



Estimating taxpayer subsidies and individual repayment burdens of a student loan program in Spain*

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Abstract

We study the program *Préstamos Renta Universidad* that provided loans to Master's students in Spain between 2007 and 2010. We estimate predicted income functions and calculate individual repayment burdens and government cost using unconditional quantile regression analysis. We exploit the changing conditions of the successive calls to illustrate three important lessons for the design of student loan schemes: fixed monthly repayments exert an excessive burden to graduates at the lower end of the income distribution; general interest rate subsidies are costly to the taxpayer and unfairly distributed; while the deferment of payments due in case of hardship protects low earners, general grace periods are costly and inequitable.

Keywords: Educational finance, Student loans, Repayment burdens.

JEL Classification: I22

1. Introduction

Public support for higher education is generally justified by the existence of borrowing constraints and the will to promote access from the less well-off students. However, the typically large private returns of investments in higher education also justify larger cost sharing by the student, particularly at times of financial restraint and to the benefit of other social programs such as basic education, pensions or health. A well-designed student loan program

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can improve efficiency as well as equity (Salmi, 2003). By allowing students to enrol at no ex-ante financial cost, barriers to entry can be eliminated. But borrowing to finance higher education is risky (see Avery and Turner [2012] or Martins and Pereira [2004]), and some graduates are never able to repay their loan in full. Adding an element of insurance in the repayment reinforces the access of the more risk averse (probably the less well-off), and protects low earners. Efficient consumption smoothing also requires insurance.

Income contingent loans incorporate insurance by making repayment of the loan depend on current earnings (to protect individuals when monthly earnings are low) as well as lifetime earnings (to protect those who are always low earners, by forgiving any outstanding debt after x years)¹. This is in contrast with typical mortgage loans, where repayments are made on the basis of predetermined amounts over a given time period. Although student loans have been used in different countries since the 1950s, income contingent loans were first introduced in Australia in 1989. The number of countries introducing income contingent loan programs to finance higher education has been increasing ever since and today includes among others New Zealand, the United Kingdom, Hungary, South Korea, and the Netherlands (Chapman, 2014).

In Spain, the program *Préstamos Renta Universidad* (PRU) provided Master's students with loans in order to increase the educational level of the population and improve educational opportunity. To this aim, each loan provided an amount sufficient to pay the fees required to attend a Master's degree and also cover living expenses. The program was in place for 4 years, from 2007 to 2010, but conditions were amended each year. The different calls allow exploiting the effect of the changing terms on individual tax burdens and taxpayer subsidies.

The aim of this paper is to evaluate this program in terms of the severity of the repayment conditions and the size of the implicit taxpayer subsidy. In order to do that, we use data from the 2008 Survey of Household Finances (Bank of Spain) to construct income predictions for individuals holding a Master's degree that year, and we do unconditional quantile regression analysis to estimate incomes at different percentiles of the income distribution (Q25, Q50 and Q75). Using our estimates of income and each year's repayment conditions, we calculate the ratio of loan repayment to gross income in a given period, or repayment burden. This is the way the severity of repayment conditions is usually measured in the literature. In the USA, analyses of student debt have included guidelines ranging from 5 to 15 percent of gross income as acceptable burdens, but *the 8 percent rule* has come to be accepted as the consensus standard (Baum and Schwartz, 2006). However, it has also been recognised that, the higher the earnings are, the higher the proportion that can be devoted to student loan repayment is (Dynarsky and Kreisman, 2013).

We also look at the government cost of the program, or the tax subsidy. Following income and repayment predictions, we are able to estimate how much money the government recovers from an individual at different points of the income distribution². Each call presented different conditions related to interest rates, maturities and deferment periods that clearly affect the ability of the government to recover its investment. The taxpayer naturally contributes whatever is not repaid.

We exploit the changing conditions of the successive calls to illustrate three important lessons to take into account in the design of student loan schemes, as pointed out, among others, by Johnston and Barr (2013). First, fixed monthly repayments exert an excessive burden to individuals at the lower end of the income distribution of Master graduates. Second, general interest rate subsidies are costly to the tax-payer and unfair. The reason is that they unnecessarily subsidise individuals who are well able to repay the whole debt while incurring a minimum burden. Third, while the deferment of payments due in case of hardship protects low earners, general grace periods are costly and inequitable.

The rest of the paper is organized as follows. Section 2 describes the data and the model used to estimate predicted income. Section 3 describes the original program and presents the estimated repayment burdens for men and women at different quartiles, as well as estimated taxpayer subsidies. It also considers a series of modifications to the conditions implied by the first call and their effects. Section 4 describes the effects of actual subsequent reforms. Section 5 concludes.

2. Data and estimated model

We use the Survey of Household Finances (SHF), conducted every three years by the Bank of Spain. The first survey was conducted in 2002, followed by a second and a third wave in 2005 and 2008. We use the 2008 data since it comes closer to the first call of the PRU programme and it better represents expected earnings of applicants. The survey collects data on wealth, income, debt, consumption and demographic characteristics from a representative sample of Spanish households. More information about the SHF2008 can be found in Bover (2011).

The total number of households interviewed is 6,197. The survey allows having information on the level of education attained and labour market experience of each member of the household. Therefore, we consider that SHF is an adequate database for the purpose of the paper, since it allows identifying Master's graduates. There are 1,422 people who hold a Master's degree in SHF2008. Following Chapman and Lounkaew (2010) and Chapman and Sinning (2012), we have excluded people who are either self-employed, in education or recorded as having zero income even though they are employed³. After exclusion, we have a sample of 693 Master degree holders.

In order to calculate the repayment flow implied by PRU, we estimate the age-income profile of workers holding a Master's degree by employing a standard income regression model as in Chapman and Sinning (2012). To compute the annual income, we use the self-reported monthly gross income. Annual income is 12 times the monthly gross income. Estimated labour market experience is defined as the number of years in labour market after Master degree. Since individuals typically graduate at 22, we assume that graduates holding a Master degree are at least 23. Therefore, labour market experience equals age minus 23.

Table 1 shows some descriptive statistics. Significant differences in gross income between females and males can be observed, a feature that is coherent with previous papers showing gender wage gaps in Spain (Amuedo-Dorantes and de la Rica [2006] and Budría and Moro-Egido [2008] among others). Using a different methodology, Courtioux *et al.* (2014) also find significant gender differences in France. Hence, it seems convenient to include a dummy variable to control for gender differences. Women present less experience as well.

Table 1
DESCRIPTIVE STATISTICS

PANEL A. GROSS INCOME AND EXPERIENCE OF MASTER HOLDERS

Master holders	Men		Women	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Gross Income	34,141.54	1,648.06	25,399.41	1,486.84
Experience	17.89	1.08	15.39	0.95
Observations	634	634	634	634

PANEL B. GROSS INCOME OF MASTER HOLDERS AND GRADUATES

Master holders		1st quartile	2nd quartile	3rd quartile	4th quartile
Men	Mean	18,774.52	31,307.31	42,506.22	73,601.59
	Std. Dev.	977.02	529.67	702.38	4,300.13
Women	Mean	12,182.24	22,579.02	31,187.41	47,458.28
	Std. Dev.	893.82	507.00	631.05	3,235.12
Observations	634	634	634	634	634
Graduates		1st quartile	2nd quartile	3rd quartile	4th quartile
Men	Mean	13,651.54	22,698.78	32,566.05	68,185.96
	Std. Dev.	517.58	623.94	800.24	10,740.27
Women	Mean	11,290.19	19,816.18	27,278.50	38,018.82
	Std. Dev.	437.59	267.06	365.79	947.56
Observations	1,022	1,022	1,022	1,022	1,022

In order to calculate individual repayment burdens and taxpayer subsidies by quartile we estimate the following equation:

$$y = \alpha + \beta_1 D + \beta_2 \exp + \beta_3 \exp^2 + \varepsilon \quad [1]$$

Where y is annual gross income, D is the gender dummy variable and \exp stands for labour market experience in years⁴. To estimate the earnings equation we use unconditional quantile regression. As pointed out in Chapman and Lounkaew (2014) this technique offers two improvements over ordinary least squares that are desirable in this context. First, it gives robust results when the dependent variable distribution is not symmetric, as it is the case with earn-

ings. Second, it provides a disaggregation of income distributions. Student payment burdens would be different along the income distribution and this cannot be captured by traditional ordinary least squares estimation. We use the re-centered influence function methodology by Firpo *et al.* (2009) to estimate the unconditional quantile regressions.

Women display on average lower earnings than men, and the gap is increasing along the income distribution, from slightly more than 5,000 euros a year when comparing men and women in the 25th percentile, to more than 10,000 euros less per year when we compare men and women in the 75th percentile (Table 2). This result adds to previous Spanish evidence. Not only higher education is associated with higher wage dispersion (Budría and Moro-Egido, 2008) but also wage dispersion increases with wealth.

Table 2
UNCONDITIONAL QUANTILE REGRESSION OF ANNUAL EARNINGS

	Q25	Q50	Q75
Gender	-5,048.94*** (1,328.50)	-6,252.90*** (1,574.68)	-10,298.39*** (2,132.06)
Experience	1,469.67*** (190.77)	1,159.73*** (217.88)	1,535.70*** (277.29)
Experience ² /100	-2,032.41*** (393.66)	-1,109.54** (499.72)	-1,803.71** (702.38)
Constant	9,152.78*** (3,005.89)	22,801.23*** (3,268.27)	36,941.02*** (3,788.88)
Observations	634	634	634
R ²	0.18	0.17	0.15

*, **, *** Statistically significant at 10%, 5% and 1% respectively.

We assume that all individuals holding a Master's borrowed the maximum amount allowed in each call and estimate the ratio of statutory payments relative to predicted annual earnings, or repayment burden, at each point in time. To calculate the cost to the government, or taxpayer subsidy, we take borrowing cost equal to the interest rate on 10-year government bonds the day the call is passed and funds are made available. With this cost we estimate the actual value of funds recovered by the government. This allows calculating the proportion of loan's principal not redeemed by students. Note that the nominal interest rate charged to the borrower is zero in three out of the four calls.

3. Introduction of the program *Préstamos Renta Universidad* (PRU)

The program was initiated in June 2007⁵. It was presented as an innovative initiative that aimed at allowing all university graduates that might have the opportunity to proceed with

graduate studies to do so irrespective of their socio-economic background. The objective was to increase the educational level of the population and improve educational opportunity. Each loan would then provide an amount sufficient to fund a Master's degree, including living expenses, and would be offered at a 0% nominal interest rate (B.O.E, June 13 2007).

In this first call the maximum amount of each loan was set at 6,000 euros plus a monthly payment of 800 euros along the duration of the Master program, with a limit of 21 months. The maximum amount that could be obtained was then 22,800 euros. Upon graduation, and after a two-year grace period, the borrower could enjoy an unlimited deferment period if her annual taxable income never increased over 22,000 euros⁶. Note the difference between grace periods, that are universal and imply that not even the highest earners repay the loan in full, and deferments periods, where payments are retarded only if needed. Each period after the debtor obtained more than 22,000 euros of annual taxable income she had to repay 1/8th of the total debt (divided in quarterly payments) but the debt was in any case extinguished 15 years after its formalization. The loan bore a 0% nominal interest rate.

Using predicted incomes at the different segments of the distribution, in Table 3 we report predicted repayment burdens according to the repayment conditions stated in the first call. When predicted annual taxable income is below 22,000, the loan is deferred. Recall that during the duration of the Master's program and two additional years, no payments were due. At least 40% of women never pay at all, so the loan program is indeed a subsidy for them. Only 46% of females and 55% of males repay the loan in full. For those who are liable to pay, the repayment burdens are not excessive as compared to the 8% rule. Also, of the cases studied, only women at the 75th percentile pay the loan in full, while men on the 50th percentile pay the full amount by the thirteenth year.

Our estimates of the cost of loans to the government (Table 4) show that, in effect, it reaches 100% at the lower quartiles; hence it becomes a complete subsidy to students. At the 75th percentile the subsidy or cost to the government goes down to less than one fourth of the principal. Although both men and women at these percentiles are able to fully repay their loans, the cost of the grace period and the 0% interest rate is borne by the government. In other words, if the income distribution or/and the repayment conditions allowed every student to pay back the loan, the program cost for the government would still be 22.64% of provided funds (Table 4).

The first call of the program was clearly bound to be too expensive for the taxpayer. We now explore the possibility of reducing this cost without imposing an excessive burden to graduates. To do so we compute the cost for the government introducing changes in the conditions of the programme. In particular, we analyse the effect of substituting grace periods by deferment in case of need, increasing the maturity of the loan contract and introducing an interest rate on the loan. Each change is introduced one at a time keeping the rest of initial conditions of the program unaltered. Table 5 collects the result of the comparison.

Table 3
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2007-2008 CALL

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	Def	Def	Def	Def	7.14	9.61
4	Def	Def	Def	Def	6.89	9.17
5	Def	Def	Def	Def	6.66	8.77
6	Def	Def	10.06	Def	6.45	8.41
7	Def	Def	9.71	Def	6.26	8.09
8	Def	Def	9.38	Def	6.09	7.81
9	Def	Def	9.09	Def	5.93	7.54
10	Def	Def	8.81	Def	5.78	7.31
11	Def	Def	8.56	Def	Repaid	Repaid
12	Def	Def	8.33	10.19	Repaid	Repaid
13	Def	Def	8.11	9.87	Repaid	Repaid
14	Def	Def	Repaid	9.58	Repaid	Repaid
15	Def	Def	Repaid	9.31	Repaid	Repaid

Legend: "Grace" stands for grace period, "Def" stands for deferment due to earnings below threshold, "Repaid" means loan has been totally repaid.

Table 4
COST TO THE GOVERNMENT AS A PERCENTAGE OF PRINCIPAL PER QUANTILE,
2007-2008 CALL

Q25		Q50		Q75	
Men	Women	Men	Women	Men	Women
100.00	100.00	31.94	71.42	22.64	22.64

3.1. Substitution of the grace period by deferment in case of need

Consider first the substitution of grace period by deferment maintaining the threshold of 22,000 euros. Without an interest rate for the borrower, neither grace periods nor deferment have an effect on the loan installments due in later years. The difference between the two alternatives lies in the fact that grace periods are granted automatically to all individuals, whether they need it or not. If repayment takes place later, the government will actually be subsidizing a larger part of the cost, due to interest accrual. Under deferment, payments are due only if annual income is greater than 22,000 euros. As with grace periods, the delay

in payments implies a higher taxpayer subsidy when the loan bears no interest for the borrower. However, in this case, the subsidy is channeled towards those who need it. Income is never larger than 22,000 euros during the first two years for agents at Q25 and Q50. Therefore, the government cost and repayment burden would be the same with or without grace periods for low income individuals. In contrast, exchanging grace for deferment in case of need for Q75 agents would be beneficial for taxpayers, while the repayment burden of these individuals would increase only moderately. In particular, the government would reduce the subsidy to the top of the earnings distribution by almost 7% of the total loan cost (from 22.64% to 15.74%).

Table 5
CHANGES IN THE BENCHMARK CONDITIONS

	Q25		Q50		Q75	
First Call-Benchmark	Men	Women	Men	Women	Men	Women
1st year of payback	-	-	6	12	3	3
Student Burden (%)	-	-	10.1-8.1	10.1-9.3	7.1-5.7	9.6-7.3
Government Cost (%)	100	100	31.9	71.4	22.6	22.6
<i>Substituting grace period by deferment</i>						
1st year of payback	NC	NC	NC	NC	1	1
Student Burden (%)	NC	NC	NC	NC	7.7-6.1	10.7-7.8
Government Cost (%)	NC	NC	NC	NC	15.7	15.7
<i>Increasing Maturity to 20 year</i>						
1st year of payback	17	NC	NC	12	NC	NC
Student Burden (%)	10.3-9.5	NC	NC	10.1-8.4	NC	NC
Government Cost (%)	76.9	NC	NC	47.3	NC	NC
<i>Increasing Maturity to 30 year</i>						
1st year of payback	17	23	NC	12	NC	NC
Student Burden (%)	10.3-8.8	10.7-9.6	NC	10.1-8.4	NC	NC
Government Cost (%)	57.4	67.1	NC	47.3	NC	NC
<i>Introducing a positive Interest rate</i>						
1st year of payback	NC	NC	6	12	3	3
Student Burden (%)	NC	NC	11.3-8.6	17.7-16.2	5.7-4.1	7.7-5.1
Government Cost (%)	NC	NC	8.18	50.1	8.18	8.18
<i>Introducing Interest rate and increased Maturity of 20 years</i>						
1st year of payback	17	NC	6	12	3	3
Student Burden (%)	22.3-20.6	NC	8.3-5.7	16.1-13.0	4.5-3.1	6.1-3.7
Government Cost (%)	50.1	NC	8.18	50.1	8.18	8.18

(Continued)

	Q25		Q50		Q75	
First Call-Benchmark	Men	Women	Men	Women	Men	Women
<i>Introducing Interest rate and increased Maturity of 30 years</i>						
1st year of payback	17	23	6	12	3	3
Student Burden (%)	14.4-11.4	29.8-26.8	5.9-3.6	9.2-6.3	3.5-2.1	4.7-2.5
Government Cost (%)	8.18	8.18	8.18	8.18	8.18	8.18

– NC stands for no change with respect to the first call conditions (benchmark) 3.2. Increase in loan maturity

3.3. Increase in loan maturity

Increasing the loan maturity allows a greater proportion of the population to pay back the loan. We modify the conditions of the first call by enlarging the repayment period to 20 and 30 years⁷. In the first case, 20 years, the government cost would be clearly reduced. Men at the Q25 would start paying back the loan saving the taxpayer almost 25% of the principal (from 100% to 76.91%). In addition, women at the Q50 would complete payments in the 19th year reducing the cost from 71.42% to 47.32%. Agents at the third quartile would not be affected. Going up to 30 years would improve the recovery rate at the Q25. Both men and women would pay back part of the loan with a cost for the government of 57.44% and 67.06% respectively. These costs, although still high, imply a significant reduction for the taxpayer since with the initial 15 years the government did not receive anything from this quartile (100% cost).

3.3. Introduction of a positive interest rate

Finally, the loan could have interest rate payments. We will assume that an interest rate equal to the cost of funds for the government is applied. With 15 years of maturity, repayment burdens of individuals at Q25 do not change under the conditions of the first call of the PRU: they never surpass the 22,000 euro threshold and therefore do not pay back. Men at the Q50 would repay back the loan with a slight burden increase and the cost to the government would go down to be 8.18% of the amount lent. This corresponds exactly to the cost of granting the two-year grace period and would reduce the 31.94% initial taxpayer subsidy for men at the Q50 when no interest rate was applied. Agents at the Q75 would be not only able to pay back the full loan with grace period (with a taxpayer subsidy of 8.18% of the cost) but they would also be able to repay the amount in full with reasonable payment burdens if grace periods were eliminated, implying zero subsidies. Therefore, given our income estimates, individuals at the upper part of the earnings distribution would be perfectly able to face a reasonable loan repayment schedule with no subsidies from the government.

4. Ensuing calls: evolution of estimated repayment burdens and taxpayer subsidies

This section describes the effects, given our income estimates, of the actual reforms to the repayment conditions carried out after the First Call of the program.

4.1 Second call

In October 2008, the maturity of the loan contract was indeed extended to 20 years. However, the maximum amount of the loan was increased to 28,800 and the grace period was also extended to 5 years. If the individual annual taxable income did not surpass the limit of 22,000 after those 5 years, the debtor could request the postponement of the sixth annuity to the year 20, by adding up to the payment due in that year since loans were now to be totally repaid within 20 years. By the same logic, if the individual annual taxable income did not surpass the limit of 22,000 on the seventh year, the debtor could apply for the recognition of 5 additional years of deferment period (a total of 10 years including the grace period). In this case, the repayment initially due during the last 5 years was doubled. Loans continued to bear a 0% nominal interest rate.

Table 6
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2008-2009 CALL

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	Grace	Grace	Grace	Grace	Grace	Grace
4	Grace	Grace	Grace	Grace	Grace	Grace
5	Grace	Grace	Grace	Grace	Grace	Grace
6	Def	Def	6.70	Def	4.00	5.39
7	Def	Def	6.48	Def	3.91	5.23
8	Def	Def	6.28	Def	3.83	5.09
9	Def	Def	6.10	Def	3.75	4.95
10	Def	Def	5.93	Def	3.68	4.82
11	7.69	9.45	5.77	6.96	3.61	4.70
12	7.52	9.19	5.63	6.75	3.54	4.59
13	7.35	8.94	5.50	6.56	3.48	4.49
14	7.20	8.71	5.37	6.39	3.42	4.39
15	7.05	8.50	5.26	6.23	3.37	4.30

(Continued)

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
16	13.82	16.60	5.16	12.16	3.32	4.22
17	13.56	16.22	5.06	11.89	3.27	4.14
18	13.32	15.87	4.97	11.64	3.22	4.06
19	13.09	15.54	4.88	11.41	3.17	3.99
20	12.86	15.23	4.80	11.19	3.13	3.92

Legend: "Grace" stands for grace period, "Def" stands for deferment period due to earnings below threshold. All loans are totally repaid. Any additional year of deferment means one year of double repayment beginning on year 20th and up to the last 5 years of the loan.

Table 6 displays the repayment burdens of men and women in different percentiles according to the repayment conditions stated in the second call. According to our estimated incomes, both men and women in the 25th percentile use the maximum deferment period. Their repayments burdens are lower during the first five years of payment but become too large afterwards, reaching 21.61% by the 16th year for women in the 10th percentile. Men in the 50th percentile do not use the deferment, while women in that percentile still use the maximum deferment period of 5 years. Repayment burdens are however much more reasonable, reaching less than 13% by year 16 for women and going down from there. At higher percentiles, neither men nor women use deferment and repayment burdens range from 3.1 to 4% for men and 3.9 to 5.5% for women at Q75.

By making the loans being totally repaid, independently of income, the program managed to recover 50% of the amount lent to individuals in the lowest percentiles. Note that in spite of full repayment, the government or, more precisely, the taxpayer, still bore the cost from the grace period and the 0% nominal interest rate. The increase in maturity raised the cost of the loan of those individuals who were already repaying their loan in full and now had many more years to do the payments. The subsequent extra-cost to the government in terms of interest forgone, nearly double from the previous call at the highest quantiles. Lower income individuals who most needed to postpone payments enjoyed higher interest subsidies. This can be seen by comparing Table 4 and Table 7. Overall, the second call increased recovery by reducing the subsidy on lower incomes but, notably, also raised the subsidy on higher incomes.

Table 7
COST TO THE GOVERNMENT AS A PERCENTAGE OF PRINCIPAL PER QUANTILE.
2008-2009 CALL

Q25		Q50		Q75	
Men	Women	Men	Women	Men	Women
50.31	50.31	41.73	50.31	41.73	41.73

4.2. Third and Fourth Calls

In November 2009, the maturity of loans was reduced to 13 years (with 3 of grace). Unsurprisingly, repayment burdens went up and the taxpayer subsidy was reduced (see tables 8 and 9). For women in the 25th percentile, repayments due under the new conditions always exceed 16% of gross income and reach more than 26% by the 11th year. Both men and women in the 50th percentile use the deferment period, 1 and 3 years respectively. By year 13, they need to devote, correspondingly, 16.49% and 19.68% of gross income to repay the loan, according to our estimated incomes. At the 75th percentile, nobody uses the deferment period, women pay between 6.7% and 8.62% of their gross income, while men in the same percentile pay between 5.22 and 6.22% of their gross income from year 4 to year 13.

Table 8
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2009-2010 CALL

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	Grace	Grace	Grace	Grace	Grace	Grace
4	Def	Def	Def	Def	6.29	8.62
5	Def	Def	10.41	Def	6.14	8.35
6	Def	Def	10.05	Def	6.00	8.09
7	12.79	16.10	9.72	12.02	5.87	7.85
8	12.44	15.56	9.42	11.56	5.75	7.63
9	12.12	15.06	9.14	11.15	5.63	7.42
10	11.82	14.60	8.89	10.78	5.52	7.23
11	23.08	28.35	8.66	20.87	5.41	7.06
12	22.55	27.56	8.44	20.25	5.32	6.89
13	22.06	26.82	16.49	19.68	5.22	6.73

Legend: "Grace" stands for grace period, "Def" stands for deferment period due to earnings below threshold. All loans are totally repaid. Any additional year of deferment means one year of double repayment beginning on year 13th and up to the last 3 years of the loan.

Table 9
COST TO THE GOVERNMENT AS A PERCENTAGE OF PRINCIPAL PER QUANTILE,
2009-2010 CALL

Q25		Q50		Q75	
Men	Women	Men	Women	Men	Women
31.50	31.50	28.15	31.50	25.64	25.64

Finally, in December 2010, a positive nominal interest rate was introduced. Three different loan modalities were allowed depending on the duration of the Master program (60, 90 or 120 ECTS respectively). Loans to pursue a 60 ECTS Master program had a maturity of 6 years (2 of grace, 4 of redemption) and an average nominal interest rate of 2.736. Loans to pursue a 90 ECTS Master program had a maturity of 8 years (3 of grace, 5 of redemption) and a 2.983 average nominal interest rate. Finally, loans to pursue a 120 ECTS Master program lasted for 10 years (4 of grace, 6 of redemption) and had a 3.180 average nominal interest rate⁸.

Table 10
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2010-2011 CALL (6-YEAR)

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	20.67	26.94	16.08	20.66	9.23	12.77
4	20.00	25.82	15.45	19.63	9.00	12.33
5	19.39	24.80	14.89	18.72	8.79	11.94
6	18.82	23.88	14.37	17.91	8.58	11.57

Table 11
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2010-2011 CALL (8-YEAR)

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	Grace	Grace	Grace	Grace	Grace	Grace
4	30.11	38.87	23.27	29.55	13.55	18.57
5	29.19	37.34	22.41	28.19	13.23	17.97
6	28.33	35.94	21.63	26.97	12.92	17.41
7	27.53	34.67	20.92	25.88	12.64	16.90
8	26.79	33.50	20.28	24.89	12.37	16.43

Tables 10 to 12 display repayment burdens corresponding to the three different modalities of loan in the last call of the program. They are clearly too large, with the exception of men in the 75th percentile who pay, for the 6-year loan, around 9% of their gross income. In contrast, the estimated burden for women in the 25th percentile almost reaches 39% of gross income on year 4 under the 8-year loan going down to only 33.5% on the last year of repayment. Both the 6 and the 10-year loan impose a lower,

although still too high, burden, almost 27% to over 23% in the former case, over 31 to almost 27% in the latter. The burden is lower for men in the lowest percentile, but it still ranges between roughly 21 and 30%, with the 8-year loan still ranking worse in severity of repayment conditions. This is due to the fact that loan conditions are proportional to Master duration but the maximum amount that can be asked for is not. Moving from a 6 year to 8 year loan allows students to nearly double the principal of the loan that will be equal to the 10 year loan option. The logical counterpart of these severe conditions is that the cost of these loans to the taxpayer reaches a minimum among the options considered (Table 13). The 6-year loan costs only 10.51% of the principal to the taxpayer, while the 8 and 10 year loans cost respectively 16.88% and 23.54% of the principal. These recovery rates are equal across the income distribution, suggesting that there is room for welfare improvements through redistribution of the burden from individuals at the lowest percentiles to their counterparts in the higher end of the distribution. This can be seen by looking together at Tables 9 to 11.

Table 12
LOAN REPAYMENT BURDEN AS A PERCENTAGE OF EARNINGS PER QUANTILE,
2010-2011 CALL (10-YEAR)

Year	Q25		Q50		Q75	
	Men	Women	Men	Women	Men	Women
1	Grace	Grace	Grace	Grace	Grace	Grace
2	Grace	Grace	Grace	Grace	Grace	Grace
3	Grace	Grace	Grace	Grace	Grace	Grace
4	Grace	Grace	Grace	Grace	Grace	Grace
5	24.81	31.74	19.05	23.96	11.25	15.28
6	24.08	30.56	18.39	22.92	10.99	14.80
7	23.40	29.47	17.79	22.00	10.75	14.37
8	22.77	28.48	17.24	21.16	10.52	13.96
9	22.19	27.57	16.74	20.41	10.30	13.59
10	21.64	26.72	16.27	19.73	10.10	13.24

Legend: "Grace" stands for grace period. All loans are totally repaid.

Table 13
COST TO THE GOVERNMENT AS A PERCENTAGE OF PRINCIPAL. 2010-2011 CALL
AND 2013 AMMENDMENT

	2010 call		Amendment
6 years	10.51	10 years	20.47
8 years	16.88	13 years	27.33
10 years	23.54	16 years	34.25

A new call, with yet new conditions (a higher nominal interest rate, yet larger maturities) was published in December 2011, but in March 2012 the call was revoked and the program discontinued, allegedly due to lack of demand.

In 2013, an amendment to the conditions of loans issued in 2010 raised the grace periods and loan contract maturities. The increase in maturity by 4, 5 and 6 years respectively raised the taxpayer subsidy accordingly, but the (lower) recovery rate remained constant across the income distribution of graduates, affecting all individuals equally. The subsidy provided by the government in this call is very similar to the 2009-2010's but the burden imposed on students was much higher⁹. As we showed in sections 3.3 and 3.4, a loan with positive interest rate would establish reasonable repayments for people at the Q50 and Q75 with a minimum maturity of 20 years. In any case, individuals at Q25 would not be able to repay back the loan due to excessive burden.

To conclude, we have calculated the cost to the government of an alternative system that would simply apply *the 8 per cent rule*, *i.e.* the rule that identifies 8 per cent of gross income as *the* reasonable repayment burden. Table 14 reports our findings for different lengths of loan maturity. At Q75 the loan is repaid in full within 15 years. At Q50, it is paid in full within 20 years. Within 30 years, women at Q50 repay almost 97% of the amount borrowed and men at Q25 repay almost 60% of their loan. Note that unlike under the other schemes, with this rule subsidies concentrate where they are most needed. Moreover, this rule completely eliminates the cost of the program for the government (and, consequently, the taxpayer) at high quartiles.

Table 14
GOVERNMENT COST (%) WITH FIXED 8% REPAYMENT BURDEN

	Q25		Q50		Q75	
Government Cost (%)	Men	Women	Men	Women	Men	Women
Maturity of 15 years	100	100	25.7	76.5	0	0
Maturity of 20 years	81,5	100	0	49.2	0	0
Maturity of 30 years	42	73.9	0	3.3	0	0

5. Concluding remarks

The debate over the convenience of using student loans to fund higher education in Spain is not over. In times of austerity and in the presence of other social programs, deserving perhaps higher priority, one needs to acknowledge the advantages of an instrument that allows the recovery and reinvestment of part of the spent resources. It is however extremely important that loans do not impose an excessive burden on graduates. The program *Préstamos Renta Universidad* provided Master's students in Spain with loans to pay university fees and a monthly payment for living expenses along the duration of the Master program. As we have seen, only the first call did not impose excessive burdens on some individuals. The

counterpart of this fact is that, according to earnings estimates based on 2008 data, the Program was in fact a subsidy for low earners, with the cost to the government ranging from 100% at the 25th percentile to slightly over 22% at the 75th percentile. This 22% would be the cost to the government even if all borrowers repaid the loan in full due to the interest subsidy and the grace period.

We have explored modifications to this call's conditions in order to reduce taxpayer subsidies while maintaining low repayment burdens. In doing so, we take into account recommendations based on the experience of other countries. The possibility of substituting grace by deferment periods, charge interest on repayments and reduce monthly repayments by increasing maturity and lowering instalments have been analysed. Our calculations suggest that subsequent calls of the program could have improved recovery while maintaining repayment burdens.

Starting with the second call (2008-2009) conditions were designed to guarantee full repayment of the loan at 0% nominal interest rate. Yet, since the maturity was increased to 20 years, the interest subsidy implied that, again, the cost to the government ranged between 40 and 50% of the principal lent. This second call imposed burdens higher than 12% for men and 15% for women on the 25th percentile of the earnings distribution. At the 75th percentile, repayment burdens were however too small, even lower than under the conditions implied by the first call. The second call was therefore too tough on low earners and mild for high earners while still imposing a heavy burden to the taxpayer. Further attempts to reduce tax subsidies managed to reduce them at the cost of increasing the repayment burden of low earners to unbearable levels, reaching almost 39% of estimated gross earnings for women in the 25th percentile repaying the 8 year loan under the 2010-11 call (fourth year).

We can thus say that only the first call provided some sort of progressive transfer to graduates. The tax subsidy ranged from 100% in the lowest percentiles to 22.64% in the top of the distribution. In contrast, subsequent calls reduced the taxpayer subsidy but at the same time distributed the burden equally across the income distribution, imposing an excessive burden on the lowest percentiles.

New proposals for student loans in Spain should rely on conclusions drawn from experience at international level. A good loan program should bear no general interest subsidies or grace periods. In contrast, repayment conditions should be eased only for those in need. Also, repayment periods should be long enough to provide a sufficient investment recovery rate to the government, hence limiting unnecessary taxpayer subsidies. As we have seen, a simple application of the 8-percent-rule may yield quite positive results.

Notes

1. We thank Nicholas Barr for pointing to this double sense in which repayments typically depend on income.
2. We assume that the terms of the agreement are respected. As will be made clearer later, this and other assumptions imply that our estimates of taxpayer subsidies constitute a lower bound for government cost.
3. As we mentioned before, these and other assumptions imply that our results represent a lower bound both on payment burdens and government cost. Self-employed excluded due to underreporting.
4. Age-income profiles have not been adjusted to capture productivity growth. Salaries in Spain have been stable in the period 2007-2014 and they are not expected to grow in the near future.
5. The description of the conditions in the successive calls, summarized here, can be found in the following B.O.E (Official Diary): June 13 2007, October 15 2008, November 19 2009, December 18 2010, and December 27 2013.
6. For annual taxable income we take annual gross income net of social security expenses and employment income tax deductions.
7. Recall that under the first call conditions the debt extinguished 15 years after its formalization.
8. These interest rates are the average of the annual interest rates quoted every two weeks for each loan modality by ICO (Instituto de Crédito Oficial).

References

- Amuedo-Dorantes, C. and de la Rica, S. (2006), "The Role of Segregation and Pay Structure on the Gender Wage Gap: Evidence from Matched Employer-Employee Data for Spain", *The B.E. Journal of Economic Analysis & Policy*, 5(1): 1538-0645.
- Avery, C. and Turner, S. (2012), "Student loans: do college students borrow too much-or not enough?", *Journal of Economic Perspectives*, 26(1): 165-192.
- Baum, S. and Schwartz, S. (2006), *How Much Debt Is Too Much? Defining Benchmarks for Manageable Student Debt*, New York: The College Board.
- Bover, O. (2011), "The Spanish Survey of Household Finances (EFF): Description and Methods of the 2008 wave", *Documentos Ocasionales*, 1103, Bank of Spain.
- Budría, S. and Moro-Egido, A. I. (2008), "Education, educational mismatch, and wage inequality: Evidence for Spain", *Economics of Education Review*, 2: 332-341.
- Chapman, B. (2014), "Income Contingent Loans: Background", Chapter 1, in Chapman, B., Higgins, T., & Stiglitz, J. E. (Eds.), *Income Contingent Loans: Theory, Practice and Prospects*, Palgrave Macmillan.
- Chapman, B. and Lounkaew, K. (2010), "Income Contingent Student Loans for Thailand: Alternatives Compared", *Economics of Education Review*, 29 (5): 695-709.
- Chapman, B. and Sinning, M. (2012), "Student Loan Reforms for German Higher Education: Financing Tuition Fees", *Education Economics*, 22: 569-588.
- Chapman, B. and Lounkaew, K. (2014), "An Analysis of Stafford Loan Repayment Burdens", *Mimeo*, Crawford School of Public Policy, Australian National University.

- Courtioux, P., Gregoir, S. and Houeto, D. (2014), “Modelling the distribution of returns on higher education: A microsimulation approach”, *Economic Modelling*, 38: 328-340.
- Dynarsky, S. and Kreisman, D. (2013), “Loans for Educational Opportunity: Making Borrowing Work for Today’s Students”, The Hamilton Project, Brookings. *Discussion Paper 2013-05*.
- Firpo, S., Fortin, N. M. and Lemieux, T. (2009). “Unconditional quantile regressions”, *Econometrica*, 77: 953-973.
- Johnston, A. and Barr, N. (2013), “Student loan reform, interest subsidies and costly technicalities: lessons from the UK experience”, *Journal of Higher Education Policy and Management*, 35(2): 167-178.
- Martins, P. S. and Pereira, P. T. (2004), “Does education reduce wage inequality? Quantile regression evidence from 16 countries”, *Labour Economics*, 11(3): 355-371.
- Salmi, J. (2003), “Student loans in an international perspective: The World Bank experience”, LAC Human & Social Development Group, World Bank, *Report 27295*.

Resumen

Estudiamos el programa Prestamos Renta Universidad vigente entre 2007 y 2010. Estimamos funciones de ingresos previstos y calculamos la carga financiera individual y el coste para el gobierno mediante el análisis de regresión cuantil incondicional. Aprovechamos las condiciones cambiantes de las convocatorias posteriores para ilustrar tres lecciones importantes para el diseño de esquemas de préstamos a estudiantes: los pagos mensuales fijos ejercen una carga excesiva a los graduados con menos ingresos; las bonificaciones generales de intereses son costosas para el contribuyente e injustas desde el punto de vista distributivo; mientras que el aplazamiento de los pagos en casos de penuria protege a personas de bajos ingresos, los períodos de gracia generales son costosos y poco equitativos.

Palabras clave: Financiación de la educación, préstamos a estudiantes, carga financiera.

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