Beyond HELP: Implementing Income-Contingent Loans in a Deregulated Environment

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Abstract

In the debate that followed the introduction of the Australian Governments Higher Education Reform Bill (2014), there emerged a general view that for the Government to proceed with full fee deregulation, the Higher Education Loan Program (HELP) would need to be capped, with some calling for a more thorough review. After reviewing the debate, I use a theoretical model to identify and examine the key issues arising from the implementation of an income-contingent loan (ICL) scheme in an environment of fee deregulation. I begin by showing that, under HELP, the contribution that students can expect to make to their tuition (or, to taking the other side of the transaction, the economic return of taxpayers/investors) will fall as rising fees reduce the likelihood of full repayment. I then derive conditions that are both necessary and sufficient for neutralising the impact of tuition on the student's contribution ratio. Two parameters, the repayment rate and the surcharge, are critical for tuition-neutrality. While there are a range of ways in which these two parameters can adjust to ensure neutrality, I show that there is only one adjustment rule that ensures stability of the probability of full repayment and therefore the stability of the adjust rule itself. This involves a dichotomy whereby only the repayment rate responds (proportionally) to changes in fees and the surcharge reflects differences in earnings prospects between courses, institutions and students. This dichotomy makes the *ex ante* subsidy an instrument of policy, while allowing the *ex post* subsidy to offer insurance against adverse labour market outcomes. I conclude with a discussion of the broader implications of this reform for education providers, students, employers and government.

1 Introduction

The consensus of opinion of policy experts, which is supported by theory, is some form of income-contingent loan scheme is essential for addressing the very severe capital market imperfections facing students (Jacobs & van Wijnbergen, 2007; Chapman, et al., 2014). In Australia, the United Kingdom and New Zealand the ICL involves an initial loan to finance tuition (and in the case of the U.K. living expenses as well). The outstanding debt, possibly augmented by a surcharge, is then indexed at a rate that may be tied to the inflation rate (Australia), indexed at government bond rate (U.K.) or not indexed at all (in New Zealand, which has a lower repayment threshold and higher repayment

rate, (Doyle, 2013)). Repayments are calculate as a percentage of the graduates income once it exceeds a minimum repayment threshold (over $53,000 under HELP), with repayment rates rising progressively with income. Repayments are collected through the taxation system (addressing the issue of monitoring costs) and continue until, in effect, the internal rate of return that equates the discounted value of (income-contingent) debt repayments is equal to the indexation rate.

Income contingent loans address a number of the capital market imperfections (Jacobs & van Wijnbergen, 2007). In the case of HELP, and its predecessor HECS, the main purpose is to offer insurance against default in the form of an implicit subsidy that varies according the graduates capacity to pay,

> As background it is useful to put into context the reasons for the initial, and continuing, application of the rate of price inflation to HELP debt. The essential reasoning behind this policy decision relates to equity, and it is to subsidise HELP debtors who experienced relatively low future incomes. This is achieved because every period for which debt is outstanding is a period in which the borrower effectively, albeit implicitly, is receiving a subsidy equal to the difference between the change in the CPI and the governments cost of borrowing. The critical point for equity is that, since relatively low income borrowers will take longer to repay a given debt, members of this group are subsidized the most. Chapman and Higgins (2014, p. 2)

To provide loan insurance under the ICL, the implied ex post subsidy will vary in response to unforeseen events: rising when earnings are lower relative to the debt and falling when earnings rise relative to the debt. This takes place automatically. When income is low, repayments are lower and this extends the duration of the loan at the subsidized interest rate. Those with higher incomes will repay faster and therefore receive less of the real interest subsidy. In general, the effective subsidy will rise as earnings fall relative to tuition fees.

In the debate that followed the introduction of the Higher Education Reform Bill, which was eventually defeated in the Senate, there was a commonly held concern that an uncapping both tuition fees and loans under HELP would lead to large fees rises (Dodd, 2015), in part due to the workings of positional competition (Moodie, 2014a), but also due to the insurance offered through HELP dampening the impact of tuition rises on demand. While the Bill was defeated in the Senate , the debate itself underscored the vulnerability of the Higher Education Loan Program (HELP) to excessive rises in tuition fee rises and the need for a more sophisticated review of HELP and its finances (Norton, 2015, p. 13).

The Governments position has been that an expansion in the number of places will intensify competition in terms of price and quality among higher education providers. In response to claims of excessive fee rises, the Minister for Education, Christopher Pyne replied:

> "Thats not possible because the competition wont allow it to happen. If a University decides to charge exponentially higher fees they will have empty lecture theatres and empty tutorials because part of this of course is the expansion of competition, the capacity to compete on price. If a university charges fees that are too high, people wont go to that university and because we have so many

> universities and so many private providers, there will always be other options. Now there wont be these exponential rises in fees, not only because of competition but because universities have no reason to raise fees to that level. They should be able to value their courses so that they gain revenue based on what they do well, rather than what they are doing now which is cramming as many students in to as many courses as possible because they all get exactly the same." (Pyne, 2014)

Market demand would moderate any rise in fees

> "Australian public universities have already been operating in open markets for international students and nationally for domestic fee-paying postgraduate students. In these markets the student chooses the university and the university sets prices for places and determines the number of places it is willing to provide. Australian universities set different fees among themselves and across the degrees they offer. They moderate fee increases consistent with their judgement of what is appropriate and the market circumstances in which they find themselves. For example when the Australian exchange rate increased and with it the cost to many international students of the fees set by Australian universities, most universities moderated or reduced the fees or the fee increases proposed." (Gardner, 2014)

However, a number of policy analysts, and VCs, expressed serious reservations as to whether a deregulated higher education market would operate in this manner. The experience of the United States was often cited to support predictions of high fee levels that "would exacerbate a social, geographical and economic divide from which Australia would never recover" (Milbourne, 2014).

> "Despite this massive choice, and despite difficult economic circumstances, fee levels have been rising at American universities at twice the rate of inflation for the past decade; an important point for those who think that expansion to private providers will keep an unregulated system in check." (Milbourne, 2014)

One eminent critic described the reforms as forcing students to pay for the creation of a competitive higher education market that is destined to fail. Again, citing the experience in the United States,

> "The US now has generations of students with huge debts. The average earnings of a US bachelor graduate fell 14.7 per cent between 2000 and 2012 but the cost of a degree grew 72 per cent, taking it from 23 per cent of median annual earnings to 38 per cent. Debt per student doubled over a 15-year period. This months Gallup-Purdue Index Report demonstrates that graduates with no student loan debt thrive compared with those with debt, and are more likely to set up their own businesses.Something similar will happen here. Judith Sloan in The Australian has pointed out that since 2009, graduate median starting salaries as a percentage of male full-time average weekly earnings have fallen significantly. The conditions are already ripe." (Parker, 2014)

For the elite sandstone universities much of the increased revenue will be used "to increase their research output in a quest for improved international rankings, which in turn will enable them to command higher fees, even though there might be no improvement in the quality of the teaching or student experience." (Parker, 2014). To this extent, students enrolled in research-intensive universities will finance the production of a public good, research (Marginson, 2014).

Nevertheless, a return to fee caps did not attract much support. As one policy analysis put it, based on past experience a capping of fees would only undermine the ability of universities to compete on price,

> "Evidence suggests that university fees will rise if this measure is implemented. In 2005, when the Howard government allowed Australian universities to vary student fees by up to 25 per cent, within two years, every university charged the top rate. A similar measure in England recently led to fee increases of 300 per cent. In New Zealand, the government reintroduced price caps in higher education in 2003 after a decade of ballooning fee increases under its income-contingent loans scheme. While a sudden increase in course fees is clearly unfair to students, it is Australian taxpayers who will bear the brunt of the cost, because the government underwrites the full cost of every place to the provider when a student enrols. While student contribution may be recouped later, via HECS repayments, the taxpayer foots the bill if HECS debts are not fully repaid." (Watson, 2015)

Moodie (2014a) argued that preserving price competition, while limiting prices increases and maintaining the long-term viability of HELP, requires capping HELP debt. Neither the markets nor the "conscience of universities" can be relied upon to limit the increase in tuition fees. Caps on fees or increases in fees raise a number of objections. The government guidelines that prevent institutions charging fees in excess of international fees are not effective. Knowing at what level to set the fee and promote competition is difficult in light of the experience domestically and abroad of the majority of universities fixing the price at the maximum. Capping the increase in fees will dampen the ability to compete on price. In the absence of these changes, therere would be an expansion in unpaid debts with the likely effect of forcing the Government to cap HELP debt, threatening the financial viability of HELP would be threatened:

> "I expect most universities will initially increase their fees for most programs by about 50% to compensate for cuts in the Commonwealth contributions announced in the budget and to relieve pent-up cost pressures. At this point fees will be so high that the proportion of new HELP debt not expected to be repaid will far exceed the 23% the budget projects for 2017-18. At some point the government will decide that it should no longer absorb this unpaid debt, which would effectively be a subsidy for yet more fee increases. The government is likely to contemplate financial caps, but rather than recapping fees it may be more likely to reintroduce lifetime borrowing limits, which it is proposing to remove from Fee-HELP" (Moodie, 2014a)

As a result, the general view of university heads and policy experts has been to support a cap on HELP debt to stem "rampant fee inflation, from public and private institutions, under deregulation" (Hare & Trounson, 2014). However, a capping of HELP is far from being a panacea for either fee inflation or access. The elite universities will have the capacity to raise fees above the borrowing limits as long as wealthy families are willing to top up on their childs HELP debt (Moodie, 2014b).

As a leading proponent of the Governments move to deregulate fees has recently put it,

> "Pending a more sophisticated review of HELP and its finances, these limits should be preserved and extended to all HELP borrowing. The current limit of nearly $100,000 for most categories of student is already at a level that many borrowers are unlikely to repay. Retaining and extending the limit would help control doubtful HELP debt." (Norton, 2015, p. 13)

In summary, the public debate that followed the introduction of the Government's legislation the Government's position was challenged on two grounds.Firstly, the assumption that competition would take the form of quality and price was challenged, with the United States serving as exemplar for critics.

The second challenge to the Government's reforms has been the prospect of the Government's income-contingent loans scheme fuelling fee inflation and raising unpaid debt to unsustainable levels. The debate over the Government reforms has highlighted a key practical issue about whether HELP may undermine the potential gains in quality and efficiency that have guided the Government's attempt to deregulate fees. It is to this second aspect of the debate that the paper makes a contribution.

In the next section, I use recent estimates of the subsidy offered under HELP to emphasise the point that it is not just the *ex post* subsidy that will vary across courses and according to graduate earnings, the *ex ante* subsidies. The variation in the *ex ante* subsidy is largely due to choices, attributes and earnings prospects of students enrolling under HELP.

This is followed by a theoretical analysis to identify and examine the key issues arising from the implementation of an income-contingent loan (ICL) scheme in an environment of fee deregulation. I begin by showing that, under HELP, the contribution that students can expect to make to their tuition (or, taking the other side of the transaction, the economic return of taxpayers/investors) will fall as rising fees reduce the likelihood of full repayment. I then derive conditions that are both necessary and sufficient for neutralising the impact of tuition on the student's contribution ratio. Section 3 derives an adjustment rule whereby course/institution based repayment rates act as efficient market-driven signals for both providers and students, and even employers.

In Section **??**, I discuss the implications for policy and in particular the impact on the motivation for providers to focus on learning outcomes; government's ability to target disadvantaged groups and financial sustainability. Section 5 concludes by examining the avenues the results suggest for future research.

2 Shortcomings of HECS/HELP

Under HELP, it is not just the ex post subsidy that varies with bad luck and bad circumstances (Chapman, 2014), but the *ex ante* subsidy will rise and fall with expected course costs relative to expected earnings. This means that prospective students have an opportunity to influence their *ex ante* subsidy. The result is *ex ante* subsidies that can vary across courses and students without any underlying public policy rationale. In particular, the *ex ante* subsidy will vary according to the students choice of course, planned participation in the domestic workforce and personal characteristics (that will effect their earning power), as well as their preparedness to risk carrying unpaid debt to retirement. For example, a risk-averse student offered two courses with the same expected earnings would have an incentive to select the riskier option, and be prepared to pay a higher price, because the taxpayer assumes the downside risk (due to the minimum payment threshold), while having limited exposure to upside risk (Tourky, 2014).. Gavin Moodie alludes to the distortionary nature of having students effectively determine their *ex ante* subsidy through their choices of courses and institutions:

> "There is no reason why a high-prestige university should not charge fees of $1 million a year. Students would get a gold-plated education without ever having to repay much of the fee they have been charged and the university would get richer." (Moodie, 2014a)

The *ex ante* subsidies will also vary with the cost of a course. In Table 1, I have reproduced the subsidies estimated by Chapman and Higgins (2014) for different course costs as they apply to low, medium and high income earners (assuming debt is indexed at the CPI and a 25 per cent surcharge is added to the debt). The subsidies are calculated by subtracting the present value of future repayments from the original cost. As well as illustrating the progressivity of subsidies, the example also highlights how subsidies can vary across courses. For example, while subsidies are reasonably uniform for low income earners (between 22 and 25 per cent), for middle income earners they range from 1 per cent for the cheapest course to 14 per cent for the most expensive course. Clearly these are not targeted subsidies but will depend on student choice.

[TABLE 1]

Table 2, below, reproduces the subsidies for their Hybrid Model. This sets the indexation rate equal to the CPI when income falls below the minimum repayment threshold and the governments cost of borrowing otherwise. The subsidies across courses are the same for medium and high income earners (10 per cent and 4 per cent, respectively). However, for the low income earners the subsidies vary substantially: from 19 per cent, 37 per cent and then down again to 14 per cent as the course cost rises from $30,000, $60,000 and to $90,000.

[TABLE 2]

As an example of how the *ex ante* subsidies may affect decisions assume the student is offered two courses, both with an upfront cost of $60,000. Assume one course is expected to place the student on the low income stream and the other on the median income stream. If the *ex ante* subsidies were the same, then the obvious decision would be to select the course with the higher earnings. However, the effective subsidy will also fall from 37 per cent to 10 per cent (Table 2). This is a substantial drop in subsidy and could mean that the student has a financial incentive to select the course that yields the low-income path.

As another example we might imagine two very similar courses being offered by two different universities. One is a rural or outer-urban university and the other is an urban university, so travel costs will factor into the choice of university. Lets assume that both courses are expected to place the student on the low income stream. Further assume, that outer-urban university prices its course at $30,000 while urban charges $60,000 (so we are comparing columns 2 and 3 in row 2, using Table 2). For urban students, there is a substantial incentive to attend the outer-urban university before the subsidy. On the other hand, after the subsidy, the difference in course costs is less than $13,500 which in many cases would not be enough to compensate for transport over a three year degree. If the Governments policy was aimed at promoting numbers at the outer-urban institution it would need to commit more funds than would otherwise be necessary.

3 Theoretical analysis

In this section I use theoretical analysis to first examine the impact of rising tuition on the economic profitability or effective *ex ante* subsidy of an ICL that allows for partial as well as full repayments, along with a repayment threshold below which no repayments are required. To my knowledge there is a not a model for ICL that has allowed for partial repayments. Models assume the student will either pay in full a the end of a period or not all. This turns out to be a special case of the model introduced below. Apart from this feature, the model is similar to Migali (2012) and so may been seen as an extension of this model to allow for partial repayments.

After examining the impact of tuition we define tuition-neutrality and examine the conditions both necessary and sufficient for tuition neutrality.These conditions serve as the basis for the discussion in the next section.

3.1 Expected education costs and the *ex ante* subsidy

At the date of enrolment,$t = 0$, each student will have a fixed time $\bar{t}$ that allocate to study from $t = 0$ to $t = t_0$ and work for the remaining period, $t - t_0$. The graduate wage, w, is only known at t_0, after graduation, and has a probability density, $f(w)$, known to th student. After t_0, wages will grow at a known constant rate, μ.

Debt repayments take the form of a proportion, τ of earnings, once earnings exceed a repayment threshold, $\hat{w}$. For our purposes we will need to derive an expression for the expected cost of education, Z, and the student's expected contribution, $z = Z/k$. The expression will take the following form,

$$Z = \int_0^{\infty} Z(w) f(w)\, dw \tag{1}$$

where $Z(w)$ denotes the present value of repayments for a given graduate wage of w. Let r be the real rate of interest and i the real rate at which the outstanding debt is index.

Define the following terms,

- b is the full repayment threshold. If the student's graduate wage b they will have fully repaid their debt by the time they retire at $\bar{t}$
- a is the partial repayment threshold. If the graduate wage is below a the student's earnings will not rise above $\hat{w}$ by the time they retire at $\bar{t}$

Definition 3.1 (Discounted present value of future repayments as a function of the graduate wage)**.**

$$\begin{aligned} Z(w) &= 0 && 0 < w \leq a \\ &= \tau w e^{-rt_0} \textstyle\int_{t_0}^{\bar{t}} e^{-(r-\mu)t} dt && a < w < b \quad ; \quad w > \hat{w} \\ &= \tau \hat{w}_{t^*} e^{-rt_0} \textstyle\int_{t^*}^{\bar{t}} e^{-(r-\mu)t} dt && a < w < b \quad ; \quad w \leq \hat{w} \\ &= \eta(t')k && w \geq b \end{aligned} \tag{2}$$

where $\hat{w}_{t^*(w)}$ is the repayment threshold at $t^*(w)$ and $t^*(w) = t_0 + \frac{1}{\mu} \ln\left(\frac{\hat{w}_{t^*}}{w}\right)$[1].

Definition 3.2 (Effective surcharge)**.** The effective surcharge consists of the nominal surcharge, γ and the interest rate subsidy

$$\eta(t') = \gamma e^{-(r-i)t'} \tag{3}$$

where $t' \leq \bar{t}$ is the time at which full repayment is made.

We can solve for t' in terms of w, and we would find t' to approach t_0 as w increases. The resulting equation is worth considering because it allows us to anticipate a key feature of the ICL

$$\begin{aligned} \tfrac{k\gamma}{\tau} &= w e^{(r-i)t'} e^{-rt_0} \textstyle\int_{t_0}^{t'} e^{-(r-\mu)t} dt && w > \hat{w} \\ &= \hat{w}_{t^*} e^{(r-i)t'} e^{-rt_0} \textstyle\int_{t^*}^{t'} e^{-(r-\mu)t} dt && w \leq \hat{w} \end{aligned} \tag{4}$$

The solution for t' will depend on the graduate wage as expected. The higher the graduate wage the lower is t' since it takes less time to repay the debt. However, the term on the left indicates that the solution will also depend on the initial cost of tuition, k and a rise in k will increase the duration of repayment; that is, unless offset by τ or η, which is not the case with ICLs as they are currently implemented.

Turning to the threshold for full repayment, b, when $w = b$, then by definition $t' = \bar{t}$ and this defines the boundary between graduate wages that result in full repayment and those that do not.

[1] t^* is the time at which earnings breach the repayment threshold and so must satisfy the folowing condition: for $w \leq \hat{w}$, $we^{(t^*-t_0)\mu} = \hat{w}_{t^*}$.

Definition 3.3 (Full Repayment Threshold: b)**.** The full repayment threshold is the level of the graduate wage, b, that satisfies $Z_P(b) = \eta k$. This implies the following fundamental relationship,

$$g\left(b\right) = \frac{\eta(\bar{t})k}{\tau} \tag{5}$$

where

$$\begin{aligned} g(b) &= be^{(r-i)\bar{t}}e^{-rt_0}\textstyle\int_{t_0}^{\bar{t}} e^{-(r-\mu)t}dt \qquad b > \hat{w} \\ &= \hat{w}_{t^*}e^{(r-i)\bar{t}}e^{-rt_0}\textstyle\int_{t^*}^{\bar{t}} e^{-(r-\mu)t}dt \qquad b \leq \hat{w} \end{aligned} \tag{6}$$

and

$$\eta(\bar{t}) = \gamma e^{-(r-i)\bar{t}} \tag{7}$$

$$t^*(b) = t_0 + \frac{1}{\mu}\ln\left(\frac{\hat{w}_{t^*(b)}}{b}\right) \tag{8}$$

Finally, the non-payment threshold, a, is defined by the fact the graduate would need to be earning (given deterministic growth) an income less that $\hat{w}$ on retirement (i.e., at $\bar{t}$).

Definition 3.4 (Non-Repayment Threshold: a)**.** The non-repayment threshold is given by $t_0 + \frac{1}{\mu}\ln\left(\frac{\hat{w}_{\bar{t}}}{w}\right) = \bar{t}$, when $w = a$, yielding

$$a = e^{-\mu(\bar{t}-t_0)}\hat{w}_{\bar{t}} \tag{9}$$

where $\hat{w}_{\bar{t}}$ is the repayment threshold at the point of retirement. If the graduate wage, w, is not above a then they will never be able to reach the repayment threshold on retirement, $\hat{w}_{\bar{t}}$, before retirement.

With these definitions we derive expressions for expected education costs, the student financial contribution and the effective *ex ante* subsidy. Expected education costs and the students contribution ratio are defined as follows,

Definition 3.5 (Expected education costs)**.**

$$Z = \eta k\left(\int_b^\infty f\left(w\right)dw + \frac{1}{g(b)}\int_a^b g(w)f\left(w\right)dw\right) \tag{10}$$

where $g(w)$, b and a are given in Definitions (3.1), (3.3) and (3.4).

Definition 3.6 (Contribution ratio or profitability ratio)**.** The (gross) expected economic profitability or equivalently the graduates financial contribution is defined as follows

$$z = \frac{Z}{k} = \eta\left(\int_b^\infty f\left(w\right)dw + \frac{1}{g(b)}\int_a^b g(w)f\left(w\right)dw\right) \tag{11}$$

where $g(w)$, $g(b)$, b and a are given in Definitions (3.1), (3.3) and (3.4). This will be referred to interchangeably as either the contribution ratio (of the student) or the profitability ratio (for investors).

What is the expected return for the investor is of course the expected cost of tuition for the graduate and the expected profitability is the expected financial burden for the graduate. The net rate of economic profit and the effective *ex ante* subsidy are also two sides of the same coin

Definition 3.7 (Effective *ex ante* subsidy and profit rate)**.** The effective *ex ante* subsidy, s, for the graduate is given by:

$$s = 1 - z \tag{12}$$

This is the negative of *net* economic profit for the investor.

In the next three sections we put these concepts to work in examining the features of the ICL scheme as generally implemented by governments (such as HELP in Australia), consider critical issues in sustaining the ICL option for students, and derive key conditions for the sustainability of ICL schemes in a deregulated higher eduction market.

3.2 ICL under current arrangements

In the context of the discussion over the impact of fee deregulation, inspection of equation (10) reveals that higher values for k will raise the probability of partial repayment, relative to full repayment. Differentiating expected education costs (for the graduate) or returns (for the financier) with respect to k,

$$\frac{\partial Z}{\partial k} = \eta \int_b^{\infty} f(w)\, dw \tag{13}$$

From (13), the following is derived expression for the elasticity of expected education costs, Z, with respect to tuition.

Definition 3.8 (Elasticity of Expected Education Costs)**.**

$$E_k^Z \equiv \frac{\partial \log Z}{\partial \log k} = \alpha(b) \tag{14}$$

$$\alpha(b) = \frac{\eta \int_b^{\infty} f(w)\, dw}{z} = \frac{\int_b^{\infty} f(w)\, dw}{\int_b^{\infty} f(w)\, dw + \frac{1}{g(b)} \int_a^b g(w) f(w)\, dw} \tag{15}$$

Since $\alpha(b) \leq 1$, expected tuition costs are less than proportional to tuition. Furthermore, E_k^Z is clearly decreasing in k,

$$\frac{\partial^2 Z}{\partial k^2} = -\eta f(b) \frac{db}{dk} < 0 \tag{16}$$

where the sign of the last derivative can be obtained using Definition (3.3) and through total differentiation,

$$\frac{db}{dk} = \frac{g(b)/k}{g'(b)} > 0 \tag{17}$$

where

$$\begin{aligned} g'(b) &= \int_{t_0}^{\bar{t}} e^{-(r-\mu)(t-t_0)}dt \quad w > \hat{w} \\ &= \tfrac{1}{\mu}\left(\tfrac{\hat{w}}{b}\right)^{1-(r-\mu)} \qquad w \leq \hat{w} \end{aligned} \tag{18}$$

In the case of z, a rise in k reduces economic profitability, which, from the graduates perspective means a rise in the *ex ante* subsidy. Differentiating z, from Definition (3.6), with respect to k

$$\frac{\partial z}{\partial k} = -\frac{1}{k}\frac{1}{g(b)}\int_a^b g(b) f(w)\, dw \tag{19}$$

Alternatively, in terms of the elasticity of z,

Definition 3.9 (Elasticity of Student Contribution or Economic Profit)**.**

$$E_k^z \equiv \frac{\partial \log z}{\partial \log k} = E_k^Z - 1 = \alpha(b) - 1 \leq 0 \tag{20}$$

where E_k^Z and $\alpha(b)$ are given in Definition (3.8), above.

A negative sign for E_k^z would follow from $0 < \alpha(b) < 1$. A zero elasticity would occur if $a = b$, while an elasticity of -1 would occur if k, and therefore b, using (17), had risen to such a level that the probability of full repayment was virtually zero.

This result, more than any other, identifies a problem faced by policy-makers in implementing an ICL such as HELP when the caps are taken off higher education fees. We turn to this issue in the next section.

3.3 Neutrality, stability and adjustment rules

In light of the previous section it will be useful to introduce two concepts: tuition-neutrality and stability. These concepts take into account the fact that the effective terms and features of ICL contracts are subject to change through change in tuition fees.

The expected profit or loss of an ICL contract may vary across individual types due to ability and across courses, or even institutions, due to differences in earnings prospects. In a risk-pooling arrangement high ability students, or students in courses with high earning prospects, cross-subsidise low ability students and those in disciplines with less favourable labour market outcomes. Taxpayers share in the risks by taking on a share of the losses. These arrangements take place though negotiation and policy decisions.

However, under current arrangements profits and losses across students and courses, as well as the fund as a whole, will also be influenced by variations in tuition costs across courses, individuals and time. These changes do not result from policy decisions or a negotiated contractual arrangement between investors and students but are the result of changes in course fees. This feature is not inherent to ICL contracts but arises because under current arrangements, the terms of the ICL contract fail to neutralise the impact of tuition costs. These considerations give us our first definition.

Definition 3.10 (Neutrality)**.** An ICL scheme is said to neutral with respect to tuition costs if the student's expected contribution ratio, z, is invariant to tuition costs

The ICL contract combines aspects of a human capital contract in that it allows repayments to be contingent on earnings and a loan in that these repayments cease when their present value, discounted at the indexation rate, equal the value of the original liability, ηk. In terms of the definitions of the previous section $\alpha(b)$ measures the relative importance of the loan-aspect and $1-\alpha(b)$ can be used as an indicator of the human-capital aspect. Therefore $\alpha(b)$ can be taken as an indicator of the form of the ICL contract, and the relative importance of the human-capital and loan features of the ICL.

Under current arrangements both η and τ are invariant with respect to k. This means that the form of the contract will vary across courses, institutions and time, not through negotiation but due to differences in tuition costs, k, through their effect on b. This leads to the following definition of stability

Definition 3.11 (Stability)**.** An ICL scheme is said to be stable if b, and therefore the form of the ICL contact, $\alpha(b)$, is invariant to tuition costs

Finally, we want to examine what types of rules there are, if any, for adjusting the parameters of the ICL so that the effective terms are neutral and stable with respect to changes in tuition. Under current arrangements the adjustment rule employed is simply to leave the parameters unchanged which, as we've seen, can be characterised as an adjustment rule that is both non-neutral (i.e., k influences z) and unstable (i.e., k changes the form of the ICL contract through its impact on b)

Definition 3.12 (Adjustment rules)**.** An adjustment rule, in the context of an ICL scheme, is a rule specifying the values of E_k^η and E_k^τ.

In the next section we derive and examine the conditions that are necessary and sufficient for neutrality and stable of an ICL scheme.

3.4 Neutrality and stability: necessary and sufficient conditions

To examine the conditions, necessary and sufficient, for neutrality, differentiate z with respect to k and derive the elasticity of student's contribution with respect to k, this time allowing η as well as τ to change.

$$E_k^z = \alpha(b)E_k^\eta - (1-\alpha(b))\,(1-E_k^\tau) \tag{21}$$

Equating (22) to zero indicates that there may be any number of adjustment rules, involving changes in η and τ, for maintaining the neutrality of an ICL scheme.

$$E_k^z = \alpha(b)E_k^\eta - (1-\alpha(b))\,(1-E_k^\tau) = 0 \tag{22}$$

Recall from Definition (3.3) that the parameters of the ICL contract, η and τ, and k also determine the full repayment threshold, b, given by $g(b) = \eta k/\tau$. Stability requires that b is invariant to k which requires

$$E_k^g = E_k^\eta + 1 - E_k^\tau = 0 \tag{23}$$

where $E_k^g \equiv \frac{d \log g(b)}{d \log k}$.

Proposition 3.1 (The dichotomy)**.** *For all b, such that $\alpha(b) \neq 0.5$, an ICL will be both stable and neutral if and only if*

1. *Elasticity condition: The repayment rate is unit elastic with respect to k:*

$$E_k^\tau = 1$$

2. *Invariance condition: the surcharge is independent of k,*

$$E_k^\eta = 0$$

For sufficiency, simply substitute $E_k^\tau = 1$ and $E_k^\eta = 0$ into (22) and (23) to show that neutrality and stability hold. For necessity, assuming neutrality and stability we can use (22) and (23) to derive the following

$$E_k^\eta = \frac{1 - \alpha(b)}{\alpha(b)} \left(1 - E_k^\tau\right) \tag{24}$$

Given (24), the necessity of the dichotomy for neutrality and stability is easily shown by the fact that assuming $E_k^\tau \neq 1$ or $E_k^\eta \neq 0$ or both gives rise to a contradiction.

It is instructive to examine what the implications are for other adjustment rules that satisfy neutrality but violate stability, along with the implications of $\alpha = 0.5$. In relation to the first item, substitute (24) into (23)

$$E_k^g = \frac{1}{\alpha(b)} \left(1 - E_k^\tau\right) \tag{25}$$

Assuming $\alpha(b) \neq 0.5$, we can ask what we would expect from adjustment rules that do not comply with the dichotomy? Consider first an adjustment rule with τ adjusting less than proportionally to tuition ($E_k^\eta < 1$). This would require η rising with k, since E_k^η would need to be positive to ensure neutrality. However, from (25) this also raises b and so reduces the probability of full repayment, which would mean that any subsequent change in η would be less effective in maintaining neutrality. This can be seen by observing the coefficient of E_k^η in Equation (22), $\alpha(b)$, will fall as b rises. As a result, relying on η to maintain neutrality in the face of a persistent rise in k would become increasing untenable and the rule would break down; namely more reliance on adjusting τ would be increasingly more effective (due to the rise in its coefficient, $1 - \alpha(b)$).

Consider next a rule involving $E_k^\tau > 1$, so that η responds negatively to a rise in k, in order to offset the more than proportionate increase in repayments due to τ. The effect is to reduce b and raise the probability of full repayment. Notice that this raises $\alpha(b)$ and so reduces the effectiveness of τ in maintaining neutrality. This is because the probability of partial repayment would fall with b (since a would not change), thereby reducing the impact of a change in τ. As a result the rule would break down.

As mentioned above, there is an exception to this conclusion. For $\alpha(b) = 0.5$, neutrality would imply stability. Therefore, any rule that satisfied neutrality would also imply stability, with the converse also being true. In this case, the dichotomy is one of many adjustment rules that yeild stability and neutrality.

Furthermore, if initially, b was such that $\alpha(b) > 0.5$, then it is conceivable that the rule would lead to a state of indeterminacy, whereby the rise in b reduced $\alpha(b)$ to 0.5. At this point, as long as the rule maintained the neutrality of z it would also imply the neutrality of b. Similarly, such a state could result from a fall in b raising $\alpha(b)$ to 0.5. Of course, the dichotomy does not require $\alpha(b) = 0.5$ to imply neutrality and stability, .

In the next section we explore some of the practical implications of our results.

3.5 Further implications of stability

dd The analysis yields a numbersof policy implication, which are summarised below.

$$a = \hat{w} \tag{26}$$

$$b \geq \hat{w} \tag{27}$$

Firstly, given wages are growing at a rate of μ, the repayment threshold, $\hat{w}$ would also need to grow at the same rate to maintain stability of the scheme. From Definition 3.4, this implies a will need to equal $\hat{w}$.

$$a = e^{-\mu(\bar{t}-t_0)}\hat{w}_{\bar{t}} = \hat{w} \tag{28}$$

If this was not the case the probability of falling below the full repayment threshold will diminish over time, negating the insurance aspect of the ICL s.

Furthermore, consider the relationship between $\hat{w}$ and b. To maintain stability b will also have to rise in line with earnings to maintain the probabilities associated with full an partial repayment constant over time.

With these conditions in mind consider what would happen if b is below $\hat{w}$. Since both rise at the same rate, those with a graduate wage between b and $\hat{w}$ will never repay despite being capable of doing so. For this reason, its reasonable to impose th restriction, $b \geq \hat{w}$.

With these results in mind we turn to the implications for reforming manner in which the ICL is configured.

3.6 Outline of a reform

The implications of the theoretical analysis for reform are summarised as follows. From Definition 3.3

$$\tau = \frac{\eta}{g(\bar{b})}k \tag{29}$$

where

$$g(\bar{b}) = \bar{b}e^{(r-i)\bar{t}}e^{-rt_0}\int_{t_0}^{\bar{t}} e^{-(r-\mu)t}dt \tag{30}$$

and we have set $b = \bar{b}$ to indicate the constancy of b under the dichotomy rule.

Having τ vary proportionally with k would be the first leg of reform. The second would require η to respond to prospective labour market conditions. Using (31) and assuming the government targets the *ex ante* subsidy of $1 - \bar{z}$,

$$\eta = \bar{z} \left(\int_{\bar{b}}^{\infty} f(w)\, dw + \frac{1}{g(\bar{b})} \int_{\hat{w}}^{\bar{b}} g(w) f(w)\, dw \right)^{-1} \tag{31}$$

where the functional form for a, from Definition 3.4, has been used.

While the repayment rate would be proportional to k it would also depend on the underlying earnings prospects through η. If a rise in tuition is accompanied by improvement in labour market outcomes, then the repayment rate need not change.

However, clearly, this raises the key issue of information, and whether the surcharge can accurately reflect prospective labour market outcomes. This is a significant issue. If η simply fixed and did not respond to changes expectations concerning prospective earnings then τ would rise, even if the rise could be fully justified in an improvement in labour marker conditions.

4 Discussion

The foregoing analysis provides a theoretical argument for fundamental reform to the way ICL are generally implemented. At the heart of the reform proposal is a dichotomy whereby the repayment rate would change proportionally with tuition costs while the surcharge would respond to conditions on the labour market.

The proposal appears to offer a number of advantages but also some challenges. If courses fees were to differ markedly between institutions for the same course and this is matched by a similar disparity between the repayment rates faced by students enrolling in these course, then this would be a clear signal that investors (the government or private investors) did not see these courses yielding significantly different employment outcomes.

The challenge here is for η to reflect the prospective labour market conditions for graduates of each institution and discipline. Departments (of a discipline within a particular institution) with fees rising on the back of their graduates' stronger labour market outcomes need to be reward through a fall in *eta* to offset the rise in k.

If the information gathered was only at the institutional level, then η would be influenced by institutional differences in the relative number of graduates from each discipline. An institution-based η would be too high for a small department outperforming other departments in terms of graduate outcomes or too low if the small department was under-performing. Similarly, the information would also need to discriminate between institutions to avoid penalising small universities that are able to outperform their larger counterparts in particular disciplines.

While a challenging task, it has already started in Australia through the recently piloted employer experiences survey (EES) under the Government's Quality in Teaching and Learning (QILT) initiative. The aim is to encourage competition between institutions based on price and quality and undermine

positional competition. While the project is primarily focused on informing students, the information would be equally valuable for departments in motivating academics to engage in teaching and learning initiatives and for companies hiring based on merit.

In relation to teaching and learning, Dill and Soo (2004) argue that if market forces are to incentivize institutions to improve teaching and learning the value added of *each department* needs to be measured. While academics at the departmental level may have repeated dealings with each other, a critical element for cooperation is missing: the outcome of cooperative endeavours to improve learning outcomes is poorly measured, if at all. Without a program-specific measure of value added, individual faculty members will allocate their time according to the individual costs and benefits to themselves. This is described by Dill (2005) as the collective action dilemma facing faculties of every university department.

> "The benefit of cooperating with other faculty members in the design and implementation of higher quality academic programs will therefore receive little or no value. By the same logic faculty members also have few incentives to invest time and effort in developing and maintaining measures of value-added by academic programs, as a consequence the decline or rise of academic standards in subject fields remains largely invisible to academic eyes." (Dill and Soo, 2004, p17)

Cooperation is essential since the "student content learning and cognitive development is affected by the nature and sequence of their curricular experiences as well as by the extent to which the curriculum faculty are collectively involved and communicating with each other about the substance of teaching and the students education experience." (Dill and Soo, 2004, p16).

Clearly, this goal of providing each department with a measure of its value-added would be more achievable if institution-specific and discipline-specific information on graduate outcomes could be distilled through a a single 'price', such as τ. It would reflect the view of government in the first instance but could also reflect the 'view of the market' if ICL contracts were securitised. The reward for successful teaching and learning initiatives would be a reduction in τ or a rise in the fees that can be charged without raising τ. As the system currently operates it is difficult to determine, let alone communicate, success in implementing improvements in the quality of education. In addition, in its current form HELP can distort price signals relating to the quality of education and needs of industry.

The usefulness of having τ as a price signal is not limited to students and university departments. Employers may also benefit. As we've seen a key concern in the debate over fee deregulation is the emergence of competition based on status or position. Positional competition is based on a lack of information about the quality of the final product (Aspers, 2009, ;Podolny, 1993). Participants rely upon the status and prestige of an institution to inform their decisions about the quality of its graduates.

For hiring managers who have enough exposure in the graduate labour market to look beyond status there can be a problem in defending their decisions before less informed superiors (Dasgupta and Prat, 2008). The need to do so

normally occurs when projects fail or business is bad and the manager's decisions come under scrutiny. In these circumstances the manager's reputation is on the line and a decision to hire a graduate from a less prestigious university is going to be harder to defend. While, a survey like the EES would provide support for merit-based hiring, having this information in the form of relative movements in the repayment rate, τ would reduce the informational barriers further.

Furthermore, if ICL contracts were securitised the interests of investors would be naturally aligned to reducing barriers to employment opportunities. Positional competition erects barriers and so would reduce the return of the broader student population who have not attended a prestigious institution. Limiting the role of status in a deregulated higher education sector, keeps the door open for graduates of less prestigious universities attaining the better paying jobs and thereby enhances the returns of those who choose to invest in them ICL contracts.

A further important implication of reform relates to the *ex ante* subsidy. With the repayment rate adjusting to neutralise the impact of tuition, the *ex ante* subsidy would become an instrument of policy. Rather than being determined endogenously, the *ex ante* subsidy could be targeted to provide special assistance based either on equity grounds, such as low socio-economic status groups, or efficiency grounds, such as the apparent under-investment in science, technology, engineering and mathematics.

In this respect, universities would themselves have a commercial incentive to bring to the government's attention cases of need which, if considered genuine, could attract a higher *ex ante* subsidy. For a university that enrolled less mobile, more disadvantaged students, there would be an incentive to lobby on behalf of their students for more funding.

Finally, insulating the expected profitability of the ICL from changes in tuition would allow the ICL to maintain its financial sustainability going forward. In so far as the repayment rate can anchor tuition fees relative to expected earnings, one would expect the Governments outlays in subsidies to rise in line with its tax base, over the long-run.

5 Concluding remarks

In this paper I have applied a theoretical analysis to examine whether the common configuration of ICL, with the repayment rate and surcharge set independently of tuition cost and prospective labour market conditions and student-type, suitable for a higher education sector with deregulated fees. The analysis highlighted the expected contribution ratio will fall as rising fees reduce the likelihood of full repayment. I then derived conditions that are both necessary and sufficient for neutralising the impact of tuition on the student's contribution ratio. The repayment rate would need to adjust proportionally with tuition cost, while the surcharge would need to adjust with prospective earnings.

With fee deregulation expected to lead to substantial rises in tuition fees, an ICL scheme such as HELP, would dampen the impact on student's by reducing the contribution ratio on th student with the taxpayer bearing more of the bearing a share of tuition costs.

The Government's proposal to raise the indexation rate to the bond rate

would have reduced this shift to some extent by eliminating the interest rate subsidy. However, the fall in the probability of full repayment would still leave the taxpayer with a larger share of the costs. In addition, the policy would have had adverse distributional implications, with debt compounding even when the graduates income fell below the repayment threshold (Chapman and Higgins, 2014).

Chapman and Higgins (2014) have put forward a compromise 'hybrid model', that would involve indexation at the Government's 10 year bond rate when income is above the repayment threshold, but fall to the CPI when income fell below the repayment threshold.

The proposal arising from the theoretical analysis involves more fundamental change in the configuration of income-contingent loans. The repayment rate is a rate of exchange between current dollars spent on education and dollars earned in the future. With the repayment rate varying proportionally with tuition and the surcharge, *and* repayment rate, responding to prospective labour market conditions, the proposal would result in this monetary rate of exchange matching movements in the real rate of exchange between tuition and labour earnings.

While, the paper has highlighted the impact of tuition changes on the repayment rate under the reforms, it needs to be remembered that prospective earnings also have an impact. A rise in prospective earnings would reduce the surcharge, as well as the repayment rate, reflecting the fall is the real cost of debt. In contrast, under the current scheme both the repayment rate and the surcharge are fixed, so the consequence of a rise in prospect earnings is a *rise* in the net contribution of students.

The implementation of the scheme depends critically on the availability of adequate data, techniques and skills for estimating return and risk properties specific to a cohorts course and provider. Future research would need to examine data requirements and availability, estimation of key parameters and relationships, as well as the respective roles of the private and public sectors in facilitating efficient information disclosure.

The overall message is that at the heart of the issue of sustaining an income-contingent loan scheme under a deregulated higher education regime is an information problem; *an information problem that can and should be addressed once the rules for successful implementation of an ICL are in place.*

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6 Tables

Table 1: Interest subsidies (% loan) for Surcharge Model[†]

Income Category	$30,000	$60,000	$90,000
Low	25%	22%	23%
Medium	1%	8%	14%
High	-6%	-1%	4%

Source: Chapman and Higgins (2014), Appendix

[†] The "surcharge model" assumes a 25 per cent surcharge and indexation at the CPI. All Subsidies represent the difference between the original loan and repayments arising from assumed lifetime earnings profiles as a proportion of the original loan.

Table 2: Interest subsidies (% loan) for Hybrid Model[†]

Income Category	$30,000	$60,000	$90,000
Low	19%	37%	14%
Medium	10%	10%	10%
High	4%	4%	4%

Source: Chapman and Higgins (2014), Appendix

[†] The hybrid model assumes indexation at governments borrowing cost above the minimum repayment threshold and indexation at the CPI when income is below the threshold. All Subsidies represent the difference between the original loan and repayments arising from assumed lifetime earnings profiles as a proportion of the original loan.