71]

For each student in our base NPD–HESA population, we start by randomly selecting an initial main activity (i.e. whether they are in postgraduate study, in work or unemployed[72]) and an initial earnings level (zero by construction for those not in work) from the distribution amongst DLHE observations with the same gender, socio-economic status,[73] university and subject (JACS one-digit code).[74]

For undergraduates, we then convert the assigned earnings six months after graduation (including zeros) into percentiles. We define cells by gender and percentile of initial earnings, which are now observed in both our enhanced NPD–HESA data and our simulated earnings profiles. Within each cell, we assign each student a profile from the set of simulated earnings profiles for undergraduates by imposing a correlation between parental income and the average of graduate earnings at ages 33, 42, 46 and 50.

This choice of intergenerational correlation and ages is based on our analysis of the NCDS data. We estimate that, among individuals who left school after age 16 (which constituted a similar proportion of that cohort to the proportion of our NPD–HESA population who go to university), the correlation between parental income at age 16 and adult earnings (at each of ages 33, 42, 46 and 50) is about 0.1. Imposing a correlation of 0.2 between parental income and average adult earnings *within* each cell in our data results in roughly a 0.1 correlation between parental income and adult earnings across our whole sample.[75]

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[71] The NCDS follows all individuals born in a particular week of March 1958. It includes measures of parental income at age 16 and their own earnings at age 33, 42, 46 and 50. For more details, see http://www.cls.ioe.ac.uk/page.aspx?&sitesectionid=724&sitesectiontitle=Welcome+to+the+National+Child+Development+Study.

[72] We excluded observations for those who were studying an advanced degree and working at the same time.

[73] We divide individuals in DLHE into three categories on the basis of parental occupation. We use the SES index constructed for our NPD–HESA population, which split it into three groups of similar size, to match the two data sets.

[74] There are usually more NPD–HESA observations than DLHE observations within each cell defined. In that case, we randomly assign each NPD–HESA observation a match from DLHE within the same cell. If the reverse is true, we duplicate NPD–HESA observations five times, reduce their weight proportionally and then match them to DLHE observations in the cell. This approach allows us to utilise more DLHE observations than purely random matching, and is useful because the DLHE sample is much smaller than our NPD–HESA sample. For 2% of the sample, there are no DLHE observations with the same four characteristics (primarily due to differences in how subject is reported between the NPD–HESA data and the DLHE data). In these cases, individuals are matched to DLHE observations on the basis of sex, institution and socio-economic status only.

[75] The correlation between graduate lifetime earnings and parental income is potentially important for the cost of providing loans, since the repayment depends on graduate earnings while the stock of debt on graduation is affected by parental income. However, in reality, the correlation between parental income and the stock of debt is not very large (see Crawford and Jin (2014) for details), and therefore our results are not very sensitive to the correlation we assume here (results available from the authors on request).

As postgraduates are in further studies six months after graduation, their earnings at that time would be very low. This is unlikely to be representative of their earnings prospects later in life, so we need to find another measure of earnings to help match postgraduates in our NPD–HESA sample to our simulated earnings profiles for postgraduates. To do so, we make use of what is known as the 'longitudinal DLHE'. This re-surveys a small sample (around 10%) of those who responded to the six-month survey (the main DLHE data) a further three years later. For those who are in work at this point, we observe their earnings (at around age 25). We impute earnings for postgraduates who were not included in the follow-up sample on the basis of this 10% subsample, conditional on university, subject, FSM eligibility, ethnicity, Key Stage 5 attainment and parental income.

We then define cells on the basis of gender and percentile of (imputed) earnings at age 25, and assign earnings profiles within each cell using a similar approach to that outlined above, again imposing a 0.2 correlation between parental income and the average of graduate earnings at ages 33, 42, 46 and 50, but this time choosing a profile from the set of simulated earnings profiles for postgraduates.

## 5. Calculating repayments, debts, etc.

Given each student's accumulated debt on graduation (calculated in step 2 above) and annual earnings (calculated in steps 3 and 4 above), we calculate annual repayments according to the repayment schedule. We assume that no one makes voluntary early repayments and that no one evades repayments (although the sensitivity of our estimated long-run public cost to these assumptions is illustrated in Section 5.3).

The long-run cost to the government of providing each student loan is calculated as the difference between the 'net present value' (NPV) of the loan issued over the duration of the student's course and the NPV of repayments:

$$\begin{aligned} Long\text{-}run\ cost &= NPV\ of\ loan - NPV\ of\ repayments \\ &= \sum \left(\frac{1}{1+d}\right)^{t-\tau} L_t - \sum \left(\frac{1}{1+d}\right)^{t-\tau} R_t \end{aligned}$$

where $L_t$ is the face value of the loan (in 2014 prices) in year $t$, $R_t$ is the repayment made in year $t$ (in 2014 prices) and $d$ is the real discount rate (which, for the purposes of calculations regarding HE finance, the government has assumed to be equal to its long-run cost of borrowing of 2.2%). The discounting of loans and repayments back to year $\tau$ in this way takes account of the fact that loans made in future cost the government less than loans made today, and repayments made in future are worth less to the government than repayments made today would be.[76]

[76] For example, if the government were paid £$X$ in 2016, it could reduce public debt by that amount, and therefore have £0.022×$X$ less debt interest to pay in 2017. In 2017, it is therefore

The long-run cost to the government of providing these loans as a proportion of the net present value of loans issued is often referred to as the 'RAB' (resource accounting and budgeting) charge. We have refrained from referring to this figure as the RAB charge in this report, as our estimates refer to a single cohort only (the 2012 cohort) and do not take into account any of the costs associated with the existing student loan book. Our estimated cost is also calculated on a particular subset of the 2012 cohort – English-domiciled students (arguably those who are most likely to repay). Our understanding is that the government's most recently announced RAB charge of around 45%[77] refers to loans issued under the new loan system only (i.e. it does not reflect the costs associated with the existing loan book), but is calculated over multiple cohorts and across all students to whom loans are issued this year.

We can decompose the estimated long-run cost into two components: (i) the net present value of the debt that will be written off at the end of the graduates' repayment period and (ii) the proportion of the long-run cost that arises from the interest rate payable on the loan being less than the government's discount rate of 2.2%:

$$Long\text{-}run\ cost \quad = \quad Interest\ rate\ subsidy + NPV\ of\ loan\ written\ off$$

In other words, the interest rate subsidy can be calculated as

$$Interest\ rate\ subsidy = \sum \left(\frac{1}{1+d}\right)^{t-\tau} L_t - \sum \left(\frac{1}{1+d}\right)^{t-\tau} R_t - \left(\frac{1}{1+d}\right)^{T-\tau} W$$

where $W$ is the face value (in 2014 prices) of the loan written off at date $T$.

The total taxpayer contribution for each student is calculated as the sum of the long-run cost of their student loan and the NPV of maintenance grants, teaching grants and other student support they receive (or their university receives on their behalf):

$$\begin{aligned} Total\ taxpayer\ contribution \quad &= \quad Long\text{-}run\ cost\ of\ loans + NPV\ of\ grants \\ &= \quad \sum \left(\frac{1}{1+d}\right)^{t-\tau} (L_t + G_t) - \sum \left(\frac{1}{1+d}\right)^{t-\tau} R_t \end{aligned}$$

where $G_t$ is the face value (in 2014 prices) of the maintenance grants, teaching grants and other student support issued in year $t$.

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£(1+0.022)$X$ better off. If, on the other hand, it were paid £$X$ (in real terms) in 2017, it would only be £$X$ better off.

[77] Source: http://liambyrne.co.uk/university-finance-system-turning-into-a-money-pit-as-rab-charge-hits-45/.

## A.2 Differences between the IFS repayments model and BIS's repayments model

The Department for Business, Innovation and Skills (BIS) has its own model of graduate repayments. It differs from ours in a number of important ways: the data it uses, the assumptions it makes regarding loan take-up, and the way in which earnings and employment interactions are modelled.

The BIS model is able to utilise some micro-data to which we do not have access. In particular, BIS has access to data from the Student Loans Company (SLC) on the size of loans taken out and the repayments made at the individual level (albeit amongst previous cohorts of students). As described above, we have to piece together information from various data sources to estimate the amount of grants and loans awarded to students, and we also have to make assumptions about the take-up of loans and repayments compliance (see below). In addition, our simulations of earnings and hence repayments rely on BHPS and LFS data alone, while BIS is able to supplement these sources with SLC data on how much recent graduates are actually repaying.

As outlined above, our model makes a number of simplifying assumptions: we assume no dropout from university and that all students take out the full amount of the grants and loans to which they are entitled; we assume no cancellation of liability due to death or disability; we assume perfect compliance with the repayment system (which BIS also assumes); and our model relates to young English undergraduates entering English universities in 2012 only. BIS is able to take advantage of information from the SLC on dropouts and repayment frictions such as non-matching of National Insurance numbers when people change jobs. Its model can therefore be considered more realistic than ours in these respects. However, the implications of most of these assumptions for our model are discussed in Chapter 3 and some robustness checks are provided in Chapter 4. Unfortunately, the specific assumptions underlying the new RAB charge estimate of around 45% have not yet been made public, so we are not able to judge the sensitivity of our model to the specific assumptions made in the most recent BIS modelling.

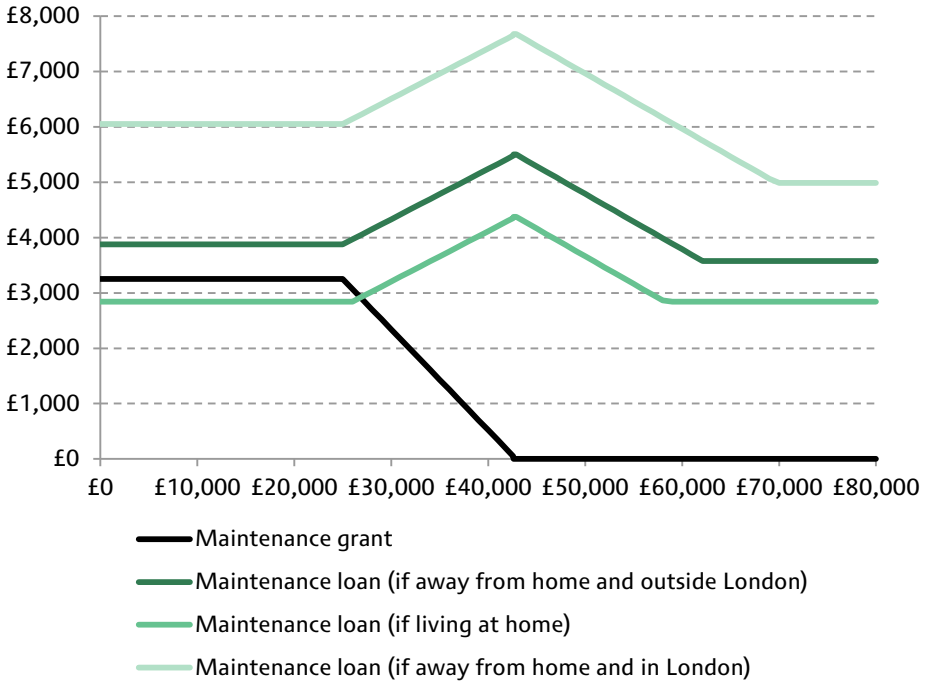
We would argue that our model provides a richer and more flexible way to model earnings dynamics than that employed by BIS. The latest BIS model for which published methodological notes are available is the HERO model.[78] This estimates paths of earnings percentiles, essentially using transition matrices to link current earnings to earnings in the last period. This has unrealistic implications: for example, two currently unemployed individuals would be assigned equal probability of being in any given position next year, regardless of how long they have been unemployed or their last earnings.

[78] See description of the model in National Audit Office (2013b) and Department for Business, Innovation and Skills (2013).

BIS no longer uses the HERO model, but details on its new model have not yet been made publicly available. From correspondence with analysts at BIS, we understand that its new model includes a stochastic wage equation and, separately, a logit model of employment. BIS's model allows employment to affect earnings in the first few years after graduation but not beyond; and it does not allow any dynamic effects of past earnings on employment. We would therefore argue that this aspect of our model is richer and more flexible than the method used by BIS, as it allows the earnings of the recently unemployed to be determined in a different way from those of the employed and to depend on the duration of unemployment and earnings when last in work. Without further details of BIS's model, however, it is difficult for us to make concrete judgements on this.

# Appendix B. Additional tables and figures

## Figure B.1. Maintenance loan and grant entitlement by parental income




Note: Figures are in cash terms, for the academic year 2012–13, for students who first enrol in 2012.

## Table B.1. Sources of spending on HE (total per graduate over degree, discounted, 2014 prices)

| | 2011 system | 2012 system | % change |
|---|---|---|---|
| ***Source of spending*** | | | |
| **Total** | **£40,922** | **£47,435** | **16%** |
| *Of which:* | | | |
| **Taxpayers** | **£25,847** | **£24,592** | **–5%** |
| HEFCE funding grants | £12,012 | £2,010 | –83% |
| National Scholarship Programme | £0 | £198 | |
| Maintenance grants | £4,741 | £4,941 | 4% |
| £ loan subsidy | £9,094 | £17,443 | 92% |
| *% loan subsidy* | *37.6%* | *43.3%* | |
| **Graduates** | **£15,075** | **£22,843** | **52%** |
| Fee and maintenance loan repayment | £15,075 | £22,843 | 52% |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. Taxpayer contribution includes the grants, the NSP and the subsidy on student loans as listed in the table. It does not include other government spending on higher education such as capital grants, research grants and grants for 'widening participation'.
Source: IFS graduate repayments model.

Table B.2. Recipients of HE spending by source (total per graduate over degree, discounted, 2014 prices)

| | 2011 system | 2012 system | % change |
|---|---|---|---|
| ***Recipients of spending*** | | | |
| **Total** | **£40,922** | **£47,435** | **16%** |
| *Of which:* | | | |
| **Universities** | **£22,143** | **£28,250** | **28%** |
| *From:* | | | |
| HEFCE funding | £12,012 | £2,010 | –83% |
| National Scholarship Programme | £0 | £198 | |
| Net fees | £11,522 | £27,299 | 137% |
| Fees | £11,522 | £28,037 | 143% |
| Fee waivers | £0 | –£738 | |
| Bursaries and scholarships | –£1,391 | –£1,257 | –10% |
| **Students** | **£18,779** | **£19,185** | **2%** |
| *From:* | | | |
| Maintenance grants | £4,741 | £4,941 | 4% |
| Maintenance loans | £12,647 | £12,987 | 3% |
| Bursaries and scholarships | £1,391 | £1,257 | –10% |

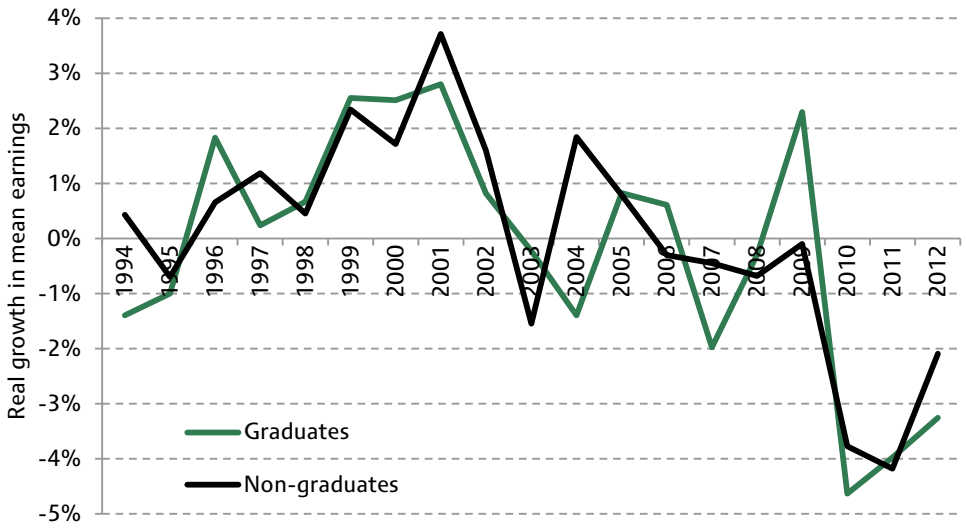
Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. The National Scholarship Programme (NSP) is a programme by which the university receives some government funding and tops it up with its own resources to give out financial support to its students. 'Bursaries and scholarships' includes awards made under the NSP.
Source: IFS graduate repayments model.

## Table B.3. Sensitivity of estimated average taxpayer contribution to real earnings growth assumption and to repayment behaviour under 2011 and 2012 funding regimes (2014 prices)

| | Total taxpayer contribution per student under 2011 system | Total taxpayer contribution per student under 2012 system | Difference in total taxpayer contribution per student |
|---|---|---|---|
| *Real earnings growth assumption* | | | |
| –1% per year | £27,656 | £27,955 | £299 |
| 0% per year | £26,715 | £26,008 | –£707 |
| 1% per year | £25,918 | £24,745 | –£1,173 |
| Baseline (1.1% per year) | £25,847 | £24,592 | –£1,254 |
| 2% per year | £25,266 | £23,270 | –£1,996 |
| 3% per year | £24,737 | £21,944 | –£2,793 |
| *Percentage of graduates who cannot be traced after graduation* | | | |
| Baseline (0%) | £25,847 | £24,592 | –£1,254 |
| 10%[a] | £27,365 | £26,893 | –£472 |

[a] We assume a randomly selected 10% of graduates will not be traceable after graduation and hence they make no repayments at all.
Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. Alternative earnings growth assumptions apply from 2020 onwards. In each scenario, we use the OBR forecasts for earnings growth between 2016 and 2020 from the 2013 *Fiscal Sustainability Report*.
Source: IFS graduate repayments model.

## Figure B.2. Historical average annual real earnings growth of graduates and non-graduates




Note: Average earnings are calculated across individuals aged between 25 and 59 with positive earnings and non-missing highest qualification. Nominal earnings are deflated by the RPI.
Source: Labour Force Survey.

## Table B.4. Long-run public cost of student loans and total taxpayer contribution: uncertainty scenarios

| | Average loan subsidy per student | | Average cost of grants per student | Total taxpayer contribution per student |
|---|---|---|---|---|
| **Baseline** | 43.3% | £17,443 | £7,149 | £24,592 |
| *Real earnings growth* | | | | |
| –1% per year | 51.6% | £20,806 | £7,149 | £27,955 |
| 0% per year | 46.8% | £18,859 | £7,149 | £26,008 |
| 1% per year | 43.7% | £17,596 | £7,149 | £24,745 |
| 2% per year | 40.0% | £16,121 | £7,149 | £23,270 |
| 3% per year | 36.7% | £14,795 | £7,149 | £21,944 |
| *Loan take-up* | | | | |
| Random 13% of students do not take out loans | 43.3% | £15,175 | £7,149 | £22,324 |
| Top-earning 10% do not take out loans | 48.2% | £17,396 | £7,149 | £24,545 |
| *Loan repayment* | | | | |
| Random 10% repay faster than necessary | 42.4% | £17,081 | £7,149 | £24,229 |
| Top-earning 10% repay faster than necessary | 43.5% | £17,512 | £7,149 | £24,661 |
| 5% of graduates cannot be traced after graduation | 46.1% | £18,584 | £7,149 | £25,733 |
| *Fee levels* | | | | |
| All fees at £9,000[a] | 44.2% | £18,320 | £7,149 | £25,469 |
| All fees at £7,500[a] | 40.6% | £14,851 | £7,149 | £22,000 |
| Fees increase in line with RPI over course | 44.1% | £18,215 | £7,149 | £25,364 |
| Fees £3,000 higher but constant over course | 50.1% | £25,070 | £7,149 | £32,219 |
| Fees increase by £1,000 per year over course | 46.0% | £20,161 | £7,149 | £27,310 |
| Fees £500 higher but constant over course | 44.5% | £18,642 | £7,149 | £25,791 |
| *Government cost of borrowing* | | | | |
| 1.1% | 30.5% | £12,434 | £7,241 | £19,676 |
| 3.5% | 55.0% | £21,839 | £7,044 | £28,883 |

[a] These scenarios set the gross fees charged by all institutions at £9,000/£7,500. Fee waivers offered to some students by some institutions mean that the net fees payable by some individuals will be lower than this level.

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. 'Average cost of grants' includes maintenance grants, the National Scholarship Programme and HEFCE teaching grants. 'Total taxpayer contribution' includes these grants and the subsidy on student loans; it does not include other government spending on higher education such as capital grants, research grants and grants for 'widening participation'.

Source: IFS graduate repayments model.

## Table B.5. Long-run public cost of student loans and total taxpayer contribution: potential reforms

| | Average loan subsidy per student | | Average cost of grants per student | Total taxpayer contribution per student |
|---|---|---|---|---|
| **Baseline** | 43.3% | £17,443 | £7,149 | £24,592 |
| *Repayment rate* | | | | |
| 12% | 35.6% | £14,342 | £7,149 | £21,490 |
| 15% | 30.9% | £12,454 | £7,149 | £19,603 |
| *Repayment threshold* | | | | |
| Threshold £18,000 in 2016 and uprated by average earnings | 36.9% | £14,850 | £7,149 | £21,999 |
| Threshold £21,000 in 2016 and uprated by RPI | 37.5% | £15,126 | £7,149 | £22,275 |
| Threshold £21,000 in 2016 and uprated by 2% a year | 31.1% | £12,511 | £7,149 | £19,660 |
| *Interest rates* | | | | |
| Zero real interest rate while studying | 45.1% | £18,151 | £7,149 | £25,300 |
| Zero real interest rate after graduation | 50.5% | £20,331 | £7,149 | £27,480 |
| Real interest rate 0–5% after graduation | 38.6% | £15,557 | £7,149 | £22,706 |
| Real interest rate 3% after graduation | 39.5% | £15,918 | £7,149 | £23,067 |
| Same interest rates as in baseline, but top 10% of earners do not take out loans | 48.2% | £17,396 | £7,149 | £24,545 |
| Real interest rate 0–5% after graduation and top 10% of earners do not take out loans | 45.3% | £16,367 | £7,149 | £23,516 |
| Real interest rate 3% after graduation and top 10% of earners do not take out loans | 45.6% | £16,458 | £7,149 | £23,607 |
| *Repayment period* | | | | |
| Write off after 25 years | 50.4% | £20,297 | £7,149 | £27,446 |
| Write off after 35 years | 38.9% | £15,691 | £7,149 | £22,840 |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012. 'Average cost of grants' includes maintenance grants, the National Scholarship Programme and HEFCE teaching grants. 'Total taxpayer contribution' includes these grants and the subsidy on student loans; it does not include other government spending on higher education such as capital grants, research grants and grants for 'widening participation'.
Source: IFS graduate repayments model.

## Table B.6. Impact of changing interest rates on interest rate subsidies and write-offs per student

| | Subsidy through lower interest rate | Subsidy through write-off |
|---|---|---|
| Baseline (real interest rate of 3% while studying, 0–3% after graduation) | £6,971 | £10,472 |
| Zero real interest rate while studying | £9,053 | £9,098 |
| Zero real interest rate after graduation | £13,660 | £6,671 |
| Real interest rate 0–5% after graduation | –£33 | £15,591 |
| Real interest rate 3% after graduation | –£8,827 | £24,745 |
| Same interest rates as in baseline, but top 10% of earners do not take out loans | £6,936 | £10,459 |
| Real interest rate 0–5% after graduation and top 10% of earners do not take out loans | £928 | £15,439 |
| Real interest rate 3% after graduation and top 10% of earners do not take out loans | –£8,227 | £24,686 |

Note: Figures are for the total cost over the course of a student's degree and are in 2014 prices discounted to 2012.
Source: IFS graduate repayments model.

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