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Financing Higher Education in the Netherlands with Graduate Taxes or Income Contingent Loans

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Abstract

In this paper we analyse the consequences of replacing government subsidies with a graduate tax (GT) or income contingent loan (ICL) system for the financing of higher education in the Netherlands. Both these systems are directed towards solving capital and insurance market failures. We constructed an empirically based simulation model to analyse loans, GT’s and ICL systems of education finance. We show that the switch to a GT or ICL system can significantly reduce the income risks that graduates would experience under a loan system. If education subsidies are dropped to zero the tax rate in a GT would have to be about 6%. In an ICL system with full risk pooling the repayment rate would be higher, ranging from 10%-6%, depending on the size of the default/solidarity premium on the interest rate. If default risks are shifted to society the repayment rate may be lower, but this goes at a cost of a smaller reduction in government outlays. Replacing ex ante subsidies with ex post subsidies makes the resulting distribution of incomes more equal because only those with low lifetime incomes benefit from ex post subsidies. We discuss behavioural responses and policy implications.

Key words: education finance, graduate taxes, income contingent loans, education subsidies, government expenditures on education.


*This paper is an abbreviated version of Jacobs (2002) and precise details on the calculations, estimations, assumptions, data, etc, used in this paper can be found there as well, see http://www.cpb.nl/nl/pub/discussie/9/disc9.pdf.

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1 Introduction

In this paper we analyse the consequences of replacing education subsidies on higher education with an equity participation scheme of financing higher education in the Netherlands. We analyse various financing schemes – graduate taxes (GT) and income contingent loans (ICL) – in order to channel private resources into higher education without harming accessibility.

We think that the subject is of both practical and scientific relevance. First of all, government budgets for education are under pressure for various reasons, such as the ageing of the population and the EMU-criteria for deficits and debt, while enrolment in higher education has been steadily increasing. This has caused a crisis in the funding of higher education, see for example Kane (1997), Barr (1998) and Barr and Crawford (1998). Policy interest in ways to circumvent pressures on government budgets to finance higher education has therefore increased.

Further, many economists have advocated education finance based on loans with insurance elements like an ICL system or an equity participation scheme such as a GT, see e.g. Friedman (1962), Nerlove (1972, 1975), Barr (1991, 1993), Chapman (1997), Oosterbeek (1998), García-Peñalosa and Wälde (2000), and Jacobs and van Wijnbergen (2002). It is argued that these systems are both more equitable and efficient. Although many economists have advocated such financing schemes, there is hardly any evidence on the financial and distributional consequences of implementing these financing schemes. In this paper we fill this gap.

We construct an empirically based simulation model to study the financial consequences of a switch to an GT/ICL system that (partially) replaces education subsidies. We derive the repayment conditions for individual students, the distributional consequences and the effects on public expenditures.

This paper is related to some earlier studies that attempt to quantify the consequences of increases in private contributions to higher education. First, Rinnooy Kan et al. (1988) investigate the consequences of replacing the (income dependent) grants by annuity type of loans provided by banks in the private sector in the Netherlands. Their main focus was to estimate the amount of compensation that private banks would receive for the default risks. Rinnooy Kan et al. (1988) do not consider ICL’s or GT’s, but restrict their attention to the current Dutch mortgage type of loan system. Further, they only consider increases in private contributions that are of limited size.

Second, Barr and Falkingham (1994) analyse the consequences of an ICL/GT system in the UK on the basis of a numerical model (LIFEMOD) with heterogeneous agents. Their main contribution is to show the various
ways how increases in private contributions can be achieved. Again, the
drawback of this analysis is that only loans of limited size are considered
(1000 UK pounds).

Third, experiences with the Australian Higher Education Contribution
Scheme (HECS) provide information on the consequences of increasing pri-
vate contributions. Chapman (1997) and CPB (2001) extensively discuss
the effects of HECS. In HECS graduates pay around 23% of the direct costs
of education. The introduction of HECS had no important effects upon en-
rolment even for students with disadvantaged backgrounds. Furthermore,
almost all outstanding debts were repaid, so that costs of default were minor.

The set up of this paper is as follows. We start with a discussion of ICL
and GT schemes of education finance in section 2. In section 3 we discuss
the assumptions made in our calculations of the introduction of a GT or ICL
in the Netherlands. In sections 4, we discuss the consequences of increasing
private contributions with a pure loan system as a benchmark. Sections
5 and 6 present calculations of a GT and an ICL system, respectively. In
section 7 we discuss some economic aspects of ICL’s or GT’s. In section 8
we conclude.

2 Income contingent loans and graduate taxes

To start our discussion we introduce some background definitions. There
seems to be a lot of confusion on what an ICL system really is, and the
same holds for a GT system. To avoid this confusion we precisely define
what is and what is not an ICL or GT system.

2.1 Income contingent loans

In an ICL students borrow the funds from the government to cover the costs
of tuition and (partly) the costs of living while enrolled in education. Costs
education are deferred to the stage in life where graduates start to earn in-
come. When graduates start to work they repay a fraction of earned incomes
to cover the costs of their loan including interest.\footnote{The repayment rate may depend on actual income earned. This is the case in the
Australian system. In the remainder we assume that the repayment rate is flat.} Some of the graduates
with insufficient incomes may not repay the complete principal and interest,
so that default occurs. The crucial difference of an ICL with an ordinary
loan is that the risks of non-repayment are bounded for student. There are
two ways of protecting students against default: *risk pooling* among students and *risk shifting* to society.\(^2\)

First, risk pooling is an *insurance* system, where risks of default are shared among graduates. The interest rate on the loans contains a premium to cover the costs of ‘default’ of those who are not able to repay.\(^3\) Therefore, students who succeed in repaying their loan are paying the costs of non-repayment of those who fail. Then, we speak of an *ICL with risk pooling*. Consequently, there is redistribution from the lucky students to the unlucky students after graduation. For a full risk pooling system, both the default premium and the tax rate must simultaneously keep the books of the ICL system balanced.

Second, under risk shifting, the default risks are borne by society as a whole as in the Australian HECS system. In that case we have an *ICL with risk-shifting* because the default premium is zero and the repayment rate is set at some arbitrary level and is equal for all students. Then, only the principal (including interest) is repaid. If the students cannot repay the costs of their education the system makes a loss that is borne by society. There is no redistribution from the lucky to the unlucky students.

Note that now tax financed education subsidies are still given, but in an *ex post* fashion. Replacing ex ante subsidies (when studying) with ex post subsidies makes the resulting distribution of incomes more equal (starting from an initial situation with subsidies). Ex ante subsidies are given to all students, whether they have high incomes or not during their working lives. However, only graduates who are not able to repay their debts see their debt remitted so only the ‘poor’ graduates benefit from ex post subsidies.

A combination of risk pooling and risk shifting occurs if the default premium and the tax rate are set such that the books of the system do not balance and part of the default losses are borne by society.

### 2.2 Graduate taxes

Under a GT every graduate receives an amount of resources. The government finances this through issuing government bonds. Graduates pay a fraction of their lifetime incomes to the government via the graduate tax. One may call this an equity participation scheme as well. The government buys shares (equity) in graduates’ human capital and graduates and the lat-\(^2\)For example Nerlove (1972) analyses an ICL with risk pooling whereas García-Peñalosa and Wälde (2000) interpret the ICL as a risk-shifting financing scheme.

\(^3\)The default premium can also be interpreted as a ‘solidarity’ premium. Apart from the risks of default that are covered, there is also income redistribution.
ter pay dividends to the government after graduation when the investment yields a return. Repayments are never stopped. Repayments under a GT may (far) exceed initial funds (including interest). Therefore, there is therefore no link between the amount of equity received and the total repayments from the individual perspective.

In case of a GT with full risk pooling, the tax rate in a graduate tax system is determined simply so as to equate the total repayments to the total costs of government debts that were created to proceed the graduates with equity. If the graduate tax is not set so as to balance the books of the system, there is always a combination of risk pooling and risk shifting, i.e., a GT with (partial) risk shifting.

2.3 Differences between ICL and GT

Exactly a graduate tax repayment scheme results if we let the default premium go to infinity in the ICL scheme. In that case, graduates have to repay a fraction of their incomes during their whole lives because they never reach the threshold when the repayments are stopped. Therefore, the graduate tax is a special case of the income contingent loan system where the solidarity premium is infinity.

In our opinion, the crucial difference between a GT and an ICL system is related to the amount of insurance and/or income protection. The GT therefore offers relatively more insurance (or redistribution) than the ICL. In an ICL system, the graduates with high enough incomes stop their repayments when they have repaid their debts including interest and default premiums. This is not so under a graduate tax.

Confusion may arise to what extent an ICL or GT may be called equity participation models. Friedman and Kuznetz (1945) were the first to express the problem of financing education with explicit reference to equity:

“Investment in professional training will not necessarily be pushed to the margin because earning power is seldom explicitly treated as an asset to be capitalized and sold to others by the issuance of “stock”. [...] if individuals sold “stock” in themselves, i.e., obligated themselves to pay a fixed proportion of future earnings, investors could “diversify” their holdings and balance capital appreciations against capital losses.” Friedman and Kuznets (1945, p.90).4

4Later Friedman restated this in similar words:
With an equity contract there is no limit on the dividends that graduates pay out to the government similar to stocks. Therefore, a GT is pure equity financing of human capital investments. An ICL is not exactly like an ordinary loan, because it also has equity elements when income risks are pooled, solidarity premiums are included and default risks are not shifted to society. One can say that an ICL is a hybrid contract: a combination of an ordinary debt contract and an equity contract.\textsuperscript{5}

Occasionally, proponents of a graduate system have suggested a ‘pay-as-you-work’ system where the currently working graduates finance costs of the currently studying. In our opinion this intergenerational link is \textit{not} essential for a GT system. However, this way of financing education generally implies income redistribution from the older to the younger generations if the real interest rate is higher than the growth rate of students enrolling in higher education. We do not see convincing arguments to incorporate elements of obligatory intergenerational redistribution in the system of education finance.

Second, most proposals of an ICL system seem to be based on \textit{voluntary} participation by students, whereas most proposals of GT’s seem to be based on \textit{obligatory} participation. We shall initially assume that participation in both an ICL system and the GT system is voluntary.

2.4 Income contingent loans and graduate taxes versus education subsidies

There are some major advantages of income contingent loans and graduate taxes over education subsidies. First, higher education finance based on subsidies is inequitable.\textsuperscript{6} The incidence of the costs is born by the average

\textsuperscript{5}[...]. The device to meet the corresponding problem for other risky investments is equity investment plus limited liability on the part of shareholders. The counterpart for education would be to “buy” a share in an individual’s earning prospects; to advance him the funds needed to finance his training on condition that he agree to pay the lender a specified fraction of his future earnings. In this way, a lender would get back more than his initial investment from relatively successful individuals, which would compensate for the failure to recoup his original investment from the unsuccessful.” Friedman (1962, p.103).

\textsuperscript{6}The Australian HECS is, strictly speaking, not an equity participation model, first of all because default risks are borne by society rather than shared amongst graduates. Second, repayment obligations in HECS are limited and there is no insurance/solidarity aspect involved.

\textsuperscript{6}This is a long standing debate, see e.g. Friedman (1962), Nerlove (1972, 1975), or Schultz (1972) for early contributions.
taxpayer, whereas the benefits accrue to the most talented part of the na-
tion. Additionally, the larger part of students enrolled in higher education
already belong to the most wealthy families. Therefore, replacing education
subsidies by an ICL or GT scheme increases equality of incomes.

One can also argue that subsidies on a large scale, as current policy
practice shows, is not an optimal, i.e., efficient policy. Clearly, arguments
related to positive economic externalities, tax distortions and merit good
arguments may justify education positive education subsidies.

However, probably the most important reason for education subsidies
is the failing of capital and insurance markets. These market failures lie
at the roots of inequality of opportunity. I.e., not all students can obtain
an education at the same financial conditions. Failing capital and insurance
markets hamper access for students from lower socio-economic backgrounds.
Disadvantaged students suffer more from liquidity constraints because they
cannot finance education themselves. And, because they are less wealthy,
require larger returns on their investments in human capital because they
are typically more risk averse. Both capital and insurance market failures
result in under-investment in human capital from a social perspective.

Subsidies are a sub-optimal policy response to mitigate the adverse con-
sequences of failing capital and insurance markets for a variety of reasons.
First, (rich) students without funding problems receive subsidies which is not
efficient. This can be avoided by means of income dependent grants, but
the latter cause large distortions in parental savings, see Edlin (1993) and
of graduates, so that they are not very efficient in reducing risk-aversion,
see Jacobs and Van Wijnbergen (2002). Third, (misallocated) education
subsidies need to be financed through distortionary taxes. Therefore, ed-
ucation subsidies tackle the problems with capital and insurance market
imperfections only indirectly.

In principle, an GT or ICL model is sufficient to overcome credit and
insurance market failures, since market failures are directly addressed. Stu-
dents obtain funds independently from background conditions so that liquidity
constraints are avoided. Income insurance by means of pooling income
risks solves the under-investment problem due to risk aversion. An equity
participation scheme does therefore not require external subsidies, see also
Jacobs and Van Wijnbergen (2002). In other words, accessibility can be
warranted at lower public costs, so that the financing of education becomes
more efficient. Savings on government outlays can be achieved by replacing
subsidies with an ICL or GT.

An equity participation scheme has two potential disadvantages, how-
ever. First, insurance of income risks may cause problems with adverse selection and moral hazard. This is the case if the system attracts too many high risk - low return graduates and the low risk high return graduates do not want to participate. Second, the equity participation model potentially distorts education choices and labour supply decisions because income insurance and redistribution of incomes cannot be completely separated.

3 Assumptions calculations

In the next section we turn to the analysis of reforming the current system of education finance with large government subsidies towards an equity participation models of higher education financing in the Netherlands. Before doing so we discuss the underlying assumptions that are made in the calculations that follow.

The earnings profiles of graduates after graduation serve as the basis of our model. These earnings profiles are estimated for graduates that obtained a higher vocational or university education. Further we estimated the profiles separately for men and women. We apply fixed effects for every education type (8 in total). In figures 1, 2, 3, and 4 we plot the estimated wage profiles for the various education categories. Familiar age-earnings profiles are obtained, see e.g. Becker (1993), Murphy and Welch (1992).

We adjust the estimated life-time earnings for labour supply effects by applying corrections for hours worked and participation rates. The reason is that some graduates do not work full-time or do not participate, and the

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The details of estimations and data sources are available in Jacobs (2002).
present value of their life-time earnings falls accordingly.

The crux of the proposed education finance regimes is that they provide insurance to graduates against the possibility that they cannot pay back their loans. In order to proxy for the effects of uncertainty we employ the standard deviation of the residuals from the estimations to measure the spread of incomes around the estimated wage-profile. A larger standard deviation in the residuals implies that there is more unexplained variation in wages. Based on the assumption that the residuals are normally distributed around log income we can divide our estimated profiles of each of our 32 profiles in quintiles. Each of which contains 20% of the students. The lowest quintile has the 20% of the students with the lowest incomes, the highest quintile contains the 20% of the students with the highest incomes.

We calculated different financing schedules for various levels of education subsidies per student per year. The reason is that there is no need to abolish all education subsidies for reasons mentioned earlier. We use 4 categories of education subsidies. The zero subsidy regime corresponds to the case where all current outlays on education (grants and institutional costs) are replaced by loans/equity. The low, middle and high subsidy scenarios correspond to 25%, 50% and 75% of current total outlays. In the current system the contribution on the part of students is 12% and 13% of the direct outlays on education for higher vocational and university education respectively.

We assume in all the calculations that follow, that the whole system as it currently operates remains in place with the difference that tuition fees are abolished and grants are replaced by loans. The major change is that the government finances the costs in advance and collects repayments from students after graduation through the tax system.

We exclude costs of health care in university education, e.g. the medical hospitals, that render the medical studies expensive. We do the same for the expenditures on scientific research at universities, and arts at higher vocational schools, e.g. arts academies, conservatories, acting schools, etc.

Both university and higher vocational education have a nominal length of 4 years. We assume however that students are enrolled 5 years in higher education. Data from Statistics Netherlands (2000, p.19) indicate that enrolment is generally longer and 5 years is a good approximation.

We take into account the potentially distortionary effect of both the GT (and ICL) on life-time labour supply, which comprises hours worked and participation effects. The graduate tax may also reduce post-initial schooling efforts which result in a smaller effective tax base. Similarly, student may
increase tax avoidance activities by shifting income to the black circuit.\textsuperscript{8} As base-line values we take for men an uncompensated wage elasticity of labour supply $E = .1$ and for women $E = .5$. This gives an average elasticity of taxable income equal to $.3$, which is in line with the literature, see e.g. Gruber and Saez (2001).

In the remainder of the analysis we do not consider various options to spend the free resources. The government may want to use the proceeds for lower taxes or higher government expenditures, or reduce government debt. A discussion on these matters is beyond the scope of this research.

Our estimates are based on a cross-section of wages. However, we base our calculations on time-series profiles. To transform the cross-sections profile to a time-series profile we assume a constant real rate of wage growth – due to technological progress (amongst other things).\textsuperscript{9} For the base calculations we use a rate of wage growth $g = .02$. Skill biased technological progress, for example due to the ICT-revolution, may further increase real wage growth for higher educated workers so that higher wage growth is a possibility to investigate. We consider cases of $g = .01$ and $g = .03$ as robustness checks.

For our base-line calculations we use a real discount rate equal to $r = .03$. We also present robustness checks for lower and higher real discount rates.

We assume that each graduate enters the labour market directly after graduation and remains in the labour market until 65 years.

There is no differentiation in costs between the subjects, only as regards to the level of education (higher vocational and university) and to the length of education.\textsuperscript{10}

We assume further that the income of (full-time) working partners is not included in the repayment scheme, i.e., there is no income check on family income.

\textsuperscript{8}We have to note here that, from a welfare perspective, not the whole increase in the tax burden can be viewed as a distortionary loss for two reasons. First, we do not consider rebating the savings in government outlays. If government savings were rebated through tax reductions, distortionary losses of increasing private contributions may vanish. Second, the system has insurance elements that cannot be fully regarded as an increase in the average tax burden. If the repayment conditions were actuarially fair, i.e., for every graduate there is no increase in the expected tax burden, behaviour does not change. Tax distortions only arise as a consequence of inevitable redistribution. Therefore, one should interpret the welfare losses of taxes computed here as a conservative upper-bound.

\textsuperscript{9}Becker (1993) also mentions business cycles, trends in supply of educated workers, and occupation or life-cycle employment changes (p.231).

\textsuperscript{10}We do not want to get involved in a discussion of the pros and cons of tuition fee differentiation, but see Nerlove (1972).
We do not consider differentiation of repayment rates according to enrolment duration, because all graduates are assumed to be enrolled for the same time.\textsuperscript{11}

4 Loan system as a benchmark

In the benchmark of a loan system no individual default occurs, because the government simply varies the repayment rate for every student exactly so as to cover principal plus interest. This is an artificial construct, however, since in reality repayment rates cannot be made contingent on individual incomes. Our only purpose here is to calculate the life-time repayment burden with an ordinary loan and compare this with an GT/ICL later on. The insurance element is completely absent because there is no redistribution from the graduates that succeed to repay their loan, to the graduates who do not succeed to do so. Table 1 shows the average fractions of income per year that the students in each category have to repay under a loan system when subsidies are zero ($s = 0$ euro).\textsuperscript{12}

First, we concentrate on the means – indicated by the bold numbers in the third category. For men with university education, the fraction of life-time income repaid varies from 3.5\% for economics, law, technical, agricultural and medical studies to 5\% for behavioural and social studies and arts and languages. For women we see that repayment burdens are higher than for men. At the university level the repayment rates are in the order of 6\% for technical subjects, economics and law education, to more than 8\% for behavioural and social studies and arts and languages. This is due to their lower life-time present value of incomes, and, more importantly, their lower labour supply and participation rates.

Repayment burdens for men with higher vocational types of education are comparable, although slightly higher than men with university education, varying from 4-8\%. For women at the higher vocational level repayments are substantial and higher compared to women with university education, ranging from 10-15\%. This is mainly the consequence of lower labour supply figures at higher vocational education. Clearly, women with higher vocational education are the first to get into repayment problems under a loan regime.

Second, we concentrate on the difference in repayment burdens within

\textsuperscript{11}In reality the repayment rate may differ according to the length of the study, costs of the study, et cetera.

\textsuperscript{12}Tables for the other subsidy regimes are available upon request.
| Table 1: REPAYMENT BURDEN IN LOAN SYSTEM (% OF LIFE-TIME INCOMES) |
|-----------------|----------------|----------------|----------------|
|                 | QUINTILE 1 | QUINTILE 2 | QUINTILE 3 |
|                 | MEN | WOMEN | MEN | WOMEN | MEN | WOMEN | MEN | WOMEN |
| Agriculture     | 6.4 | 12.3 | 8.8 | 19.7 | 4.6 | 8.5 | 6.3 | 13.2 |
| Science         | 8.3 | 16.2 | 6.0 | 11.3 | 4.8 | 8.8 | 3.8 | 6.8 |
| Technical       | 7.2 | 11.5 | 7.8 | 21.1 | 5.2 | 8.0 | 5.6 | 14.2 |
| Medical         | 9.5 | 18.0 | 10.0 | 26.1 | 6.9 | 12.5 | 7.1 | 17.5 |
| Economics       | 5.7 | 10.4 | 7.5 | 19.8 | 4.4 | 7.2 | 5.4 | 13.3 |
| Law             | 6.0 | 11.3 | 9.1 | 23.9 | 5.2 | 5.3 | 3.2 | 6.8 |
| Behavioural & social | 8.6 | 15.2 | 10.0 | 24.3 | 6.2 | 10.6 | 7.1 | 16.3 |
| Arts, languages | 9.6 | 16.0 | 14.5 | 30.7 | 6.9 | 11.1 | 10.3 | 20.6 |
| Teacher         | 10.3 | 24.0 | 7.3 | 16.1 | 5.2 | 4.7 | 4.6 | 8.0 |
|                 | 10.3 | 24.0 | 7.3 | 16.1 | 5.2 | 4.7 | 4.6 | 8.0 |

Note: Higher vocational students borrow 8,420 euro per year and university students borrow 8,569 euro per year. This is equal to total current educational expenditures per student, including tuition fees from students.


Table 2: Graduate taxes (%)

<table>
<thead>
<tr>
<th>Case</th>
<th>s = 0</th>
<th>s = 2.119</th>
<th>s = 4.237</th>
<th>s = 6.355</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>5.9</td>
<td>4.4</td>
<td>2.9</td>
<td>1.4</td>
</tr>
<tr>
<td>$g = .01 \ (\approx r = .04)$</td>
<td>7.6</td>
<td>5.7</td>
<td>3.8</td>
<td>1.9</td>
</tr>
<tr>
<td>$g = .03 \ (\approx r = .02)$</td>
<td>4.4</td>
<td>3.4</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>$r = .05$</td>
<td>9.7</td>
<td>7.2</td>
<td>4.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Elasticity high</td>
<td>6.1</td>
<td>4.4</td>
<td>2.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Elasticity zero</td>
<td>5.7</td>
<td>4.3</td>
<td>2.9</td>
<td>1.4</td>
</tr>
</tbody>
</table>

The various education types. We see that there is substantial heterogeneity in fractions of income repaid within education groups. For men with university education, the repayments are roughly 75% higher if graduates belong to the first quintile compared to the mean - the third quintile. Repayment burdens fall to about half of the mean for the highest quintiles. For women and men at higher vocational education the lowest income quintile has repayments that are about two times higher than the mean in each category.

We can see that especially women in lower income quintiles get into repayment problems, because they have to repay sometimes 20% or more of their incomes in order to repay their debts. The variations in earnings follow the general pattern of the standard deviation of the residuals in the estimations.

5 Graduate taxes

We compute the repayment rate ($\tau$) to cover all outstanding debts, so that no aggregate default occurs and all risks are borne by the students themselves. Table 2 shows the graduate taxes required. We first concentrate on the base line case in which no subsidies are given. In that case the repayment rate, or GT, equals 5.9%. When we compare this rate with the various rates we encountered in table 1, it becomes clear that there is a lot of redistribution involved. The reason is that with a graduate tax all elements in table 1 are equal to 5.9. Thus, there is a very strong compression in repayment obligations. As such our calculations show that income insurance is substantial. There is insurance/redistribution in particular from men to women, from high earning subjects to low earning subjects, and from university to higher vocational education. We can conclude that pooling of risks is highly beneficial in order to reduce the uncertainties involved of doing a particular type of education.

With a low average subsidy of 2,119 euro the graduate tax equals about
4.4%, with subsidies in the middle it falls to 2.9% and with a high subsidy of 6,355 euro the tax rate is only 1.4%. However, government savings on education expenditures also decrease when subsidies are brought in line with current levels, see below.

In the rest of the table we have computed the consequences for the GT when the crucial parameters of the model are changed. Clearly, unfavourable conditions with regards to the interest rate $r$ or the growth rate of wages $g$ are importantly affecting the repayment conditions. Interestingly, repayment rates are not very sensitive with respect to labour supply elasticities. We calculated cases in which labour supply effects are absent, i.e., $E = 0$, and where labour supply is more elastic, that is, $E = .25$ for men and $E = 1$ for women. These are upper bounds that are found in the literature. Very modest increases are found when labour supply elasticities are set at levels that can be considered very high. Based on these figures we may say that moral hazard in labour supply after graduation is potentially not a very important factor that drives repayment conditions.

Finally, we computed the loss in tax revenues per year as a consequence of increasing the effective tax burden. In table 3 we computed for the baseline values the yearly revenue losses for the different values of the graduate tax. From table 3 can be concluded that losses in tax revenues with income contingent payments can be substantial compared to the savings on government outlays. As noted before, the savings on government outlays may be rebated through general tax reductions so that welfare costs of taxation may disappear. In the current discussion, the government savings are simply taken out of the economy.

Potential revenue losses critically hinge on the presumed labour supply elasticities. For the most reasonable values of the labour supply elasticities (base-line scenario) we see that the loss of tax revenues is about 1/4 of the total reduction in government outlays. We calculate that net yearly savings on government outlays with a graduate tax are ranging from .3 to 2.5 bln euro if the subsidies on higher education are decreased from 6,355 euro on average per student to 0 euro per student. In the case where labour supply elasticities are zero, full gross savings are realised as net savings, since there are no revenue losses. However, if the labour supply elasticities are set at upper bounds found in the literature, net savings on government expenditures are very much reduced due to lower tax revenues.
Table 3: Lost tax revenues and net government savings (bln. euro)

<table>
<thead>
<tr>
<th>s = 0 euro</th>
<th>$\tau = 5.9%$</th>
<th>$\tau = 5.7%$</th>
<th>$\tau = 6.1%$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross savings</td>
<td>3.2</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Lost revenues</td>
<td>0.7</td>
<td>0</td>
<td>1.6</td>
</tr>
<tr>
<td>Net savings</td>
<td>2.5</td>
<td>3.2</td>
<td>1.6</td>
</tr>
<tr>
<td>s = 2,119 euro</td>
<td>$\tau = 4.4%$</td>
<td>$\tau = 4.3%$</td>
<td>$\tau = 4.4%$</td>
</tr>
<tr>
<td>Gross savings</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Lost revenues</td>
<td>0.5</td>
<td>0</td>
<td>1.1</td>
</tr>
<tr>
<td>Net savings</td>
<td>1.8</td>
<td>2.3</td>
<td>1.2</td>
</tr>
<tr>
<td>s = 4,237 euro</td>
<td>$\tau = 2.9%$</td>
<td>$\tau = 2.9%$</td>
<td>$\tau = 2.9%$</td>
</tr>
<tr>
<td>Gross savings</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Lost revenues</td>
<td>0.2</td>
<td>0</td>
<td>0.7</td>
</tr>
<tr>
<td>Net savings</td>
<td>1.2</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>s = 6,355 euro</td>
<td>$\tau = 1.5%$</td>
<td>$\tau = 1.4%$</td>
<td>$\tau = 1.5%$</td>
</tr>
<tr>
<td>Gross savings</td>
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<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Lost Revenues</td>
<td>0.2</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>Net savings</td>
<td>0.3</td>
<td>0.5</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 4: Repayment rates $\tau$ (%) in ICL with full risk pooling.

<table>
<thead>
<tr>
<th>$s = 0$ euro</th>
<th>$\rho = .01$</th>
<th>$\rho = .02$</th>
<th>$\rho = .03$</th>
<th>$\rho = .04$</th>
<th>GT ($\rho = \infty$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>s = 0 euro</td>
<td>10.3</td>
<td>7.8</td>
<td>6.9</td>
<td>6.4</td>
<td>5.9</td>
</tr>
<tr>
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<td>7.5</td>
<td>5.8</td>
<td>5.1</td>
<td>4.8</td>
<td>4.4</td>
</tr>
<tr>
<td>s = 4,237 euro</td>
<td>4.9</td>
<td>3.8</td>
<td>3.4</td>
<td>3.2</td>
<td>2.9</td>
</tr>
<tr>
<td>s = 6,355 euro</td>
<td>2.4</td>
<td>1.9</td>
<td>1.7</td>
<td>1.6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

6 An income contingent loan system

6.1 ICL with full risk pooling

In table 4 we have computed the repayment rates for the various subsidy regimes and for varying the default/solidarity premiums $\rho$. We have used the baseline values of the other parameters. The values of the repayment rates are obtained by solving the budget constraint of the financing system for $\tau$ so that no losses occur.

We see that the repayment rates increase relative to the repayment rates encountered under a graduate tax. The reason is that the high-earning graduates are leaving the system earlier so that the low-earning graduates have to pay more of their incomes to repay their debts. Again we can see that the spread in repayment rates in the various subsidy regimes is reduced,
when we compare the repayment rates in table 4 with those encountered in table 2. However, at very low levels of $\rho$ ($\rho = .01$), the effective insurance against the bad states of nature has importantly diminished compared to the graduate tax system. The reason is that high income earners contribute little to solidarity. Only women with higher vocational education benefit from the insurance characteristics, i.e., transfers from high income earners.

Furthermore, we see relatively large reductions in repayment rates when $\rho$ is increased at low initial levels of the default premium. An increase in the default/solidarity premium implies that high earning graduates repay more and remain repaying for a longer period of their lives. This improves the insurance/redistributional characteristics of the system, so that repayment rates can be lower. The reductions in $\tau$ level off when $\rho$ gets higher. The repayment rates converge to the values of the graduate tax when the default premium is increased to about 12%. The reduction in government expenditures for the various subsidy regimes are assumed to be equal to that of the graduate tax as no external losses of default are present.\(^{13}\)

### 6.2 ICL with (partial) risk shifting

One may also design the ICL system where costs of default are (partly) shifted to society at large. In the Australian system, students never repay more than the principal (the real interest rate is zero). That implies that there is no ex post redistribution from lucky students to unlucky students. Subsidies on education now enter in an *ex post* fashion, however, rather than *ex ante*, since the costs of default are funded from government budget.

We present calculations for various (exogenous) values of the default premium and the repayment rate. In the Australian system there is no risk-pooling so that $\rho = 0$. This is a natural lower bound. Rinnooy Kan et al. (1998) use a default-premium $\rho$ equal to 1.3% to cover costs of default and early mortality. They do discuss also the possibility of a solidarity premium. As a benchmark we take $\rho = .02$. This figure implies that the effective interest rate for students increases to $r + \rho = .05$ in the base line case. We also present calculations for a default premium of $\rho = .04$ which is our upper bound and $\rho$ gets more the character of a solidarity premium. We

\(^{13}\)This depends on the timing of tax revenues and the elasticities of labour supply over the life-cycle. Tax losses with an ICL are generally larger compared to a GT because tax smoothing over the life-cycle is optimal as the GT does, rather than concentrating it at the young ages in an ICL. However, tax losses may be smaller if the elasticity of labour supply is smaller at young ages, the period to which the tax burden is shifted. Given that repayment periods are generally very long, we are inclined to think that the differences are relatively minor.
finally calculate the consequences if we let $\rho$ go to infinity. These calculations then correspond to a graduate tax with partial risk-shifting.

For the repayment rates we take values $\tau = .02$, $\tau = .03$, and $\tau = .04$. These values are somewhat arbitrarily chosen, but probably represent the politically feasible range. Finally, we restrict our subsidy regimes to $s = 2,199$ euro, and $s = 4,237$ euro. The high and zero subsidy regimes ($s = 0$ euro and $s = 6,355$ euro) are probably not very interesting from a policy perspective.

In order to assess the behaviour of the ICL scheme we also present some additional statistics. First, we calculate the so called debt-gap. This is the fraction of total outstanding debt that has been repaid. Second, we calculate the fraction of students that are able to repay their debts in full. This is denoted the debt-count. Third, we computed the average number of years it takes to repay debt, for those who do pay back in full, see also Barr and Faulkingham (1993). Fourth, we compute the average costs of default for graduates with higher vocational and university education.

Table 5 and table 6 present the results for the $s = 2,119$ euro and $4,237$ euro regimes where students pay 75% and 50% of total current costs respectively. For the low subsidy regime we see that the debt gap is substantial. Large fractions of outstanding debts are not repaid with the repayment rates and default premiums chosen here. Even with a repayment rate equal to 4% of total life-time income and a default premium of $\rho = .04$ about 11% of outstanding debt is not repaid. This is less so in the high subsidy regime, where the debt gap may be close to 100% or more if the repayment rate is 4% and the default premium is 2% or higher. Furthermore, we see that a substantial fraction of students in all scenario’s does not repay in full. Of course, the number of students that repays falls if the default premium increases, since it takes longer to repay debts for given repayment rates. The average duration of repayment is long, i.e., about 30 years or more.

If one regards the base-line parameters and tax and default rates as plausible, it is not surprising that the private sector is reluctant to provide students with substantial loans. The low debt gaps require substantial risk premiums and repayment rates. The very low fractions of students that repays in full and the long periods of repayment make education loans very costly from an administrative point of view. As such, the role for government intervention seems vindicated.

Yearly costs of default decrease if the government increases subsidy rates. Students have to borrow less if the government is financing larger parts of the costs of education. Reducing *ex ante* subsidies on education by increasing private contributions yield marginally decreasing savings on government
Table 5: ICL with (partial) risk shifting (s = 2,119 euro)

<table>
<thead>
<tr>
<th>$\rho$</th>
<th>$\tau$</th>
<th>Gap (%)</th>
<th>Count (%)</th>
<th>Average years repay</th>
<th>Loss x 1000 euro</th>
<th>Gross savings (bln euro)</th>
<th>Revenue loss (bln euro)</th>
<th>Net savings (bln euro)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00</td>
<td>.02</td>
<td>45</td>
<td>6</td>
<td>44</td>
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<td>3.3</td>
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<tr>
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<td>.02</td>
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<td>-</td>
<td>-</td>
<td>3.7</td>
<td>3.2</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>.04</td>
<td>.02</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>3.7</td>
<td>3.2</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>$\infty$</td>
<td>.02</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>2.8</td>
<td>2.0</td>
<td>1.2</td>
<td>0.4</td>
</tr>
<tr>
<td>.00</td>
<td>.03</td>
<td>62</td>
<td>19</td>
<td>39</td>
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<td>.03</td>
<td>67</td>
<td>6</td>
<td>42</td>
<td>2.5</td>
<td>1.5</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>.04</td>
<td>.03</td>
<td>69</td>
<td>1</td>
<td>48</td>
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<td>1.4</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>$\infty$</td>
<td>.03</td>
<td>69</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>1.4</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>.00</td>
<td>.04</td>
<td>73</td>
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<tr>
<td>.02</td>
<td>.04</td>
<td>82</td>
<td>18</td>
<td>39</td>
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<td>0.4</td>
<td>1.8</td>
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</tr>
<tr>
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<td>.04</td>
<td>89</td>
<td>6</td>
<td>41</td>
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</tr>
<tr>
<td>$\infty$</td>
<td>.04</td>
<td>91</td>
<td>-</td>
<td>-</td>
<td>1.2</td>
<td>-0.5</td>
<td>2.1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

outlays because ex post subsidies on education increase. Given the repayment scheme ($\tau, \rho$), lowering education subsidies ex ante, implies that more costs of default that are shifted to society at large, so that education subsidies ex post increase. From the figures on the government savings we can see that the reductions in government outlays are almost similar in both regimes for identical repayments schemes ($\tau, \rho$).

If $\rho \rightarrow \infty$ results converge to that of a GT (with partial risk-shifting). In the low subsidy regime a repayment rate of 4% is too low to cover all outstanding debts since the debt-gap is 91%. From table 4 we can see that a tax of 4.4% is sufficient to get the debt gap at 100%. Similarly, for the high subsidy regime, we see that the debt gap is 118%, so that the repayment rate covers more than all outstanding debts. From table 4 follows that a repayment rate of 2.9% is sufficient to cover debts.

We did some sensitivity analyses for the ICL scheme for different assumptions of the parameter values used in the base-line calculations.\footnote{Calculations can be found in Jacobs (2002).} Again, the results show large sensitivity with respect to the growth rate of wages and the real interest rate. The labour supply effects have again relatively modest effects. So the earlier conclusion that one needs to be careful with drawing inferences is also confirmed here.
Table 6: ICL with (partial) risk shifting ($s = 4,237$ euro)

<table>
<thead>
<tr>
<th>$\rho$</th>
<th>$\tau$</th>
<th>Gap Count (%)</th>
<th>Average Years Repay</th>
<th>Loss x 1000 euro</th>
<th>Gross Savings (bln euro)</th>
<th>Revenue Loss (bln euro)</th>
<th>Net Savings (bln euro)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00</td>
<td>.02</td>
<td>62</td>
<td>19</td>
<td>39</td>
<td>1.8</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>.02</td>
<td>.02</td>
<td>67</td>
<td>6</td>
<td>42</td>
<td>1.7</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>.04</td>
<td>.02</td>
<td>69</td>
<td>1</td>
<td>48</td>
<td>1.4</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>$\infty$</td>
<td>.02</td>
<td>69</td>
<td>-</td>
<td>36</td>
<td>1.1</td>
<td>0.6</td>
<td>1.0</td>
</tr>
<tr>
<td>.00</td>
<td>.03</td>
<td>78</td>
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<td>.02</td>
<td>.03</td>
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<td>97</td>
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<td>-</td>
<td>-</td>
<td>-1.0</td>
<td>-2.8</td>
<td>2.1</td>
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</tbody>
</table>

7  Discussion

7.1 Adverse selection and moral hazard effects

Moral hazard and adverse may occur if graduates share the costs of default in the financing system, i.e., with the risk pooling arrangements. Adverse selection implies that low-risk and high-return graduates do not participate. With moral hazard students and graduates do not exert enough effort to avoid defaults on loans. However, the importance of adverse selection and moral hazard problems is hard to assess empirically. No real empirical evidence exists on the impact of the terms of the loan system on the risk-characteristics of the students involved in the system.

We may distinguish between a number of types of moral hazard. First, there is moral hazard relating to the risks of not earning a high enough income after graduation. Graduates may reduce their labour supply or work effort, even stop participating in the labour market, or switch to the black circuit in order to reduce or avoid the income contingent repayments. Second, students are better informed about their capabilities and efforts to graduate than the government. Since students know that the costs of default are borne by their fellow students, there is a reduced incentive to study and there is too much risky borrowing accordingly. Third, a form of moral hazard occurs if the repayment rate is not properly differentiated according to length of study. If repayments are not differentiated the graduates who are enrolled shortly, subsidise those who are enrolled longer.

We take the effects of the repayment rate on life-time labour supply into account in this paper. Based on our calculations we do not expect that this
second form of moral hazard is of quantitative importance for repayment conditions. For a proper functioning of an ICL or GT, the repayment conditions should be dependent on length of enrolment to avoid distortions in education choices so that the third form of moral hazard can be tackled.

The government may further alleviate problems with asymmetric information in various ways. First, and most important is to generate more information on the risk characteristics, abilities and motivations of students. In general, the government is confronted with similar moral hazard problems as the private sector, unless it can gather the information on the ‘rotten apples’ in the system more efficiently that private parties. As stated above, repayment conditions should be dependent on easily observable characteristics such as length of enrolment and potentially also on the costs of education. Further, the government could select students upon enrolment and track them thereafter. Thereby the government circumvents the information problem that lies at the heart of the moral hazard mechanism. This may reduce problems with adverse selection as well. If the government can get the high risk students out of the student population, the low risk students voluntary participate, see also Oosterbeek (1998). Also, the repayments my be differentiated for graduates with different expected life-time earnings to avoid pure income redistribution, while at the same time maintaining income insurance for graduates within the same income categories. This requires that there is a sufficient number of graduates within each income category to make risk pooling possible.

Second, the effective insurance of the ICL can be reduced. Nerlove (1975) proposes a fixed limit on the default premium, so that repayments are never larger than principal plus interest plus the default premium. This is a so called opting-out provision. The possibility of opting out, provides incentives to the low risk students to participate in the program, so that adverse selection can be avoided. An opting out provision is not a free solution because it has a price in terms of less effective insurance. Therefore, the under-investment problem due to lacking insurance, which the government attempted to solve in the first place, reappears if insurance is reduced.

Third, if the costs of default are borne by society, repayment conditions are independent of the risk-characteristics, preferences and abilities of the students. Low risk/high ability consumption students are not confronted with the costs of default of high risk/low ability students. Consequently, adverse selection is avoided. This is the case in the Australian HECS system. Note however that this is not a real ‘solution’, since the average tax payer is confronted with the risks of default and the problem is simply shifted to other parties than students.
Fourth, participation may be obligatory so that low risk students have no choice of opting out and adverse selection does not occur. Most proposals of GT seem to assume that participation is indeed obligatory. This eliminates the adverse selection problem because the low risk students are obliged to participate, but introduces inefficiencies of obligatory redistribution from low risk - high return to high risk - low return students.

7.2 Positive selection effects

Some types of education clearly have higher monetary benefits than others. If private contributions are increased, not only the low risk graduates drop out of the system (adverse selection), but also the students with the lowest mean returns. This is what we will denote as positive selection. Since these ‘marginal students’ are confronted more with the real costs, enrolment of these groups tends to fall. If this is true, repayment conditions in the system become more attractive.

Education is not only a pure investment good but also features consumption and immaterial benefits, see also Lazear (1977) and Kodde and Ritzen (1985). Students with stronger preference for the immaterial aspects of education are probably also the students in low return education types. One cannot explain why students pursue a low return study if there is no apparent non-economic benefit instead. Thus, incentives to enrol in types of education with more consumption and immaterial benefits are reduced if private contributions are increased, because these students are confronted with larger costs.

Social efficiency is enhanced if there are no convincing other reasons to subsidise education of low return or non-income oriented students. Again, given the absence of any empirical evidence on these matters we cannot assess the potential strength of positive selection effects.

7.3 Accessibility effects

The question is whether lowering the subsidies and replacing these with income contingent repayments harms accessibility for students. At least theoretically there hardly seems to be a case for this mechanism to be relevant. The reason is threefold. First, the capital market imperfection is resolved so that every student with sufficient talents is able to obtain the necessary funds to enrol in education, independently of background conditions. Liquidity constraints for the poor are therefore avoided.

Second, enrolment of students in education types with low returns may
be reduced in view of the larger private contributions. Low return education types are typically encountered in the ‘softer’ subjects (arts, languages, etc). If there are no other convincing reasons for subsidising low return education types, this drop in enrolment, creates a positive selection effects and actually improves social efficiency. The reason is that education in low earning subjects with a system of education subsidies is apparently too cheap from a private perspective and over-investment occurs with subsidies.

Third, large risk aversion, as a consequence of low initial wealth, ceases to be a serious problem, since all downside risks are eliminated. All redistribution of incomes goes in the direction of graduates with the most risky education types with the largest downside income risks. This runs counter the idea that providing ICL’s or GT’s for the financing of education imposes serious risks on students in the riskier education types. In fact, the graduates with little income risks are the ones who bear the costs in a risk-pooling system. These students may drop out of the system and have to self-finance their investments. Low risk graduates opting for self-financing suffer from problems with imperfect capital markets and absent insurance, social inefficiencies may occur if the low risk students under-invest.

7.4 Enrolment effects

Decreasing the subsidy rates and increasing the repayment obligations through the tax after graduation may cause a drop in enrolment in higher education because students are confronted with lower returns on their investment in education. Whether a potential drop in enrolment is a social disadvantage or not depends on both positive and adverse selection effects, as stated before.

We do not expect large drops in enrolment however. Empirical evidence on the price elasticity of enrolment in higher education for the Netherlands by Kodde (1986), Oosterbeek and Webink (1995) and Canton and De Jong (2002) suggest that enrolment is hardly price-responsive. Empirical evidence for other countries – notably the US – suggests that increasing tuition rates could reduce enrolment in higher education. However, empirical evidence is mixed in the US. Leslie and Brinkman (1987) and Hilmer (1998) find a substantial impact of lowering tuition prices upon enrolment. Kane’s (1994, 1995) findings suggest that this effect is substantially lower.15

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15 The explanation for these mixed results is probably that Leslie and Brinkman (1987) present evidence for the price elasticity of enrolment in university education whereas Kane presents estimates of the elasticity of enrolment for college education. Colleges have much lower average tuition costs than universities. So the evidence might hint at a non-linear relationship between the elasticity of enrolment and the level of tuition fees: the higher
Based on the low elasticities of enrolment in the Netherlands, combined with the tuition levels in the Netherlands that are comparable to Kane’s studies, we are inclined to think that the enrolment elasticity is typically low. Additional evidence based on subjective evaluation by students also suggests that effects upon enrolment are not very large, see also SEO/Amsterdam Economics (2000).

Chapman (1997) shows that the introduction of the Australian HECS system did not produce negative effects on the enrolment of the lower income groups, see also CPB (2001) for a more detailed discussion. It has to be noted however that in HECS private contributions to the direct costs of education are only 23%, so there may be effects upon enrolment at higher levels of private contributions.

Furthermore, in the Netherlands we have seen that enrolment has been steadily increasing in recent years despite lower grants and higher tuition rates. Other factors seem to be more relevant to explain this observation. Hereby one can think of increases in real incomes by parents and students (working while studying) which may have caused relaxations of credit constraints, an increased preference for education as a consumption good, or an anticipated future increase in real returns on education, see also Leslie and Brinkman (1987) for more arguments.

7.5 International environment

Some have expressed concerns that if private contributions in higher education are increased, an outflow of students and high skilled workers to foreign countries may take place which is harmful for the Netherlands. Distortions arise in any scheme where the inter-temporal link between benefits and tax contributions is broken. I.e., when academics permanently leave the country after graduation if the repayment rate in a GT or ICL is a residence based tax that can in fact be avoided.

It is however a matter of political choice to let the repayments in a GT/ICL take the form of a residence based tax. One may also opt for a source based GT or ICL in similar fashion as an income contingent loan to avoid the problem. Alternatively, a so called ‘exit tax’ can be applied for graduates that leave the country.\textsuperscript{16}

\textsuperscript{16}Note that the government is confronted with people leaving the country, for reasons of various sorts (including government policy). No matter how the financing of education is organised, governments have to deal with international movements of graduates in any case. This applies as well to, for example, the current loan scheme.

\begin{footnotesize}
\item[16] are tuition costs, the more enrolment responds to price changes.
\end{footnotesize}
Moreover, increasing private contributions could also be a so-called ‘beggar thy neighbour policy’. Governments may shift the costs of education to foreign countries if students take up their education abroad, and return after graduation and work in the Netherlands. In that case, increasing private contributions increases welfare for the Netherlands.

Furthermore, the current fraction of higher educated workers that works abroad is only very low (about 2.5% for higher vocational graduates and about 4% for university graduates, see HBO Raad (Council for Higher Vocational Studies) (1999) and VSNU (Association of Cooperating Dutch Universities) (2000). One may therefore argue whether international movements of students or graduates are of serious quantitative importance, apart from the question whether the government solves problems with evasion of repayment obligations. Both students and graduates seems to react hardly to international financial incentives for a number of reasons.

First, studies on international mobility of labour typically find very low estimates of international labour mobility of workers within the EU despite substantial differences in for example tax and benefit systems, see e.g. Nahuis and Parikh (2002), and the references therein. Financial incentives are apparently too weak to provoke arbitrage flows of labour migration, since there are important non-financial factors that severely limit migration such as language and cultural barriers, social networks, family, relationships, and so on. It seems unlikely that increasing private contributions will therefore induce significant labour movements.

Second, international labour movements are in fact labour supply effects. Therefore, international mobility effects on tax revenues are captured as well by the tax-elasticity of income. We took the latter into account in our analysis. Recall that estimates of labour supply elasticities are typically low and moral hazard in labour supply was not a serious problem in our analysis.

Third, students’ potential responses to international differences in education costs is also indirectly related to the price-elasticity of demand for education. If the price-elasticity of demand for higher education is indeed rather low, as the figures reported earlier in this paper suggest, one should be surprised to find large sensitivity of enrolment with respect to foreign education costs.

8 Conclusions

In this paper we have analysed the consequences of replacing government subsidies on education with a graduate tax (GT) or income contingent loan
(ICL) system for the financing of higher education. GT’s and ICL’s are more efficient and more equitable than education subsidies.

To analyse the consequences of a policy switch towards increased private contributions, we constructed a simulation model based on empirical wage profiles to analyse loans, GT’s and ICL systems of education finance. We analysed increases in private contributions by students from the current system to the abolition of all current education subsidies. We have shown that the switch to a GT or ICL system can significantly reduce the default risks that graduates would experience if they had to finance their education under an ordinary loan system. This implies that the insurance element in an GT/ICL schemes is crucial.

A graduate tax on earned income of 6% would result if education current subsidies are dropped to zero. In an ICL system with full risk pooling the repayment rate is higher. The range varies from 6-10% depending on the size of the default/solidarity premium. If default risks are shifted to society the repayment rate may be lower, but this goes at a costs of a smaller reduction in government outlays.

Under a risk-shifting regime, the government faces a trade-off between reducing ex ante subsidies on education subsidies on the one hand, and financing the costs of non-repayment (ex post subsidies) on the other hand. Nevertheless, replacing ex ante subsidies with ex post subsidies makes the resulting distribution of incomes more equal.

We took into account potential effects of the repayment rate on life-time labour supply. These turned out not to be very important for the repayment conditions. Nevertheless, net savings on government expenditures are importantly determined by the sensitivity of taxable labour income with respect to the repayment rate. This can be mainly attributed to the fact that savings on government outlays are not rebated through for example lower taxes. We have also shown that the results are sensitive with respect to the assumptions regarding interest rates and growth rates of wages. So one has to be careful in drawing firm conclusions about the exact size of the repayment rates.

We discussed potential effects of raising private contributions upon enrolment in higher education and concluded that enrolment may slightly decrease. We do not expect that increasing private contributions will have any significant effects on international movements of graduates.

Finally, if adverse selection/incentives and moral hazard are indeed important, the government can avoid the repercussions on repayment conditions by bearing (partially) the costs of default. Problems with adverse incentives and asymmetric information are potentially more important in a GT
system than an ICL system, because there is more insurance/redistribution in a GT compared to an ICL. We discussed various options to mitigate adverse consequences of adverse selection and moral hazard.

References


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