DEPARTMENT OF ECONOMICS, FINANCE & ACCOUNTING

WORKING PAPERS SERIES

N271/16

Modelling Higher Education Financing Reform for Ireland

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Modelling Higher Education Financing Reform for Ireland

Bruce Chapman[**] and Aedín Doris[*]

June 2016

Abstract

This paper examines the feasibility of various alternative potential student loan schemes for Ireland. Using National Employment Survey data for 2006, we model the life-cycle earnings distribution for Irish graduates. We then use these estimates to simulate the effects of alternative types of student loans, including mortgage-type (government guaranteed bank) loans and income-contingent loans of various designs, incorporating participation and migration patterns into the simulations. The results show that mortgage-type loans entail unsustainably high repayment rates for low income graduates. Through the specification of several alternative income-contingent loan schemes, it is demonstrated that this approach to higher education financing is feasible in terms of affordability for graduates and with respect to implied government subsidies. There are some important policy design issues to be addressed and we conclude with some recommendations for a future Irish scheme.

JEL Codes: I220, I280, H520, H810

Acknowledgements

We are grateful to Mary Smyth and Ben Berstock of the Central Statistics Office for facilitating access to the NES data used in our analysis. We thank participants at seminars at the Geary Institute, University College Dublin and Maynooth University and at the 2016 Irish Economic Association Annual Conference in Galway for comments on earlier versions of this paper. We acknowledge the funding provided by Maynooth University for the conference on Higher Education Funding that initiated this research project. Bruce Chapman wishes to acknowledge gratefully funding assistance from the Australian Research Council. The authors alone are responsible for errors and omissions.

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1 Introduction

The Irish higher education system is currently financed by a combination of direct government funding and student fees. Uniquely among OECD countries, the fee component is not accompanied by access to a student loan scheme, which has led to growing concerns about restrictions on access and hardship for students' families. As a result, the government is currently considering reform of the funding of the system, including the introduction of a student loan scheme. The aim of this paper is to assess the feasibility of various alternative schemes, in terms of concerns about both affordability for graduates and the consequences for public finances.

In conceptual and policy terms there is a consensus that government intervention is required in the financing of higher education, and this is explained in Section 2. Student loan schemes exist in many countries, and can be broadly broken into two types. The first entails a mortgage-type loan, known as a government guaranteed bank loan (GGBL), which is either provided directly or guaranteed by the government, and has the main feature that graduates repay the amount borrowed over a fixed time period. The conceptual and empirical issues associated with GGBLs are examined in Section 3.

An alternative approach is an income contingent loan (ICL), which have been or are now being adopted in many countries as an alternative to GGBLs. The critical feature of an ICL is that borrowers repay their debt only once their incomes surpass a given threshold, with the size and duration of repayments beyond this depending on the borrower's income. Conceptual issues and the costs and benefits of ICLs are examined in Section 4.

However, there are several reasons for concern about the feasibility of introducing student loans Ireland, and these are discussed in the context of the history and policy environment of Irish higher education funding in Section 5. Section 6 outlines the econometric approach taken to simulating the earnings distribution for Irish graduates; it also describes the data and reports the disaggregated estimations of life-cycle earnings profiles for Irish female and male graduates. These estimates are then used to examine the effects of a simulated GGBL on 'repayment burdens', the proportion of a graduate's earnings that are required for repayment of the loan, with results being presented and discussed in Section 7. Section 8 uses the estimated earnings profiles to simulate the likely collection experience of a hypothetical ICL, with varying design parameters, to illustrate the affordability of such approaches from the perspective of both graduates and public finance subsidies. Section 9 concludes.

2 Higher Education Financing: Why do we need student loans?

In many countries in the past,[1] and in a minority of European countries at present,[2] students are allowed to enrol in higher education free of charge, which means that taxpayers subsidise

[1] Such as England, Wales, Australia and New Zealand. All four of these countries introduced ICL systems to cover tuition starting with Australia in 1989.
[2] Including Germany, Sweden and Denmark.

100 per cent of the direct costs. In some countries students are provided with means-tested income support grants,[3] and in others loans of different types are available for student income support.[4] In a situation in which the costs of higher education are paid by the government, students face no upfront costs, and the difficulties associated with obtaining credit from banks, explained fully below, are unimportant; however so-called 'free' higher education has become distinctly unfashionable over the last 25 years, with a significant number of countries replacing zero-tuition policies with charges on the direct beneficiaries, the students, including Australia (1989), New Zealand (1991), and England and Wales (1997).

There are two reasons for the introduction of tuition in public sector universities over the last several decades in many countries. Firstly, governments have generally sought to increase the number of university places and in a world of fiscal parsimony have required new sources of revenue to allow this to happen. Second, policy-makers have increasingly recognised that a no charge university system is regressive, since such an arrangement is funded by all taxpayers (the majority of whom are not university graduates), delivering benefits to students who are more likely to have come from higher income family backgrounds and who receive on average considerable private rates of return to the investment.[5]

These arguments have underpinned the case for a contribution from students and, in combination with the general agreement concerning the existence of positive social spillovers from higher education (see Chapman and Lounkaew, 2015), a taxpayer subsidy as well (Barr, 2001; Chapman, 2006). An important question that then arises is: is there a role for government beyond the provision of the subsidy?

An understanding of this issue is facilitated through consideration of what would happen if there were no higher education financing assistance involving the public sector. That is, a government that is convinced that there should be a part-subsidy for higher education, could simply provide the appropriate level of taxpayer support to higher education institutions, and then leave market mechanisms to take their course. Presumably this would result in institutions charging students up-front on enrolment for the students' contribution for the payment of the service.

However, there are major problems with this arrangement, traceable in most instances to the potent presence of risk and uncertainty. The essential point is that educational investments are risky, with several sources of uncertainty (Barr, 2001; Palacios, 2004; Chapman et al., 2014). First, enrolling students do not know fully their capacities for (and perhaps even true interest in) the higher education discipline of their choice. This means that they cannot be sure that they will graduate; in Australia, for example, around 25 per cent of students end up without a qualification. Second, even given that university completion is expected, students will not be aware of their likely relative success in the area of study. This will depend not just on their own abilities, but also on the skills of others competing for jobs in the area. Third, even if

[3] Such as Australia.
[4] Such as in Canada, New Zealand, England and the US.
[5] For documentation of these points for Australia and the UK see respectively Chapman and Nicholls (2014) and Barr (2001).

students know the value of an investment based on current returns, there is uncertainty concerning the future value of the investment. The labour market – including the labour market for graduates in specific skill areas – is undergoing constant change; what looked like a good investment at the time it began might turn out to be a poor choice when the process is finished. Finally, many prospective students, particularly those from disadvantaged backgrounds, may not have much information concerning graduate incomes, due in part to a lack of contact with graduates.

These uncertainties are associated with important risks for both borrowers and lenders. The important point is that if the future incomes of students turn out to be lower than expected, the individual is unable to sell part of the investment to re-finance a different educational path. For a prospective lender, a bank, the risk is compounded by the reality that in the event of a student borrower defaulting on the loan obligation, there is no available collateral to be sold, a fact traceable in part to the illegality of slavery. And even if it were possible for a third party to own and sell human capital, its future value might turn out to be quite low taking into account the above-noted uncertainties associated with higher education investments.

It follows that, left to itself – and even with subsidies from the government to cover the presumed value of externalities – the market will not deliver propitious higher education outcomes. Prospective students judged to be relatively risky, and/or those without loan repayment guarantors, will not be able to access the financial resources required for both the payment of tuition and to cover income support. Markets left alone cannot deliver equality of educational opportunity because those without collateral – the poor – will be unable to participate. These capital market failures were first recognised by Friedman (1955) who suggested as a possible solution the use of a graduate tax or, more generally, the adoption of approaches to the financing of higher education involving graduates using their human capital as equity. The notion of 'human capital contracts' developed from there and is best explained and analysed in Palacios (2004).

In the absence of the widespread availability of such human capital contracts, governments in almost all countries intervene in the financing of higher education. There are currently two major forms that this intervention takes: GGBL and ICL. The former is now examined in Section 3 and the latter in Section 4.

3 Higher Education Financing: GGBL

A possible solution to the capital market problem associated with the funding of higher education is used in many countries, such as the US, Canada and Japan. It involves the institutions charging up-front fees but with GGBL for both tuition and income support being made available to students on the basis of means testing of family incomes. Public sector support usually (for example, in Canada) takes two forms: the payment of interest on the debt before a student graduates; and the guarantee of repayment of the debt to the bank in the event of default. Arrangements such as these are designed to facilitate the involvement of

commercial lenders, and the fact that they are internationally a common form of government financial assistance would seem to validate their use.

This form of assistance seems to address the capital market failure problem for lenders, since with this approach banks do not need borrowers to have collateral because the public sector assumes the risks and costs of default. However, solving the problem of the provision of finance from the perspective of the banks is not the end of the story – GGBLs raise two problems for borrowers (students). They are that loans requiring repayment on the basis of time rather than capacity to pay are associated with both default risk and the prospect of future financial hardships related to borrowers' repayment difficulties. These issues are now considered in turn.

All forms of bank loans have repayment obligations that are fixed with respect to time and are thus not sensitive to an individual's future financial circumstances. This raises the prospect of default for some borrowers, and this means damage to a graduate's credit reputation and thus eligibility for other loans, such as for a home mortgage (Barr, 2001; Chapman, 2006). Thus, in anticipation of potential credit reputation loss, some prospective students may prefer not to take the default risk of borrowing because of the high potential costs. The possible importance of this form of 'loss aversion' is given theoretical context in Vossensteyn and de Jong (2004).

There is a distributional issue here, related to the evidence concerning which students actually default. Dynarski (1994) uses the National Post-secondary Student Aid Study for the US and finds strong evidence that experiencing low earnings after leaving formal education is a strong determinant of default. Importantly, borrowers from low-income households and minorities are more likely to default, as are those who do not complete their studies. An important implication of these findings is that some poor prospective students might be averse to borrowing from banks and thus choose not to enrol because of the risk of default; there is little empirical evidence available on this issue.

Even so, it would be an exaggeration to suggest that students with bank loans have no alternative other than to default in circumstances in which they are unable to meet their repayment obligations. In the US, for example, borrowers have some limited potential to defer loan repayments if they are able to demonstrate that their financial situation is unduly difficult, and in some cases this might lead to loan forgiveness. But there would generally be no expectation that a bank loan repayment takes into account capacity to repay.

There is some evidence related to the costs to governments of defaults from GGBL, which usually takes the form of GGBL default rates as measured by the percentage of borrowers who fail to maintain repayments in any given financial year. Chapman and Lounkaew (2016) document these for the systems in the US, Canada, Thailand and Malaysia, with the default incidence ranging from around 15 per cent for the US and Canada to about 50 per cent in Thailand and Malaysia. There is little doubt that defaults are the major cost to governments in countries with relatively low graduate incomes and less than fully functioning administrative

systems. And it is these costs to governments that explain why GGBLs are rationed and typically are available to only around half of the prospective student population.[6]

A related, and arguably the biggest, problem for students with GGBLs concerns possible consumption difficulties associated with fixed repayments which, by definition, are not influenced by a borrower's capacity to pay. If the expected path of future incomes is variable, a fixed level of a debt payment must be associated with a relatively high variance of disposable (after debt repayment) incomes. Define the repayment burden (RB) in period *t* as:

$$RB_t = \frac{Loan\ repayment_t}{Income_t} \tag{1}$$

RBs are the critical issue associated with GGBLs because the higher is the proportion of a graduate's income that needs to be allocated to the repayment of a loan, the lower will be disposable income. And lower graduate debtor disposable incomes have the two mortgage-type loan problems: higher default probabilities and repayment hardship. Whereas ICLs have RBs set at a maximum by law, RBs for mortgage-type loans are unique for each individual borrower and can in theory be close to zero for high income debtors and well over 100 per cent for very low income debtors.

There is by now considerable empirical analysis of RBs associated with mortgage-type student loans in many different countries (see for example, Chapman et al. (2010) and Chapman and Sinning (2011)), including with respect to Vietnam, Thailand, Indonesia, Germany and the US. An important and innovative aspect of this empirical work is that the calculation or simulation of RBs for graduates is done at different parts of the graduate earnings distribution using an unconditional quantile regression approach (UQR). This allows the impact of student loan repayment obligations to be revealed for the whole of the graduate income distribution by age and sex, a major improvement over previous analyses which focussed on RBs at the means of the graduate income distributions. This is the approach adopted for our analysis of a possible GGBL for Ireland.

From this literature, the results show that graduates in the bottom 25 per cent of the lifecycle income distribution of graduates have particularly high RBs in developing countries. In Vietnam, RBs are between 20 and 85 per cent, and even graduates in the top 25 per cent of the earnings distribution would have to spend between 14 and 17 per cent of their income in the first ten years to pay off the debt; in Thailand, where the student loan scheme has a large public subsidy, RBs range from 5 per cent to 30 per cent; finally, in Indonesia, the simulation of a typical mortgage-style student loan scheme reveals that RBs would vary from around 30 per cent in a relatively high income area (Java), to around 85 per cent in a relatively low income area (Sumatra). However, even in developed countries, graduates can face high repayment burdens, ranging from 50-60 per cent for public sector lawyers in the United

[6] Rationing has the additional consequence for access of prospective students who are ineligible for loan assistance because their family incomes are too high but who are unable to secure financial assistance from within their household.

States (Chapman and Lounkaew, 2015) to 70 per cent for East German women (Chapman and Sinning, 2012).

These estimates reveal that GGBLs are universally associated with very high RBs for low income young graduates and thus likely significant problems of consumption hardship, and a concomitant high minority of prospective students facing defaults. Default, it should be emphasized, is very expensive for debtors because of the associated effects on individuals' credit reputations (Chapman, 2006). These points suggest consideration of the alternative higher education financing option, ICLs, in which, by design, RBs cannot be an issue. This is because the RBs for ICLs are set by law as part of the design of such systems. In Australia, New Zealand and England, for example, the maximum RB allowed with their ICL schemes are 8, 9 and 10 per cent of income respectively. The costs and benefits of ICLs are now considered in detail.

4 Higher Education Financing: ICL

The essential difference between ICLs and GGBLs is that the income contingent variety serve to protect former students who earn only low incomes; capacity to pay is an explicit feature of the approach. That is, ICL schemes offer a form of 'default insurance', since debtors do not have to pay any charge unless their income exceeds the pre-determined level. And after the first income threshold of repayment is exceeded, ICL repayments are always capped at a fixed and low proportion of the debtor's annual income.

Effectively, ICLs offer a form of consumption smoothing since there are no repayment obligations of the loan when incomes are low, and a greater proportion of income is remitted to repay the debt when incomes are high. As noted above, these features of an ICL are very different to a GGBL, in which the costs of defaulting on the loan may be very high in terms of being denied access to other capital markets (most notably housing) through the damage to a borrower's credit reputation. The removal of repayment hardships and the related advantage of default protection via income-contingent repayment thus resolves the fundamental problems for prospective borrowers inherent in mortgage-style loans.

While repayment hardship for graduates is much less an issue for ICLs than for GGBLs, non-repayment of loans implies government costs for both loan types. It is inevitable that there are unpaid debts associated with ICLs, mainly due to graduate incomes being insufficient to involve full repayment over the life-cycle. In Australia these amounts are continually estimated by a government unit, the *Office of Doubtful Debt*. The calculations reveal that unpaid debt is of the order of 15-18 per cent of total loan outlays; this should not be classified as default *per se*, but rather as an inevitable consequence and cost of the insurance aspect of an ICL.

A significant further point is that the protections of an ICL could particularly matter for both default probabilities of borrowers and loan revenues for governments in times of recession. That is, if there are poor short-term employment prospects at the time of graduation, such as

was the case for many countries in 2008-2013, this can mean both high defaults and low loan repayments for systems with GGBLs. The default issue is avoided with an ICL. On the other hand, the onset of a major recession will necessarily mean lower repayments of an ICL and thus the potential for higher levels of taxpayer support, most clearly in the form of higher interest rate subsidies. These higher subsidies will be small if the recession is short and there are no or low permanent employment dislocation effects for graduates. If, on the other hand, the job consequences for graduates are long-lasting, then the effect on subsidies will be more substantial, since repayments will be prolonged.

As well as the non-repayment costs of ICLs, their administrative costs must also be considered. As emphasised by Stiglitz (2014), it is an advantage of ICLs that they can be collected very inexpensively, a feature he has labelled 'transactional efficiency'. The Australian Tax Office estimates put the collection costs for their ICL at less than 3 per cent of yearly receipts. To this figure, Chapman (2006) adds an estimate of the compliance costs for universities and comes up with a total administration cost of less than 5 per cent of yearly receipts. In collection terms the system seems to have worked well and there are apparently significant transactional efficiencies in the use of the income tax system for the collection of debt. Estimates of the costs of collection for the ICL operating in England and Wales are very similar (Hackett, 2014).

The reason for this transactional efficiency is that the collection mechanism simply builds on an existing and comprehensive personal income tax system, and is essentially a legal public sector monopoly. Of course, if legal jurisdiction was granted to the private sector to be able to know citizen's incomes, this could be changed in the future, although it is difficult to imagine that a commercial entity could do this as cheaply as the taxation authorities.

In considering any loan scheme, its implications for the composition of enrolments must be taken into account. At the time of the implementation of the Australian ICL scheme, HECS, important areas of concern were raised with respect to the potential for the new tuition arrangement to exclude prospective students from disadvantaged backgrounds. The main area of investigation into the effects of HECS has been with respect to the consequences of the scheme for the access of relatively disadvantaged prospective students. The Australian research with respect to socio-economic mix and access indicates that the relatively disadvantaged in Australia were less likely to attend university even when there were no student fees, providing further support for the view that a no-charge public university system (that is, financed by all taxpayers) is regressive. Once HECS was introduced, aggregate enrolments in higher education increased, including increases in the participation of prospective students from relatively poor families, although the percentage point increases were higher for less disadvantaged students, especially in the middle of the wealth distribution. Broadly speaking, the socio-economic make-up of the higher education student body was about the same 25 years after the introduction of the policy as in the late 1980s. From this, it can be concluded that there have been few consequences for the accessibility to higher education of students from relatively disadvantaged backgrounds, at least as represented by enrolments. This might have also happened with other financing approaches, of course.

When discussing ICLs, it must be emphasized that such schemes differ importantly with respect to some key collection parameters and other policy features. One important parameter variation is in respect of interest rates, the approaches to which vary widely. The Hungarian system has close to no interest rate subsidies, whereas the New Zealand arrangement has a zero nominal rate of interest, implying very high interest rate subsidies.

A second source of variation lies in the first income levels after which repayment is required, known as the earnings threshold. This threshold lies at about the level of mean earnings in Australia and England, but at about half of median earnings in New Zealand. Moreover, repayment rates and the income bases to which these rates apply differ substantially. Most countries have collection based on a marginal rate only on income above the earnings threshold; in contrast, the Australian system collects a percentage of *total* income once that threshold has been reached. Depending on the income bases used – whether marginal or total – the rates also differ. For example, in Australia, repayments are calculated as between 4 and 8 per cent of total income, whereas in England and Wales, repayments are calculated as 9 per cent of marginal income, and in New Zealand, the rate is currently 12 per cent of marginal income. Further, Australia does not have a period after which all debts are forgiven, which is not the case elsewhere (e.g. it is 25 years in England and Wales). In sum these policy differences mean that the amount of unpaid debt in countries such as England is likely to be considerably higher than is the case for Australia.

A final design issue relates to the need to minimise the potential for non-repayment from debtors going overseas. One (likely very ineffective) approach to this issue would be to involve the co-operation of other governments in the collection of the debt. However, as suggested by Chapman and Higgins (2013) and now instituted in New Zealand, a system can be designed that puts a legal obligation on a debtor going overseas to repay a minimum amount of their obligation each year in which they are away. The Australian government recently legislated an obligation for ICL debtors to submit payments in line with their incomes outside Australia, but it is too early to judge the success or otherwise of this new arrangement.

These administration and design issues are very important to the success or otherwise of an ICL system, at least in terms of public sector subsidies. But the big point remains: if designed properly, ICLs are a superior student loan system to the more conventional mortgage-type loans essentially because the former offer insurance against hardship and thus default. It should not be a surprise that the international transformation of higher education financing has taken the clear directions apparent over the last 25 years.

5 Irish Higher Education Funding and the Irish Policy Context

Before 1996, Irish university students paid tuition fees that were substantial relative to typical incomes at the time; in 1996, fees were typically about €2,000 per annum at a time when average annual industrial earnings were about €18,000. These costs were mitigated by a system of ‘student grants’ that paid the fees (and some maintenance payments) for the

children of families whose income was low enough to qualify. The proportion of university students in receipt of grants varied over the years, but an indicative figure is provided by McCoy et al. (2009), who report that it was 63 per cent in 1992.

Student fees were abolished in 1996, at which point only a 'student contribution' of €191 was payable towards non-tuition costs such as examinations; as before, this charge was covered by the student grant scheme for students from low income families. The student contribution was gradually increased over the years and by 2008, it was €900. However, it was when the economic crisis hit Ireland in 2008/2009 that the most dramatic increases were imposed, with the contribution rising by €500 per year until it reached €3,000 in 2014.

It is important to understand the economic background to this reversal away from 'free' higher education. Ireland was one of the countries worst affected by the Great Recession, with output falling by over 10 per cent in real terms between 2008 and 2010 and unemployment rising from about 5 per cent in 2007 to 12 per cent in 2009, eventually peaking at 14.6 per cent in 2011. The effects of the global recession felt elsewhere were compounded in Ireland by the bursting of a property bubble and the collapse of Irish banks, whose debts the government had earlier guaranteed. The government deficit rose from almost zero in 2008 to 13.9 per cent in 2010 and a remarkable 30.8 per cent in 2011, when banking losses crystallized. As a result, yields in Irish bonds reached unsustainable levels in 2010, and the government sought and accepted a rescue package from the International Monetary Fund, the European Union and the European Central Bank.[7] The crisis resulted in the government undertaking a severe programme of austerity measures, combining tax increases and expenditure cuts.

The increased fee income from students allowed the government to reduce its expenditure on higher education during the years of most severe fiscal pressure. As well as transferring some of its expenditure on HE to students themselves, the government also further reduced its funding of the sector, at a time when student numbers increased substantially: between 2008 and 2015, total university income (including the increased student contribution) fell by 8 per cent while student numbers rose by 14 per cent, leading to core income per student falling by 22 per cent. The state contribution fell by a remarkable 38.4 per cent over this period. This sustained reduction in funding of HE over several years has led to widespread recognition that funding must be increased if quality is not to deteriorate significantly.

As well as increased funding per student being necessary, demographic patterns indicate that total funding would have to increase for many years to come even if funding per student were to be held constant: the number of students completing second level education is not projected to peak until 2029, when there will be 27 per cent more school-leavers than there are at present. With a participation rate of 18-20 year olds in higher education of 58 per cent, this clearly has significant implications for future funding needs.

Because of significant tax increases during the crisis, there is little political or popular enthusiasm for increased funding coming from general taxation. On the other hand,

[7] This trio of institutions is known as 'the Troika' in programme countries.

increasing the student contribution further under the current system is expected to be difficult. Although student grants – and a waiver of the student contribution – are available for about 50 per cent of students whose parents have low incomes, for the remainder, the fee component is already believed to be causing hardship for many families (Amárach Consulting, 2015). This hardship would clearly increase if the student contribution were to be increased. As a result, serious consideration is currently being given to the introduction of a system of student loans. The government appointed an Expert Group on the Future Funding of Higher Education, and this group is believed to have recommended the introduction of an ICL system.[8]

In the discussion of ICLs in Ireland, two main objections are commonly raised. First, because of the ongoing precarious position of the public finances, the possibility that a large proportion of the student loan book might not be repaid would be problematic. Moreover, the lag in repayments implied by a student loan scheme is of concern, given legal constraints on government borrowing implied by the EU Fiscal Treaty by which Ireland is bound. Second, the economic crisis is believed to have affected the young particularly badly, and the idea that young graduates would be further burdened with student debt is regarded by many as unfair. We detail these two concerns in turn below.

ICLs operate in several countries, including Australia, England, New Zealand and Hungary. In those countries, the size of the government subsidy varies widely across countries as well as over time. Shen and Ziderman (2009) report 'hidden grants' in these systems that vary from about 12 per cent in the English scheme as it operated at the time to about 26 per cent in Australia; the reforms to the English system introduced in 2012 raised projections of the government subsidy to 43 per cent according to Crawford et al. (2014). Some of the subsidy arises because of interest charges being below the cost of government borrowing; this is a policy decision and can be controlled by policy makers to a large extent. The remainder of the subsidy arises from non-repayment of loans, which in turn arises because of graduates having low earnings and because of non-repayment by emigrants. These factors are less amenable to control by policy makers, and thus need to be assessed in advance of the introduction of an ICL.

There is good reason for concern about the possibility of high rates of non-repayment due to low earnings. A recent paper by Collins (2015) showed that 12.6 per cent of employed Irish graduates are on 'low pay', defined as lower than a 'living wage' of €11.45 per hour. This may be explained by a particularly high level of over-education in Ireland: McGuinness et al. (2015) conclude that 33 per cent of graduates working full-time in Ireland are over-educated, the highest level of the 26 European countries included in their analysis, and significantly higher than the (unweighted) cross-country average of 18 per cent.

In addition to concern about low graduate pay, emigration is a particular concern in Ireland. Reports for recent cohorts of graduates indicate a high level of graduate emigration, with 12

[8] Although the report was submitted to government in January 2016, this coincided with a general election campaign, which has since been followed by prolonged negotiations on government formation, so at the time of writing, the report has not yet been published. However, its contents have been extensively leaked to the press.

per cent of those graduating with primary degrees from Irish universities in 2013 working abroad nine months after graduating. This was a significant increase from the rate of 5 per cent in 2006, but lower than the 17 per cent recorded in 1986, during the prolonged downturn of the 1980s (HEA, 2007; HEA, 2014). As regards broader graduate emigration, the OECD has estimated (Arslan et al., 2014) that the high-skilled emigration rate for Ireland is about 20-21 per cent, which is much higher than in the UK (11 per cent), in New Zealand (9-17 per cent) or Australia (2-3 per cent), all countries for which graduate emigration has posed challenges for the implementation of ICLs. However, little is known about the duration of emigrating graduates' stays or the proportion that emigrate permanently, which makes it difficult to assess the implications of emigration for repayments.

In addition to fiscal considerations regarding the introduction of an ICL, the effect on young graduates of loan repayments is a further important consideration. Many of the austerity measures introduced during the crisis period affected the young particularly strongly. The unemployment assistance payment was reduced for young claimants by almost 50 per cent, initially for 18-19 year olds, but eventually for all claimants aged under 25; these cuts were in addition to the general cuts to social welfare payments. Pay was cut by 10 per cent for new entrants to public sector employment on top of substantial pay cuts that had already been applied to all public sector workers. A hiring ban was introduced in the public sector in order to reduce public sector employment, which particularly affected the employment opportunities of young graduates. As a result of these policy decisions, starting salaries for graduates fell by almost 12 per cent between their peak in 2007 and 2012, bringing salaries back to below 2004 levels (Conefrey and Smith, 2014). In addition, unemployment rose from 15.8 per cent in 2006 to 48.3 per cent in 2012 for 15-19 year olds, and from 8 per cent to 29 per cent for 20-24 year olds. Emigration has also been substantial, with the European Commission (2013) estimating that the population of 15-24 year old Irish nationals fell by 9 per cent between 2007 and 2012.

The effects of recent developments in the housing market on young people have also attracted much comment. In 2015, the Central Bank of Ireland introduced new mortgage rules that mean that first time buyers must save substantial deposits (10-20 per cent of the purchase price) before being able to buy. This coincided with a rapid increase in rents and wage stagnation, which has made such saving very difficult, and the public perception is that young people are being prevented from entering the property market. In a country that has traditionally had a high home-ownership rate – among Irish nationals, it is 77 per cent – this is regarded as unfair.[9]

For all these reasons, particular attention must be paid to choosing scheme parameters that make repayments affordable to graduates while still yielding a reasonably high repayment rate to the government if a loan scheme is to be politically feasible in Ireland. Thus, one of the main aims of this paper is to compare GGBL and ICL schemes, and to compare alternative parameters for an ICL scheme.

[9]A recent editorial in the Irish Independent newspaper ('Mortgage Rules are Very Unfair to Young People', March 2016) is typical of the media discussion of this point.

There is one existing study that models an ICL for Ireland (Flannery and O'Donoghue, 2011) in the context of a comparison of an ICL with a graduate tax from both fiscal and redistributional points of view. The methodology and data used differ from our analysis as the authors obtain their graduate earnings profiles from an Irish microsimulation model based on data from the Living in Ireland Survey, which was the Irish component of the European Community Household Panel (ECHP) that ran from 1994-2001.[10] The authors model an ICL scheme entailing a loan of €10,000 repaid at a rate of 10 per cent on marginal earnings over a threshold of €35,000 and 15 per cent for earnings over €42,000; they model two interest rate scenarios – one with a zero real rate, and another with a 2 per cent real rate. Under this scheme design and assuming that emigrating graduates repay 40 per cent of their debt, the average subsidy is 25 per cent if a positive interest rate is charged, and 40 per cent if not. The analysis of the repayment patterns of the graduates is somewhat unclear, however, with no explicit analysis of repayment burdens. In the analysis described in Section 7 below, we vary the parameters of the ICL loan scheme and pay particular attention to various measures of affordability as well as the size of the fiscal subsidy.

6 Simulating the Graduate Earnings Distribution

To conduct the analysis of alternative schemes, we model life-cycle earnings across the Irish graduate earnings distribution using unconditional quantile regression and 2006 data from the National Employment Survey (NES). The NES are large employer surveys, combining payroll data on earnings and hours with information on personal characteristics from surveys of individual employees. An advantage of the NES is the sample size: 67,700 employees in 4,800 firms were surveyed, including about 8,500 Irish graduates aged 25-55. A further advantage is the lack of measurement error in the earnings data. NES surveys were carried out in 2003, 2006 (twice) and annually from 2007-2009, at which point they ceased because of government funding cutbacks. Thus, their disadvantage is that they are not current.

The only up-to-date Irish data set containing earnings data is the EU-SILC (Survey of Income and Living Conditions) and initially we attempted to conduct our analysis with these data. However, there were too few observations to estimate earnings profiles with any precision. Since no recent NES data are available, the solution chosen was to use 2006 NES data as a proxy for more recent data. The rationale for this was that the current (2016) mean starting salary is probably close to the 2006 mean. Information on starting salaries is contained in the annual surveys conducted by the Higher Education Authority. These report that the mean starting salary for Irish graduates in 2006 was just under €26,000 (Conefrey and Smith, 2014), while more recent HEA surveys indicate that salaries began to recover from their 2012 average level of €24,000 in 2013 (HEA, 2014). Since the economic recovery has strengthened considerably since then – real GDP growth rates rose from 1.4 per cent in 2013 to 5.2 per cent in 2014 and 7.8 per cent in 2015 – we expect that graduate salaries have also continued to improve.

[10] Although the earnings projections are obtained from this micro-simulation model, labour market participation responses are not simulated.

However, we acknowledge that even if mean starting salaries in 2006 and 2015 do turn out to be (roughly) equal, the crisis could well have caused changes in remuneration patterns that result in differences in the variance of graduate earnings and in life-cycle earnings profiles. For this reason, our estimates should be treated as indicative. Of course, this would be the case even if we had up-to-date NES data: simulations of lifecycle graduate earnings distributions are typically based on the assumption that future earnings of current cohorts will follow the same pattern as those of previous cohorts.

To assess the effects of different loan arrangements, we need to estimate lifecycle earnings profiles at various parts of the distribution, and this will be of particular importance for the welfare of those in the bottom parts of the graduate earnings distribution. The method usually used for estimating the effects of variables at points of the distribution other than the mean is quantile regression. However, standard quantile regression estimates the effects of variables on the conditional distribution of the outcome variable, but this is not what is of interest here. Rather, we are interested in the effect of age on unconditional earnings.

Various methods have been used to 'back out' the unconditional effects. The method we use is one proposed by Firpo et al. (2009) and used, for example, in Chapman and Liu (2013).This method transforms the dependent variable using a re-centred Influence Function (RIF) transformation, and then regresses the transformed dependent variable on the independent variables using OLS. For the τ^{th} quantile, q_τ

$$\text{RIF}(Y; q_\tau, F_Y) = q_\tau + (\tau - D(Y \leq q_\tau))/f_Y(q_\tau) \quad (2)$$

where Y is income, D is an indicator function, and F_Y and f_Y are the cumulative and marginal density functions respectively; the latter is estimated using the kernel density estimator.[11]

To model the distribution of earnings in sufficient detail, we estimate the relationship between age and earnings for 19 quantiles (from the 5^{th} to the 95^{th}), separately for men and women of Irish nationality aged 25-55. Descriptive statistics for the sample used are reported in Table A1 in the Appendix. The relationship between age and earnings is allowed to be fully flexible for each quantile; the final specifications vary between men and women and between quantiles. A quartic specification performs best for all quantiles of the female distribution up to the 85^{th}, which probably reflects a reduction in hours worked during the child-rearing years. For men, a quartic specification is best up to the 35^{th} quantile, but for higher quantiles, cubic and quadratic specifications are preferred. For each quantile, the parameter estimates were used to predict earnings at each year of age from 21 to 66 for each of the 19 quantiles, thus yielding a detailed picture of the entire distribution of life-cycle earnings.

[11] The estimator is implemented using the *rifreg* command in Stata, provided by the authors.

Figure 1
Simulated Male Life-Cycle Earnings Profiles

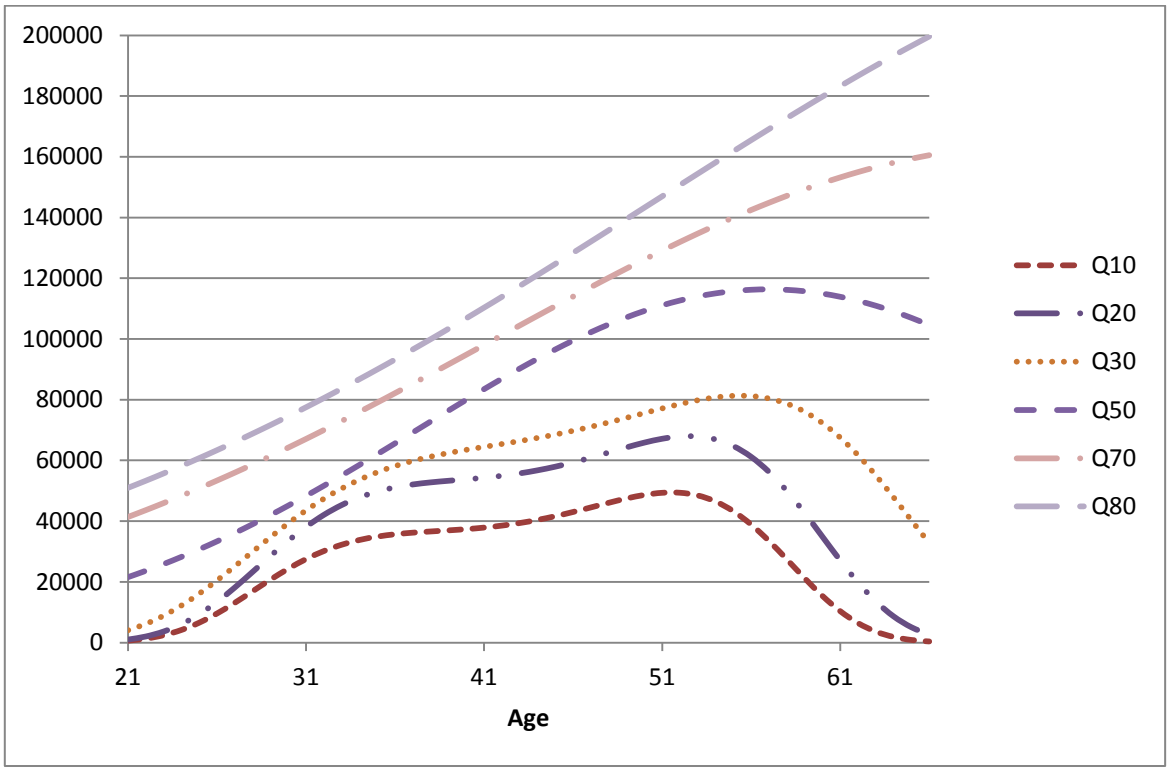
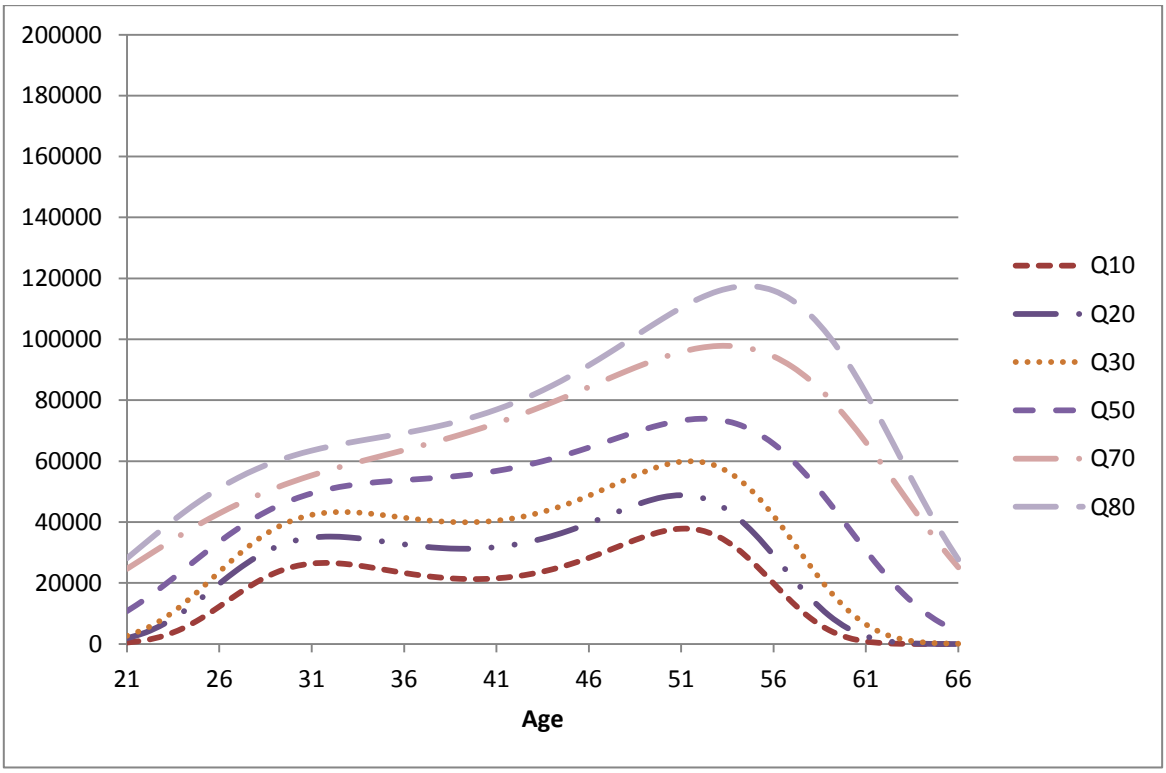


Figure 2
Simulated Female Life-Cycle Earnings Profiles



Once the quantiles of the lifetime earnings distribution have been simulated, annual productivity growth of 1 per cent across the distribution was assumed, and the earnings profiles adjusted accordingly. This is similar to the 1.1 per cent per annum baseline growth rate assumed for the UK in Crawford *et al.* (2014), but lower than the 2 per cent per annum rate of productivity growth assumed in Flannery and O'Donoghue (2011) for Ireland.

The resulting simulated life-cycle earnings profiles for various quantiles of the distribution are shown in Figures 1 and 2 for males and females respectively. These are the basis for the analysis in the remainder of the paper. A striking feature of these earnings profiles is the sharp reduction in earnings for most quantiles for ages beyond the late fifties for men, and beyond the early fifties for women. It is likely that these patterns reflect the labour supply patterns of the particular cohorts of graduates of these ages rather than reductions in hourly wage rates, and given changes to pension arrangements in recent years,[12] it is not clear that such patterns will apply to recent graduates. However, as the results below show, this is not of concern as the vast majority of graduates will have paid their loans off before reaching these ages.

7 Results for Ireland: GGBL

In this section we first discuss the RB results for a GGBL. The primary loan amount considered is €16,000 in total. This is equivalent to €4,000 per year for a four-year degree, which would entail a small increase in per student funding from the current situation (see Expert Group, 2015). In fact, the Irish system includes both three and four year degrees for historical reasons, but accounting fully for different degree lengths is not possible as it would require knowledge of where in the earnings distribution graduates with different degree lengths lie, which information is not available. To give an indication of the effect of a GGBL on graduates from three year degree programmes, we also provide some information for a loan of €12,000. The interest rate is set at a real rate of 2 per cent per annum and repayments begin at age 23.

Figure 3 shows the time pattern of repayments, both real and nominal, for a GGBL of €16,000, repayable in equal instalments over 10 years, assuming that repayments begin two years after graduation and that a real interest rate of 2 per cent is charged from the date of graduation.[13] Although not shown, the pattern for a GGBL of €12,000 is similar.

[12] Defined benefit private sector pension schemes are now mostly closed to new entrants, and the age of entitlement to the state pension has increased from 65 to 66, and will increase further to 68 by 2028.

[13] This is a fairly typical set of parameters for the GGBLs of other countries, for example the Stafford loan program in the US.

Figure 3
GGBL Repayments for a €16,000 Loan Repaid Over 10 Years, Real and Nominal

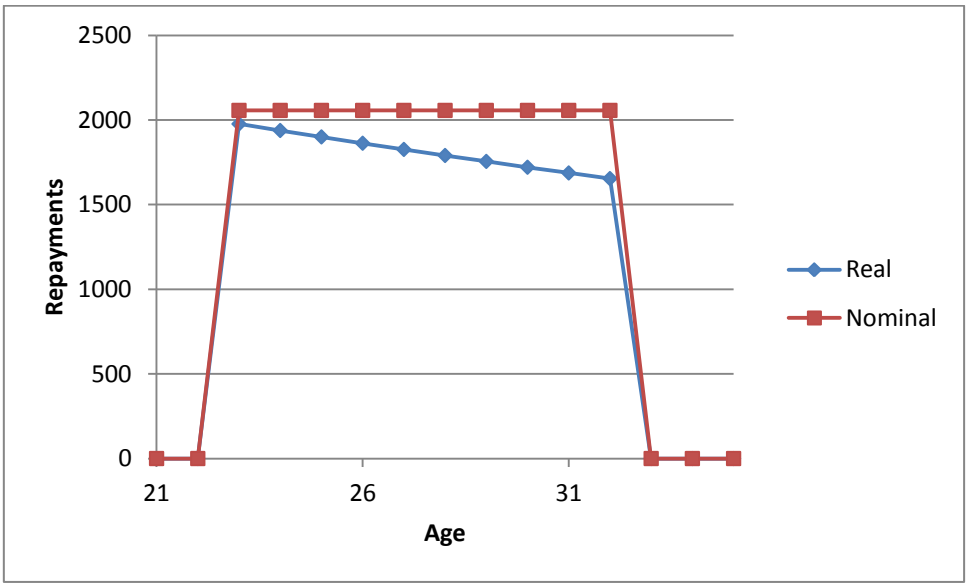


Table 1 shows mean, minimum and maximum RBs for this GGBL for the loan of €16,000, where the RB is the proportion of gross income needed for repayments. In all cases, the maximum RB is the one that applies in the first year of repayments, and the minimum is the one that applies in the final year of repayments. It is interesting to note that mean and maximum RBs are lower for women in the bottom half of the female lifecycle earnings distribution than for comparable men, but minimum RBs are uniformly lower for women. This is due to the fact that, although earnings early in the lifecycle are typically higher for women, with correspondingly lower RBs, their age-earnings profiles are much flatter, so that by the end of the repayment period, the RBs women face are higher.

For both women and men the average RB is particularly high for the bottom two deciles of the lifecycle earnings distribution, being between 10 per cent and 23 per cent. Of even greater concern are the maximum RBs that apply to the bottom three deciles; these are greater than 20 per cent, and rise to 83 per cent for men in the bottom decile. The high RBs that apply to these lower deciles are clearly illustrated in Figures 4 and 5 for men and women respectively. They show that while RBs for all workers – male and female – are below 10 per cent by the 8th year of repayments, there is substantial variation in RBs in the 3-4 years after repayments start, which is 5-6 years post-graduation. Arguably it is at this stage in their working lives that graduates with GGBLs are most vulnerable to hardship and default.

Of course, with a GGBL, the size of the loan is critical for the repayment burden, since the repayment period is fixed. RB figures for a €12,000 loan are therefore uniformly lower. However, for the bottom two deciles, mean RBs range from 8 per cent to 17 per cent, while maximum RBs range from 22 to 62 per cent.

Table 1
GGBL Repayment Burdens as Percentage of Gross Income, Selected Percentiles of Lifecycle Earnings Distribution, Loan Amount of €16,000

Females						
	10th	20th	30th	**50th**	70th	80th
Mean	19.6	10.4	8.5	**5.4**	4.1	3.5
Minimum	6.2	4.7	3.8	**3.2**	2.9	2.5
Maximum	72.7	29.9	23.6	**10.3**	6.1	5.2
Males						
Mean	23.0	15.7	8.9	**5.1**	3.2	2.7
Minimum	5.5	3.9	3.5	**3.2**	2.4	2.1
Maximum	82.6	53.7	22.1	**7.6**	4.3	3.5

Figure 4
GGBL Repayment Burdens for Male Employees, Various Quantiles of the Earnings Distribution, €16,000 Loan

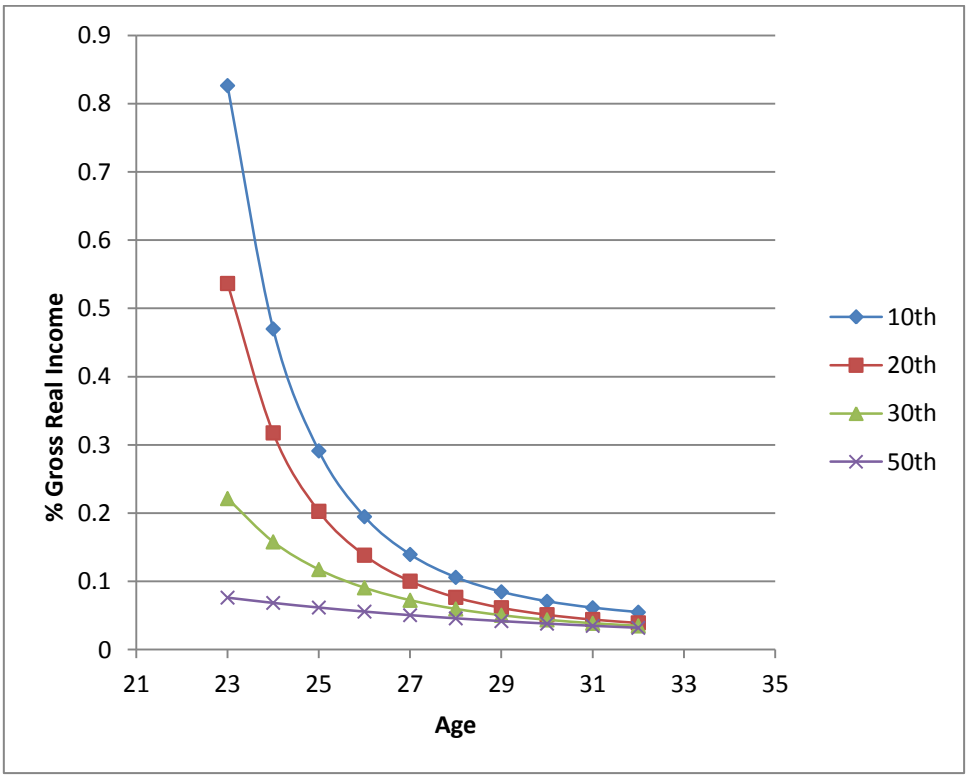
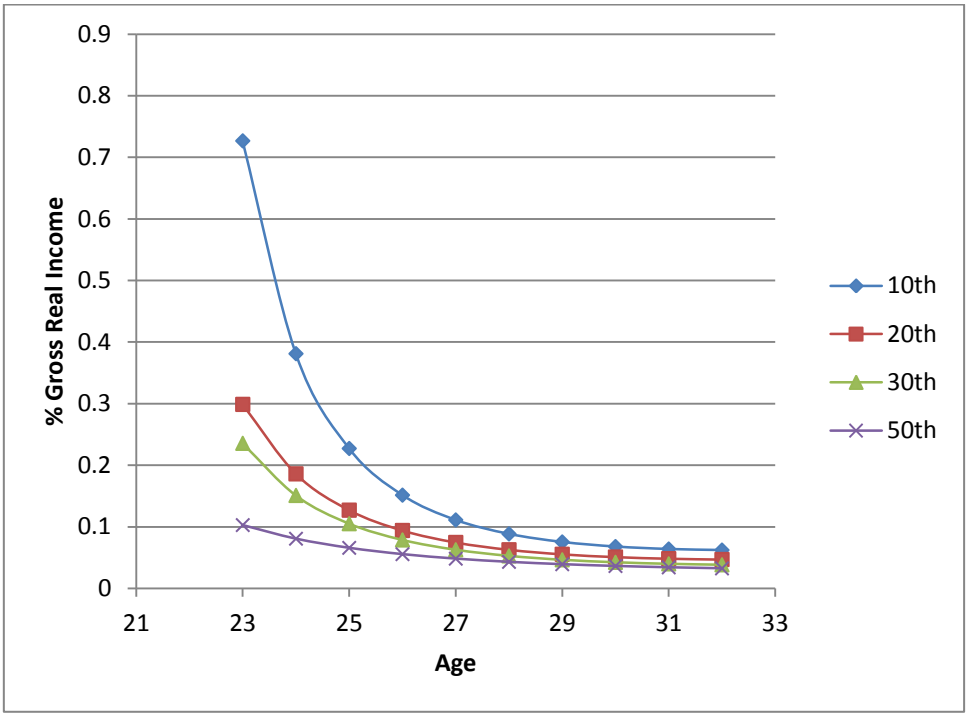


Figure 5
GGBL Repayment Burdens for Female Employees, Various Quantiles of the Earnings Distribution, €16,000



Our next step is to estimate the proportion of graduates for whom the repayment burden is problematically high. Here, we adopt the Baum and Schwartz (2006) definition of an RB as 'excessively high' if it exceeds 18 per cent of gross income. We assume that graduates must repay over a fixed time period, and are not allowed to defer repayments if they are not working. In order to implement this, we need to consider those who are not in employment, for whom RBs will obviously be excessive, as well as the RB figures for employees given in Table 1. We therefore calculate employment rates by year of age separately for male and female graduates using the EU-SILC data mentioned in Section 4 above.[14] These employment rates are given in Table A2 of the Appendix.

The patterns shown in these employment data indicate that women have higher rates of participation than men when they are young, perhaps due to fewer women pursuing postgraduate study. However, 10 years after graduation, men's employment rates exceed women's and remain higher thereafter. Nevertheless, women's employment rates remain above 80 per cent until women are aged 37, at which stage they begin to drop steadily. It should be noted that using the employment rates of women currently aged over 40 is likely to underestimate the future employment patterns of current university students if female participation rates continue to increase, as seems likely. However, it is employment rates at young ages that are of most concern in the present exercise, since this is when the bulk of repayments of student loans (whether GGBL or ICL) are made.

[14] Recall that the NES data cover employees only and so cannot be used to estimate employment rates.

Adding all those not employed in the ten years during which repayments are required (from ages 23 to 32) to working graduates experiencing RBs of greater than 18 per cent during those years yields the probabilities of excessively high RBs shown in Table 2.

Table 2
Probabilities of RBs in Excess of 18 per cent of Gross Income: €16,000 Loan

	Years After Repayments Begin: Non-Workers Cannot Defer				
	1	**3**	**5**	**7**	**9**
Females	0.67	0.27	0.25	0.14	0.11
Males	0.70	0.43	0.28	0.15	0.13

The results of Table 2 show that in the first year in which repayments are due, a large majority of graduates – 70 per cent of males and 67 per cent of females – face excessively high RBs. Income growth ensures that this proportion falls in subsequent years but even after five years, over a quarter of graduates face such high RBs. Even if those not working are allowed to defer their loans, the proportion of graduates with excessively high RBs lies between 10 and 40 per cent for women in the first three years of repayments, and between 20 and 35 percent for men in those years. It seems highly unlikely that these RBs would be seen as fair; moreover they reflect the strong likelihood of many graduates experiencing consumption hardship with a proportion of these being forced to default.

8 Results for Ireland: ICL

Having established that a GGBL would entail RBs that are problematic for individual graduates, we now turn to modelling several alternative ICL schemes, which are designed to limit RBs to affordable levels. As emphasized in Section 4, there are several parameters of ICL loan schemes that affect personal affordability and the size of the government subsidy, including: the earnings threshold; whether repayments are levied on total or marginal income once the threshold is reached; the rate(s) at which repayments are levied; what, if any, real interest rate is charged; whether the interest rate is charged in all years in which debt is held, in post-graduation years, or only in years in which earnings exceed the threshold; and whether outstanding debts are written off at some age, typically 55 or 60.

We experimented with a broad range of scheme parameters. It quickly became apparent that a relatively low earnings threshold should be used, as otherwise graduates in low earnings quantiles repay a very low proportion of their loans. The earnings threshold is therefore set at €26,000.[15] In addition, because of the shapes of the age-earnings profiles reported in Section 6, introducing a write-off age made no difference; loans had either been paid off by age 55, or earnings had fallen below the threshold at that stage.

[15]This is the 2006 mean annual average starting salary in the HEA graduate earnings survey (HEA 2007).

When we experimented with a positive real interest rate of 2 per cent, charged in all years after graduation, repayments were found to be strongly regressive in the sense that those from higher earnings quantiles repaid less than those from lower earnings quantiles. This would be regarded as a very unattractive feature of an ICL scheme if introduced in Ireland, particularly considering the fact that students whose parents have low incomes pay no fees in the present Irish system, leading to strong progressivity in terms of parental income (but not graduate income). To avoid regressivity, we therefore model two alternative interest rate regimes, one entailing a zero real rate of interest, and the other rising to a 2 per cent real rate of interest in periods when income rises above the €26,000 threshold, but zero otherwise; hence no interest is charged prior to graduation.

Two repayment schedules are modelled. The first one entails a flat rate of 8 per cent on marginal income above the threshold. The second entails rates of 2-8 per cent on total income once the threshold is reached, starting at 2 per cent and rising in increments of 1 per cent for every €5,000 of additional earnings over €26,000 up to 8 per cent on earnings above €56,000.

The loan amount is again assumed to be €16,000[16] and graduates may start repaying their loans immediately on graduation.

Tables 3 and 4 show results for working females and males respectively. The four panels of the tables apply to the four alternative specifications of the ICL scheme; the columns show the results for various quantiles of the distribution, with the column for median earnings highlighted in bold. The rows in each panel represent various indicators of affordability, absolute monthly and total repayments, repayments as a percentage of net earnings, and total repayments discounted at a rate of 2 per cent per annum. Years of repayment and age of final repayment are also included to allow comparison with GGBLs, for which the years of repayment are set at 10 and the age of final repayment for our hypothetical graduates is set at 32.

For female workers, the proportion who pay off their loans in full depends on the particular scheme design; schemes with repayments that are based on marginal income generate a lower degree of full repayment, with the bottom 15 per cent of lifecycle earners failing to pay in full, whereas the bottom 10 per cent of earners fail to pay in full in schemes with repayments based on total income once the earnings threshold has been reached. For all schemes, the number of years for which repayments are made declines as the earnings quantile decreases, so the higher the earnings, the more quickly and the earlier in life they are paid off in full. Similarly, while repayments are being made, average monthly repayments both while graduates are in their twenties and over all repayment years are higher for those in higher lifecycle earnings quantiles.

[16] In modelling the ICL schemes, we allow for graduation after three years, and note that to the extent that students take four year degrees, this will be picked up in their lower employment rates at age 21, which means that the calculation of the size of the government subsidy takes delayed graduation into account and remains correct. However, to the extent that students graduate after three years, their loans will be lower than €16,000 and the number of years of repayment will be correspondingly lower, so these figures should be thought of as the worst case scenario; the RBs faced by graduates under ICLs remain correct.

Table 3
ICL Repayments for Female Employees, Selected Percentiles of the Lifetime Earnings Distribution, Various ICL Specifications

Panel A: 8% Repayment Rate on Marginal Income; 2% Real Interest Rate when income > €26,000						
	10th	20th	30th	**50th**	70th	80th
% Loan Repaid	9.0	100	100	**100**	100	100
# Years Payment	14	26	17	**12**	12	11
Age Final Payment	55	53	43	**36**	33	31
Mean % Net Income	1.5	2.7	3.5	**4.3**	4.3	4.4
Mean Monthly Payment	35	69	92	**127**	127	137
Mean Payment, 21-29	n/a	27	51	**76**	98	132
Total Repayments	5854	21456	18853	**18247**	18353	18054
Total, 2% Discount	3099	13126	13388	**13929**	14782	15077
All percentiles above the 15th repay in full						
Panel B: 8% Repayment Rate on Marginal Income; 0% Real Interest Rate						
% Loan Repaid	36.6	100	100	**100**	100	100
# Years Payment	14	23	15	**11**	11	10
Age Final Payment	55	50	41	**35**	32	30
Mean % Net Income	1.5	2.4	3.4	**4.2**	4.1	4.3
Mean Monthly Payment	35	58	89	**121**	121	133
Mean Payment, 21-29	n/a	27	51	**76**	98	118
Total Repayments	5854	16000	16000	**16000**	16000	16000
Total, 2% Discount	3099	10293	11619	**12348**	13027	13206
All percentiles above the 15th repay in full						
Panel C: 2-8% Repayment Rate on Total Income; 2% Real Interest Rate when income above €26,000						
% Loan Repaid	56.0	100	100	**100**	100	100
# Years Payment	14	19	11	**9**	9	8
Age Final Payment	55	46	37	**33**	30	28
Mean % Net Income	3.3	3.6	5.1	**5.8**	5.9	6.3
Mean Monthly Payment	73	84	134	**162**	163	182
Mean Payment, 21-29	n/a	63	86	**124**	162	182
Total Repayments	12335	19180	17749	**17550**	17650	17440
Total, 2% Discount	6868	13126	13388	**13929**	14782	15077
All percentiles above the 10th repay in full						
Panel D: 2-8% Repayment Rate on Total Income; 0% Real Interest Rate						
% Loan Repaid	77.1	100	100	**100**	100	100
# Years Payment	14	17	10	**8**	9	8
Age Final Payment	55	44	36	**32**	30	28
Mean per cent Net Income	3.3	3.4	5.1	**6.1**	5.4	5.9
Mean Monthly Payment	73	78	133	**167**	148	167
Mean Payment, 21-29	n/a	63	86	**124**	162	167
Total Repayments	12335	16000	16000	**16000**	16000	16000
Total Discounted by 2 per cent	6868	11270	12167	**12773**	13480	13896
All percentiles above the 10th repay in full						

Table 4
ICL Repayments for Male Employees, Selected Percentiles of the Lifetime Earnings Distribution, Various ICL Specifications

Panel A: 8% Repayment Rate on Marginal Income; 2% Real Interest Rate when Income above €26,000						
	10th	20th	30th	**50th**	70th	80th
% Loan Repaid	100	100	100	**100**	100	100
# Years Payment	21	12	11	**13**	9	7
Age Final Payment	51	40	38	**36**	29	27
Mean % Net Income	3.1	4.3	4.4	**4.0**	5.2	6.0
Mean Monthly Payment	80	127	136	**119**	162	203
Mean Payment, 21-29	n/a	17	43	**60**	162	203
Total Repayments	20227	18231	17993	**18637**	17492	17014
Total Discounted by 2%	12369	12868	13126	**14208**	15077	15077
All percentiles above the 5th repay in full						
Panel B: 8% Repayment Rate on Marginal Income; 0% Real Interest Rate						
% Loan Repaid	100	100	100	**100**	100	100
# Years Payment	18	11	10	**12**	9	7
Age Final Payment	48	39	37	**35**	29	27
Mean % Net Income	2.9	4.2	4.4	**3.8**	4.8	5.7
Mean Monthly Payment	74	121	133	**111**	148	190
Mean Payment, 21-29	n/a	17	43	**60**	148	190
Total Repayments	16000	16000	16000	**16000**	16000	16000
Total Discounted by 2%	10103	11417	11770	**12340**	13878	14229
All percentiles above the 5th repay in full						
Panel C: 2-8% Repayment Rate on Total Income; 2% Real Interest Rate when income above €26,000						
% Loan Repaid	100	100	100	**100**	100	100
# Years Payment	15	9	8	**10**	7	5
Age Final Payment	45	37	35	**33**	27	25
Mean % Net Income	4.3	5.8	6.3	**5.4**	6.9	8.6
Mean Monthly Payment	104	162	182	**149**	202	276
Mean Payment, 21-29	n/a	48	68	**101**	202	276
Total Repayments	18693	17533	17442	**17910**	16966	16588
Total Discounted by 2%	12369	12868	13126	**14208**	15077	15077
All percentiles above the 5th repay in full						
Panel D: 2-8% Repayment Rate on Total Income; 0% Real Interest Rate						
% Loan Repaid	100	100	100	**100**	100	100
# Years Payment	14	8	8	**9**	6	5
Age Final Payment	44	36	35	**32**	26	25
Mean % Net Income	4.0	6.0	5.8	**5.5**	7.6	8.3
Mean Monthly Payment	95	167	167	**148**	222	267
Mean Payment, 21-29	n/a	48	68	**101**	222	267
Total Repayments	16000	16000	16000	**16000**	16000	16000
Total Discounted by 2%	10775	11804	12096	**12787**	14265	14565
All percentiles above the 5th repay in full						

The percentage of net income that is accounted for by repayments – the net RB – ranges from 1.5 per cent to 6.3 per cent; for those in the bottom half of the lifecycle earnings distribution, the maximum net RB is 6.1 per cent. These compare favourably to the much higher RBs implied by the GGBL scheme described in Section 7 above. RBs are clearly higher in panels C and D, which describe results for schemes with repayments based on total income. However, the loans are also fully repaid more quickly for these ICL versions.

Considering the total amounts repaid, for variations that entail a zero real interest rate, there is no difference across the earnings distribution. However, for the two schemes that entail a positive real rate of interest (Panels A and C), total repayments are lower for higher life-cycle earnings quantiles, because interest payments are greater. However, this apparent regressivity of repayments is reversed when total repayments are discounted by 2 per cent. In this case, the fact that those at lower quantiles repay their loans later in their working lives leads to those repayments being discounted more heavily, and so discounted repayments being progressive. This progressivity of total discounted repayments is also evident in Panels B and D, which entail zero real interest rates.

Results for male workers, reported in Table 4, show similar results as for women in many respects. However, for all ICL versions, all but the bottom 5 per cent of earners pay off their loans in full, compared to the 10-15 per cent that applies to women. This is the result of men having steeper age-earnings profiles, so that even those at lower quantiles reach the earnings threshold for enough years to make repayments in full. The fact that the simulated earnings profiles for men are steeper than for women also leads to the RBs for men being higher, lying between 2.9 per cent and 8.6 per cent of net income for the quantiles shown. Of course, the faster rate of repayment also leads to men making repayments for fewer years than women.[17] Once again, total discounted repayments are progressive in the sense that they increase as the position in the lifecycle earnings distribution improves.

Tables 3 and 4 take no account of two crucial elements that determine ICL repayments: employment and emigration. It is important to note that a year of non-employment does not cause a permanent non-repayment, but rather a delay of one year. Thus, non-employment reduces the net present value of total repayments. To include non-employment in the analysis, we again use the data on graduate employment by year of age in the EU-SILC 2006 data given in Table A2.

In implementing the modification of the repayment patterns caused by employment rates of below 100 per cent, we assume that years of non-employment are experienced randomly; this imposes the assumption that in any year each graduate has a fixed probability of working given by the sample employment rate. This is certainly an over-simplification, since years of non-work are not randomly experienced, with non-participation in one year correlated with non-participation in subsequent years. However, in the absence of panel data of sufficient

[17] Note that the number of years of repayment is higher at the median than for the 30th percentile, and the size of the repayments is correspondingly lower. The reason for this apparently anomalous pattern is that the estimated age-earnings profile is relatively shallow after the repayment threshold of €26,000 is reached, so the payments made are positive but relatively low during the repayment years.

length to estimate covariances of employment periods, this is the best that can be achieved. It is important to note that there is no behavioural content in this analysis – current employment rates are used only to adjust for the proportion of total loans repaid.

As discussed in Section 5, emigration is also an important consideration in the Irish context. Although Australia, New Zealand and England have all introduced methods to encourage repayments by emigrating graduates, we assume the worst case scenario – that emigrants make no payments while abroad. Based on the Arslan *et al.* (2014) figure of 21 per cent of Irish graduates living abroad cited above, we assume that 10 per cent emigrate permanently, while another 10 per cent are living abroad in any given year. As with the implementation of the adjustment for non-employment described above, a year of living abroad is drawn randomly from a distribution with the assumed emigration probability of 10 per cent. And as with a year of non-employment, the effect of living abroad for a year is to delay repayments. A year of permanent emigration, on the other hand, necessarily permanently reduces repayments.

The results of this analysis are reported in Table 5. The column for the undiscounted repayment rates indicates that total repayment rates remain high, even allowing for non-employment and emigration. The ICL versions that entail positive real interest rates imply repayment rates of 95 and 97 per cent for schemes with repayments based on total and marginal income respectively; for the schemes with a zero real interest rate, repayments of 83 per cent and 85 per cent are predicted. However, because many graduates do not reach the earnings threshold until several years into their working lives, and because both non-employment and temporary emigration entail further delays in repayments, discounted repayment rates are significantly lower, at 63 to 74 per cent, implying a subsidy of 26 to 37 per cent on the student contribution component of government funding.

Table 5
Proportion of €16,000 Repaid for Alternative ICL Repayment Schemes, Accounting for Employment and Emigration Patterns

	0% Discount Rate	2% Discount Rate
8% Repayment of Marginal Income, 0% Real Interest Rate	0.83	0.63
8% Repayment of Marginal Income, 2% Real Interest Rate	0.97	0.72
2-8% Repayment of Total Income, 0% Real Interest Rate	0.85	0.67
2-8% Repayment of Total Income, 2% Real Interest Rate	0.95	0.74

It is important to recall, however, that these subsidy rates are based on the strong assumption that graduates who emigrate – whether permanently or temporarily – make no repayments in the years that they are abroad. If the question of how to encourage repayments by emigrants can be addressed, subsidies will be lower than these figures; a separate analysis, not reported here, shows that in the absence of non-repayments due to emigration, subsidy rates are about 10 per cent lower.

An overview of the results shown in Tables 3-5 indicates that the schemes that include a non-zero real interest rate element are preferable from the point of view of the government's fiscal position, since the discounted repayments are higher for these schemes; of course, they are less preferred by graduates for the same reason. The slight regressivity of schemes with interest rates – at least in terms of undiscounted repayments – is an unattractive feature of these schemes, although discounted repayments are progressive. However, for all of the ICL schemes modelled, repayments are affordable and lie well below the critical RB threshold of 18 per cent.

9 Conclusions

This paper has assessed the feasibility of alternative student loan schemes for the Irish case, which is a highly pertinent exercise for current Irish higher education financing policy, for several reasons. First, additional funding is needed for the higher education system as a result of a severe fiscal crisis. Second, the same fiscal crisis has led to substantial increases in taxes in recent years, which has led to strong political resistance to higher education funding coming from further increases in taxes. Finally, the measures taken during the crisis have been perceived as affecting younger generations particularly badly, so the importance of loan repayments being affordable is particularly strong.

We first explain the necessity for student loans in order to ensure that students invest sufficiently in higher education, and for equity reasons. We then assess the two broad alternatives – government guaranteed bank loans and income contingent loans – in detail, describing their main characteristics, drawbacks and advantages. We conclude that income-contingent loan schemes are more equitable than mortgage-type loans, essentially because ICLs offer insurance against repayment hardships and default as a result of low incomes.

We then illustrate how alternative loan schemes might operate in practice in the Irish case. To do this, we first simulate life-cycle earnings profiles for 19 points across the graduate earnings distribution, separately for men and women, using unconditional quantile regression. Simulations of the time pattern of repayments are then carried out, first for a GGBL repaid over 10 years followed by four alternative ICL schemes that vary according to their interest rate regime and the basis on which repayments are calculated.

The results for a GGBL confirm that, as in other countries, RBs are adversely very high for men and women at the bottom of the earnings distribution. Using a threshold of 18 per cent of gross income as the point at which hardship arises, we see that a substantial majority of Irish graduates would be in difficulty with a GGBL of the form analysed in the early years following the commencement of repayments.

Turning to the alternative ICL schemes, it is found that repayment burdens are modest for all graduates, and particularly for low earners; this of course is the result of ICL scheme design, which sets by law maximum caps on RBs. We also find that the government subsidy varies substantially according to the design of the scheme that is chosen, with the most important

consideration being the choice of interest rate regime. We model a scheme with an interest rate equal to the rate of inflation as the baseline, but rising to a 2 per cent real rate in years in which the earnings threshold is reached. For this option, the government subsidy is 26 per cent; this figure is not very different to that found for Australia, and a lot lower than is the case for England.

Also, the analysis highlights the importance of the policy treatment of graduates who emigrate. Hypothetical calculations reveal that encouraging emigrants to repay their student loans will reduce the government subsidy by up to 10 percentage points.

The analysis reported above essentially reveals two critical points for the Irish student loan policy debate. The first is that the use of a GGBL, such as exists in the US and Canada, will be associated with significant repayment difficulties for many graduates, and thus lead to non-trivial levels of default. The second is that if designed well, an ICL has considerable potential merit in addressing what many would describe as a crisis in Irish higher education. Paying attention to issues of interest rate subsidies and graduate emigration will be critical.

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Appendix

Table A1
Descriptive Statistics for Estimation Sample

Variable and Statistic	Males	Females	All
Annual Earnings: Mean	64,188	45,952	53,879
Standard Deviation	42,602	24,529	34,795
Age: Mean	38.1	36.3	37.1
Standard Deviation	8.7	8.4	8.5
Hours per Week: Mean	36.1	33.0	34.3
Standard Deviation	9.0	10.2	9.8
Part-Time%	4.8	14.4	10.2
Education: Primary Degree %	31.8	22.6	26.6
Degree plus Professional Qualification %	23.3	31.4	27.9
Degree plus Postgraduate Certificate or Diploma %	14.0	22.7	19.0
Postgraduate Degree %	24.9	20.3	22.3
PhD %	6.0	2.9	4.2
Public Sector %	47.7	66.5	58.4
Ever Lived Abroad%	28.1	28.8	28.5

Table A2
Female and Male Employment Rates for Irish Graduates, EU-SILC 2006

Age	Female Graduate Employment Rate	Male Graduate Employment Rate
21	0.442	0.386
22	0.532	0.569
23	0.677	0.6
24	0.772	0.647
25	0.831	0.77
26	0.787	0.826
27	0.748	0.769
28	0.851	0.829
29	0.865	0.849
30	0.823	0.875
31	0.894	0.87
32	0.845	0.88
33	0.823	0.943
34	0.831	0.947
35	0.82	0.958
36	0.819	0.947
37	0.762	0.957
38	0.765	0.94
39	0.736	0.909
40	0.753	0.88
41	0.837	0.871
42	0.83	0.927
43	0.846	0.91
44	0.861	0.935
45	0.821	0.909
46	0.872	0.92
47	0.861	0.908
48	0.834	0.871
49	0.808	0.888
50	0.826	0.91
51	0.832	0.915
52	0.837	0.883
53	0.828	0.887
54	0.793	0.889
55	0.791	0.917
56	0.761	0.838
57	0.707	0.812
58	0.635	0.744
59	0.575	0.736
60	0.581	0.581
61	0.456	0.558
62	0.521	0.619
63	0.387	0.518
64	0.306	0.573
64	0.265	0.364
66	0.111	0.222