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Getting Student Loans Right in Japan: Problems and Possible Solutions

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Abstract

In this paper we take a detailed look at the Japanese university graduate labor market to understand more fully the problems with the current Japanese student loan system identified in Kobayashi and Armstrong (2017). We see that unlike most other countries with a large proportion of female university graduates, Japanese female graduates earn significantly less than male university graduates and this appears to be driven by significant wage falls when female graduates marry or have their first child. This means that understanding the repayment burden problems of the current student loan system and designing alternative income contingent loan systems needs to take into account the *household* income of graduates. We show that an affordable income contingent loan (ICL) system could be introduced in Japan, however the repayments would probably have to be based on household income. We illustrate this with a couple of example ICLs and highlight further work that needs to be done to come up with a feasible and fair student loan system in Japan for post high school education.

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1. Introduction

Kobayashi and Armstrong (2017) give an extensive overview of current problems with the Japanese Higher Education finance system as well as outlining recent reforms including the recent introduction of a small-scale income contingent style loan.

At the same time in Japan, there is evidence that the labor market for Japanese graduates is changing. Increasingly, more university graduates are entering non-standard employment, or employment with relatively low wages. Traditionally Japanese university students have relied on parents to fund their university education but prolonged tight economic conditions have impacted on the ability of parents to pay and in recent years the number of students taking out JASSO student loans has been increasing rapidly. However, with increasing numbers of graduates accessing non-standard employment and the longstanding low wages of female graduates in the bottom half of the earnings distribution, this necessarily means that an increasing number of graduates (and their families) are facing student loan repayment hardship. There is also qualitative evidence suggesting that the cost of funding the education of children is impacting on fertility decisions.

In this paper, we use Japanese micro data to look in detail at the problems identified by Kobayashi and Armstrong (2017) with the current loan system and outline possible approaches to solving these problems using a universally available income contingent loan (ICL).

Our analysis shows that Japan is very different from other countries that have introduced ICLs: simply borrowing an ICL scheme from these countries is unlikely to work. This is mainly because historically, female Japanese graduates have comparatively low earnings compared to male graduates once they get married or have children. This is very different to countries like Australia and the UK where the gender differences in the wages of graduates are much less marked even after marriage or having a child. Whilst our analysis suggests that this is changing for younger cohorts, Japanese cultural and economic factors mean this is likely to be a feature of the graduate labor market for the foreseeable future. Hence a sustainable ICL system will need to take this into account.

This also means that traditional RB analysis needs to be carefully interpreted in the Japanese context to get a full and nuanced picture of the current problems with the Japanese loan system. It is also essential to keep in mind when considering ways to design a robust and affordable student loan system going forward, including a universal and sustainable ICL system advocated by Kobayashi and Armstrong (2017) and Armstrong, Chapman and Dearden (2017).

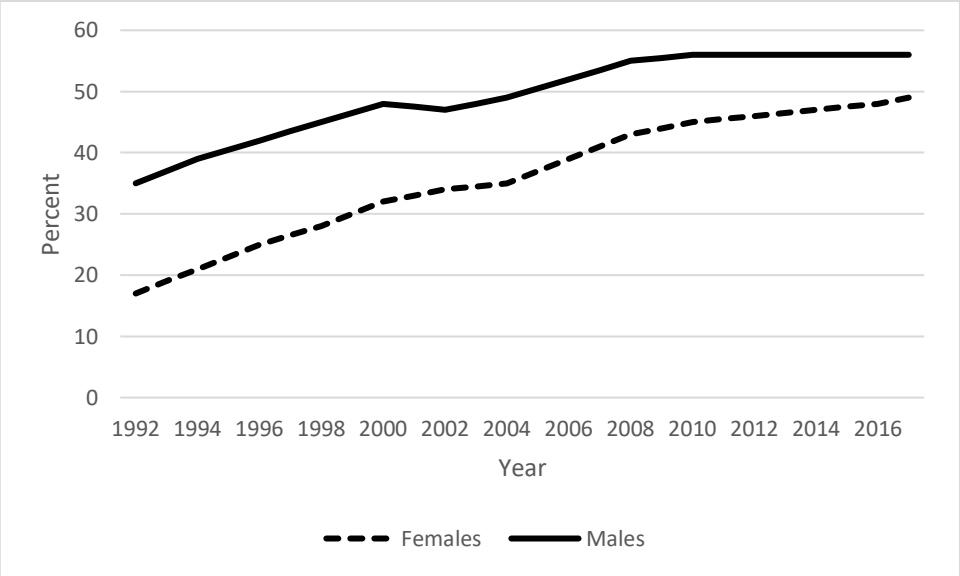
In section 2 we look at recent trends in the Japanese graduate labor market and estimate age earning profiles by percentile for Japanese graduates by gender as well as by marriage unit to highlight the interesting features of the Japanese graduate labor market. In section 3 we show the typical repayment burdens associated with the current JASSO loan system which clearly illustrates why default rates have been increasing in Japan in recent times. In section 4 we look at the stylized implications of different types of ICL loan design for Japan and show why a household based system is probably needed to ensure sustainability and fairness for the foreseeable future and in section 5 we conclude and highlight what further work needs to be done to design an affordable and universally available ICL student loan system in Japan.

2. The graduate labor market and graduate earnings in Japan

The percentage of high school graduates entering four year university (what we will term BA graduates in this paper) has been rising steadily since the early 1990s as illustrated in Figure 1. Figure 1 shows that the percentage of high school graduates entering four year university is on a rise, both for males and females. Females typically in the past went to two year junior

college for post secondary education, but when the labor market for two year college graduates stagnated, demand for two year college declined. Today, the proportion of women undertaking four year BA degrees is at a historical high. Figure 1 also clearly illustrates the narrowing of the gender gap in university enrolment over the period. This expansion has no doubt been due to both the increase in provision of four year university facilities as well as the expansion of loans available through JASSO to university students (see Kobayashi Armstrong (2017)).

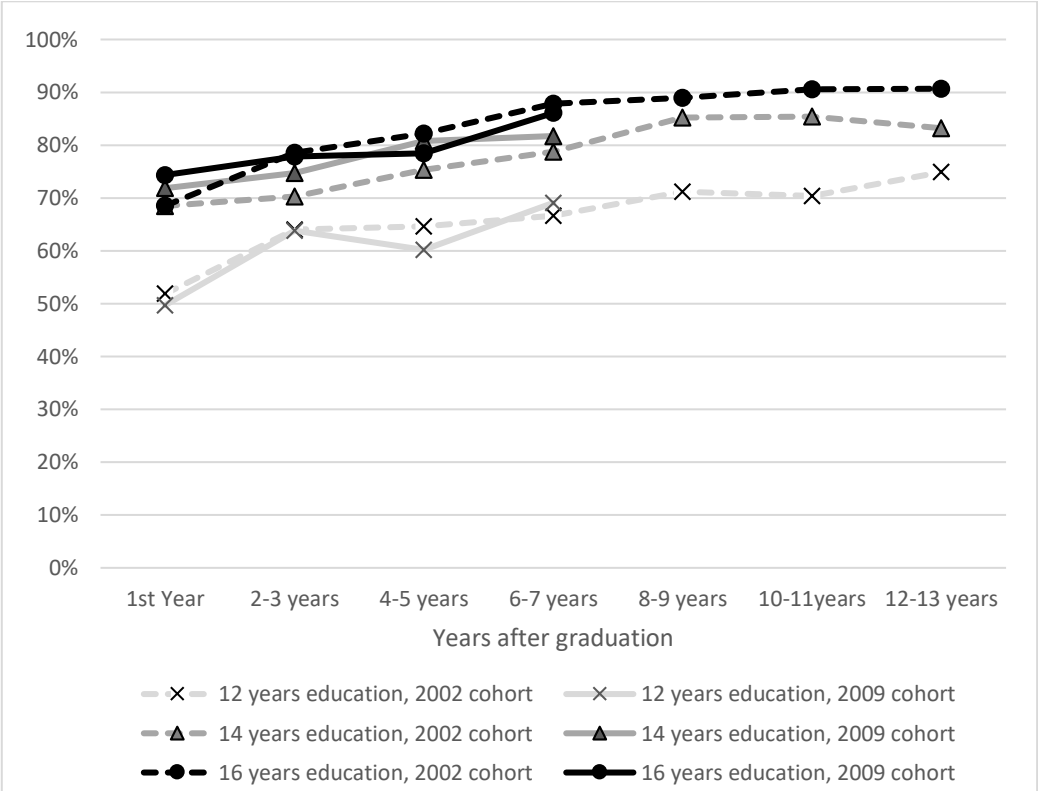
Figure 1: Four year BA degree enrolment by gender (percent)



Source: Ministry of Education, Culture, Sports, Science and Technology Japan (MEXT) School Basic Survey (*Gakko Kihon Chosa*)

Figures 2 and 3 shows that males on average, have a higher probability of getting regular full-time employment, *seishain*, once they have graduated from university or school. For males, the ratio of *seishain* is around 50 percent for high school graduate one year after graduation whilst for university graduates in 2002 and it was 69 percent and for graduates in 2009 it was 74 percent. Further this proportion continues to rise every year after graduation with around 90 percent of male university graduates in *seishan* jobs 10 years after graduation.

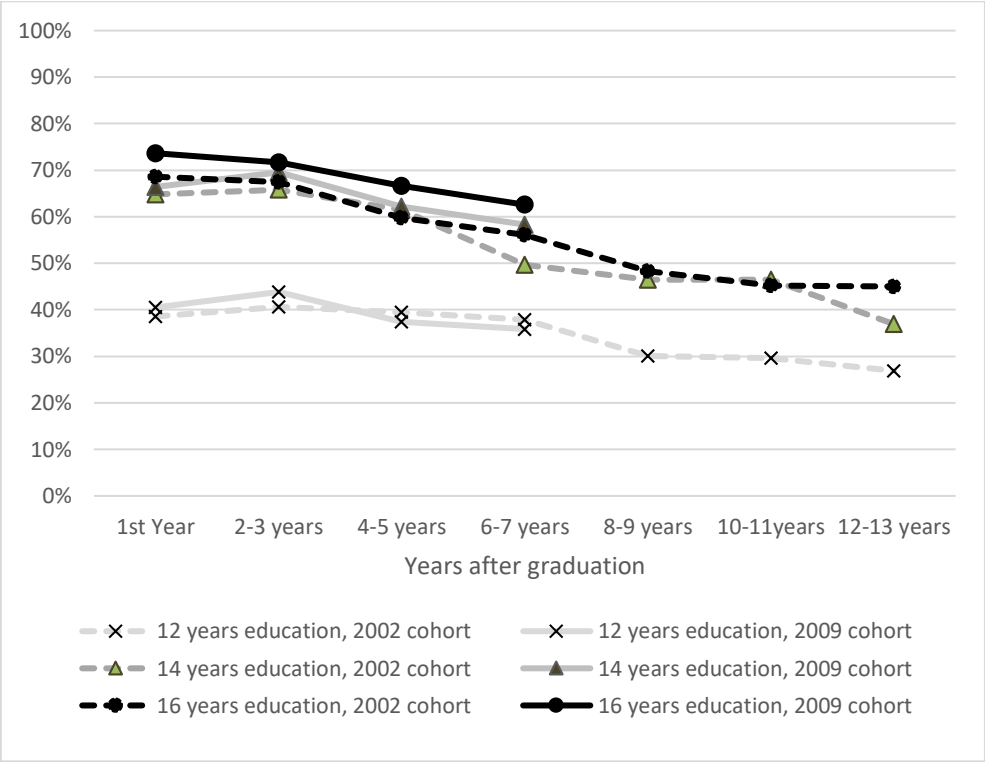
Figure 2: Percentage of Male *Seishain* by education group and years after graduation: Graduates of 2002 and 2009



Source: Source: Nagase (2017a) using Labor Force Survey (LFS) data.

On the other hand, from Figure 3 we seen that whilst female university graduates have a higher percentage of *seishain* (70 percent) compared to female high school graduates (40 percent), the percentage of *seishain* for all groups including university graduates declines steadily every year after graduation. Whilst there has been an increase by around 5 to 7 percentage points in the proportion of *seishain* by age between the 2002 and 2009 cohort of female university graduates, 12 years from graduation only 45 percent remain in *seishain*. This reduction is generally associated with marriage and/or having a child (see Nagase (2017a) and Nagase(2018)).

Figure 3: Percentage of Female *Seishain* by education group and years after graduation: Graduates of 2002 and 2009



Source: Nagase (2017a) using Labor Force Survey (LFS) data.

For analyzing and designing student loan systems, it is important to see what implications these labor market features have for the distribution of graduate earnings. To look at this we use two Japanese data sources. The first is publicly available Japanese cross-sectional data from the Japanese General Social Surveys (JGSS). The second is Japanese Labor Force Survey (LFS) data. JGSS surveys have been held in 2000, 2001, 2002, 2003, 2005, 2006, 2008, 2010 and 2012 and include data on education level, income and earnings of the main respondent as well as household members including their spouse if married. We use data from all but the 2000 survey in our work to ensure sufficiently large graduate sample sizes. Our LFS sample is taken from the monthly data of the 2015, 2016 and 2017 surveys. In both samples, we restrict our sample to BA graduates or those with higher university qualifications aged between 23 and 65. We also include in our sample individuals whose spouse has a BA or higher qualification (for our household analysis). Hence our two sources of income estimate earnings profiles for graduates approximately 10 years apart on average. To compare our two survey samples we put all earnings into 2016 prices using the Japanese consumer price index (CPI).

If we limit ourselves to those main respondents in the JGSS who have BA degrees we have a sample of 5243 individuals who approximately 2/3 are male (3,463). Most of our empirical analysis employs data from the repeated monthly cross-section of the Japanese Labor Force Survey (LFS). This data was obtained from the Statistics Office for the period January 2015 to May 2017. The LFS is a nationally representative survey conducted every month that covers about 40,000 households and about 100,000 individuals over the age of 15. It is a rotating panel and households are surveyed four times in the same months in two successive years. From January 2002, the survey began to collect data on the fourth and last visit to households using a longer questionnaire which asked not only about labor force status, but also about educational attainment, tenure, and annual income in the previous year for all relevant individuals in the household. Data from this longer questionnaire is used in this analysis. We limit our sample to those who graduated from university or post-graduate study, who are aged between 23[1] and 65 and who undertook their 4th interview in the LFS between from January 2015 until May 2017. This leaves us with a sample of 53459 males (of whom 5467 are post-graduates) and 29137 females (of whom 1656 are post-graduates).

As stated earlier, in designing student loan systems and for understanding the repayment burdens associated with student loans it is important not only to know average graduate earnings but graduate earnings across the entire earnings distribution. One problem with both the JGSS and LFS earnings data is that it is banded into income groups rather recording the actual level. This makes estimating income profiles across the earnings distribution more complicated. Following Dearden (2017) we get around this by using interval regression and the rich covariates contained in the JGSS and LFS to estimate continuous earnings measures within each income band.[2]

We then estimate calculate the raw percentile earnings by age and smooth these profiles using flexible polynomials in age following Dearden (2017). The estimated earnings profiles for

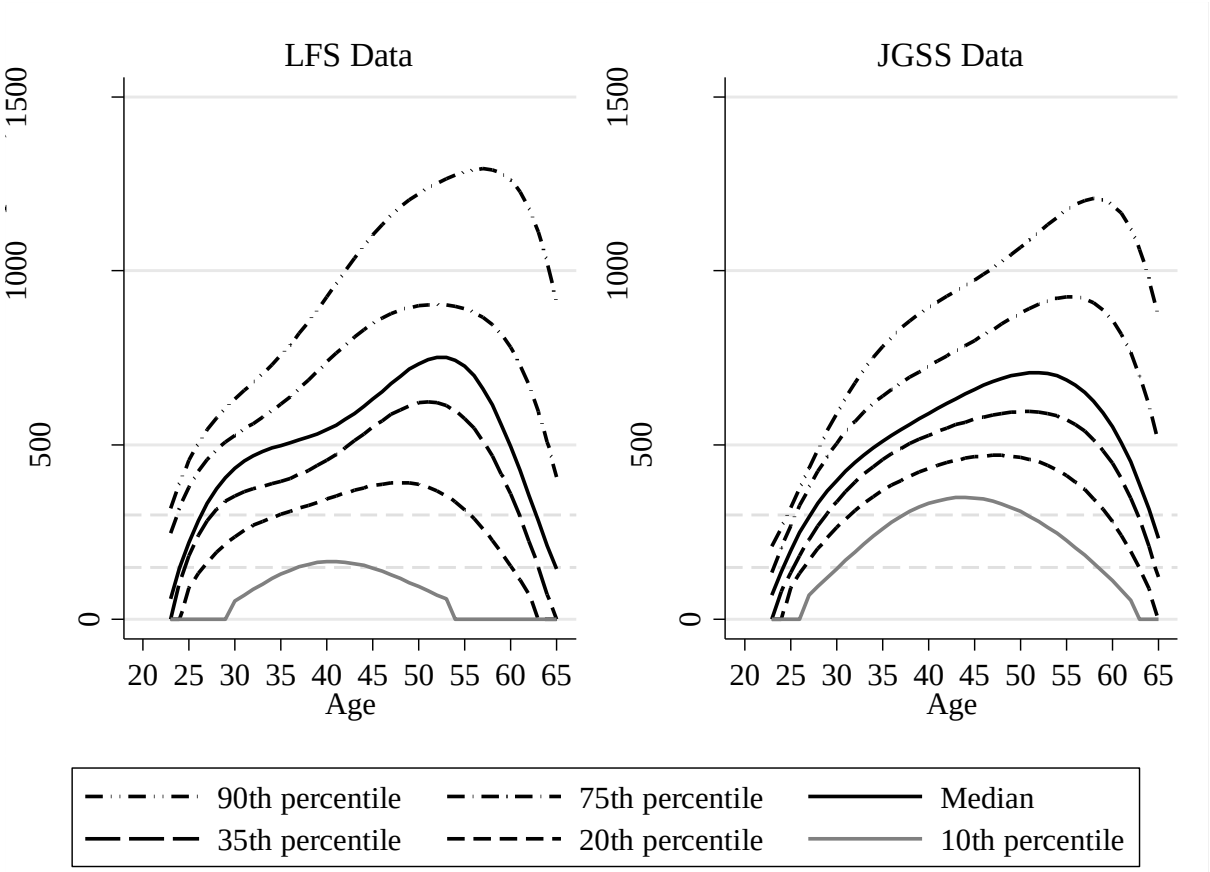
[1] In both our JGSS samples and LFS samples we merge any 22 year old BA graduates with our 23 year old graduates as the number of 22 year olds is relatively small.

[2] The JGSS data has 20 income bands whereas the LFS data has only 10 income bands. Our explanatory variables included tenure, hours of work, age, firms size dummy variables, marital status, dummy variables for age of children in households, number of children in the household, dummy variables identifying type of employment, as well as detailed industry and occupation dummy variables. Full details are available from the authors.

BA male graduates using both the JGSS and LFS data are shown in Figure 4 and the corresponding estimates for females are shown in Figure 5.

From Figure 4 we see the estimated quantile earnings profiles are reassuringly similar when we use the JGSS and LFS data. The only marked differences are for men on low income (the 10th centile of the BA earnings distribution) where the LFS shows significantly lower earnings. This simply could reflect the fact that the data is taken from different years (the LFS is a more contemporaneous cohort) or measurement error in one or both surveys or a combination of both.[3] There are also some differences at the 90th centile, but Dearden (2017) showed that the interval regression method used for turning banded earnings into a continuous measure is not as reliable for high incomes.

Figure 4: Quantile estimates of Male BA graduate earnings: LFS and JGSS data



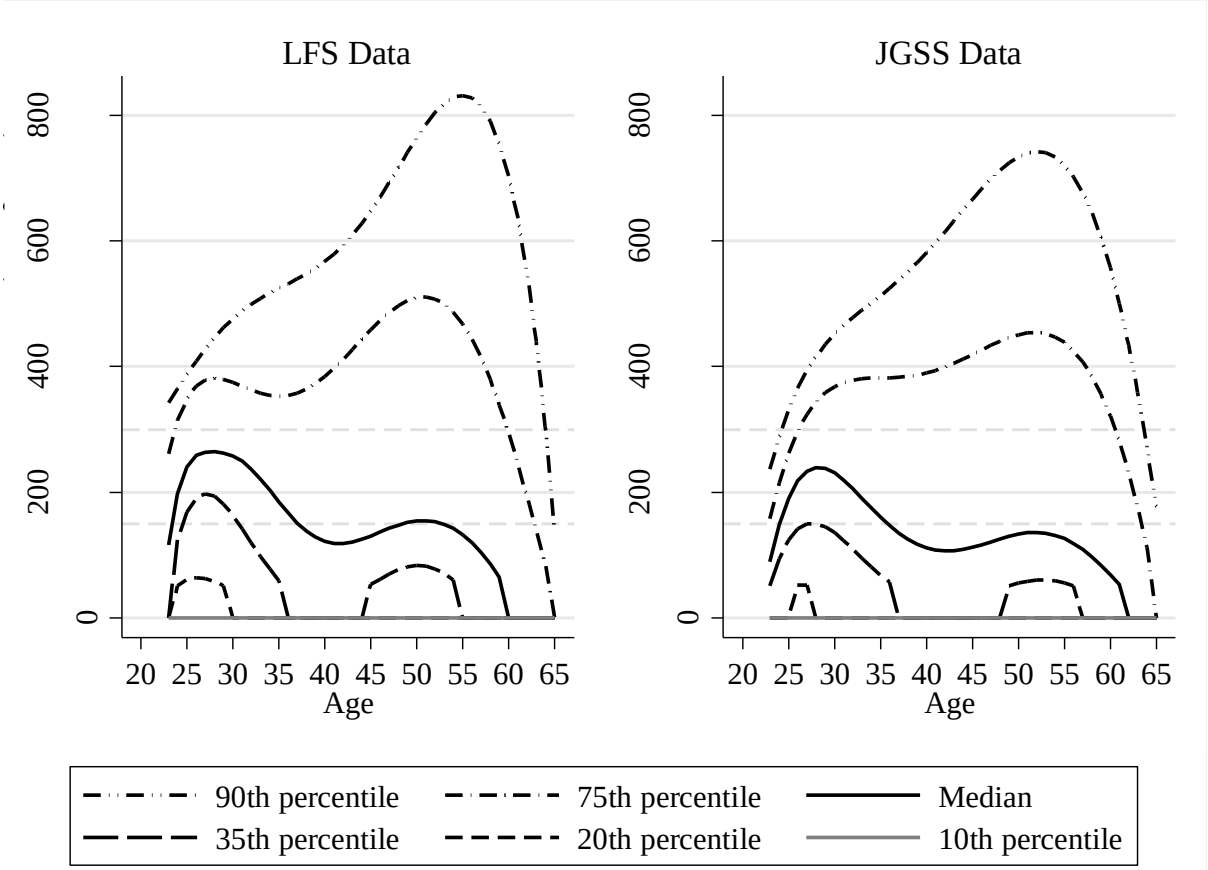
[3] Male earnings in Japan have been declining since 1997, with some upturn after so called 'Abenomics' (the economic reforms of Prime Minister Abe) since 2013. The difference may reflect a real reduction in the bottom 10 percent of male earnings over this period. It could also reflect differences in response rates in the two surveys. Response rates in the LFS are higher than those in the JGSS and this may mean coverage of low earners Is better in the LFS.

In our analysis we concentrate on the LFS sample as it is more recent and involves larger sample sizes. It suggests that median earning four year university educated males are earning around 5 million yen by the age of 35 and this rises to about 7.5 million by the age of 55. Males in the bottom 10th percentile never earn above 1.5 million yen per year. Those in the 20th percentile of the earnings distribution earn about half of median earnings whereas those in the 90th percentile earn between 50-75 per cent more than median earnings throughout most of their working life. The variance in graduate earnings increases up until about the age of 55 before narrowing in the run up to retirement. This is typical of most male earning profiles seen in other countries and featured in this special issue of the EER.

In Figure 5 we see the corresponding estimates for females. This shows a very different picture compared to males and compared to females in other countries. Typical age earning profiles are only seen for women in the top quarter of the earnings distribution. Median earning women never earn above 3 million yen per annum. It appears that the situation is improving slightly for the slightly younger cohort covered in the LFS data[4] but the increase in earnings is modest in all parts of the earnings distribution.

[4] Nagase (2018) shows that the proportion of female university graduate continuing their *seishain* job after their first childbirth has increased since 2013.

Figure 5: Quantile estimates of Female BA graduate earnings: LFS and JGSS data



In Figures 6 to 8 we instead use LFS data look at *household income* of BA graduates where we include the income of the BA graduates' spouse if they are married. This is important point to consider when we are considering the repayment burdens of the current JASSO system or when designing a possible ICL systems as it is clear from Nagase (2017b) that there are institutional reasons why a significant proportion of female BA graduates earn very little. She shows that a significant portion of women quit work once they have a child, and firm hiring policies often penalize workers who leave the labor market and re-enter during middle age (predominantly mothers returning to work). A large proportion of firms pay spouse allowance for long term employees who have dependent housewives, and this allowance is often taken away when spousal earnings exceed tax threshold. This practice is changing but has obvious disincentives for women working. In addition, the Japanese social security system has protection for housewives who are exempted from social security tax but are given rather generous coverage for basic pension, health and old age insurance so long as their income is below 1.3 million yen a year. These tax and social security regimes coupled with spouse allowance mean many married women earn just below these tax and social

security thresholds. This bunching is very clear in the LFS data. There is currently a lot of policy debate in this area in Japan, especially given demographic changes which has seen a rapid decline in the working age population, but at the moment this is the context in which student loans systems need to work.

To explore these issues more fully, we split our sample into 5 groups. Single male BA graduates, single female BA graduates, Female BA graduates married to non-BA graduates, Male BA graduates married to non-BA graduates and finally BA graduates who are married to each other. We show the age earning profiles of these 5 groups by age of BA graduate. With our final group we show the age earnings profiles based on the male BA graduate age and the female BA graduate age. For our married profiles we start at age 25 due to the relatively low number of BA graduates married at ages 23 and 24.

Figure 6 shows the distribution of earnings by gender for single BA graduates by age for different percentiles of the earnings distribution.

Figure 6: Quantile estimates of single BA graduate earnings: LFS data

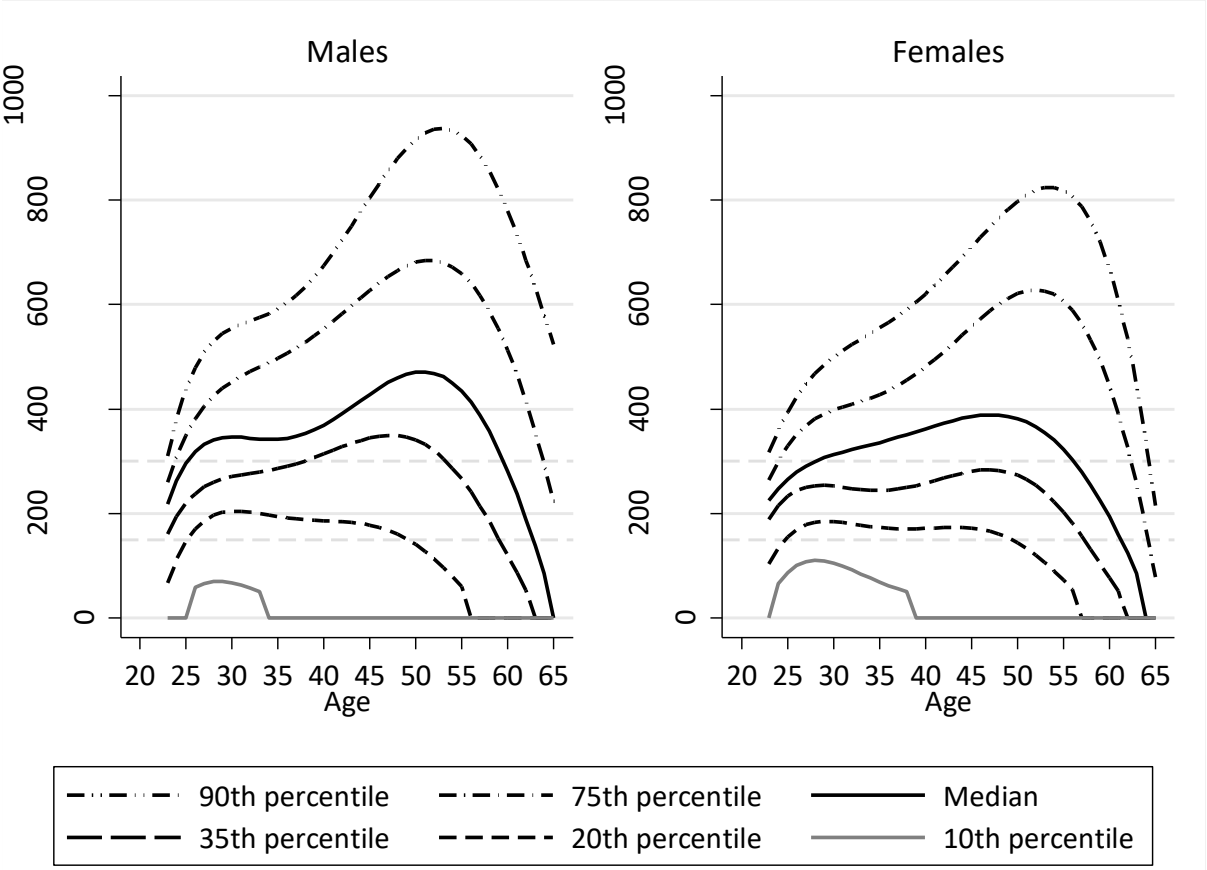
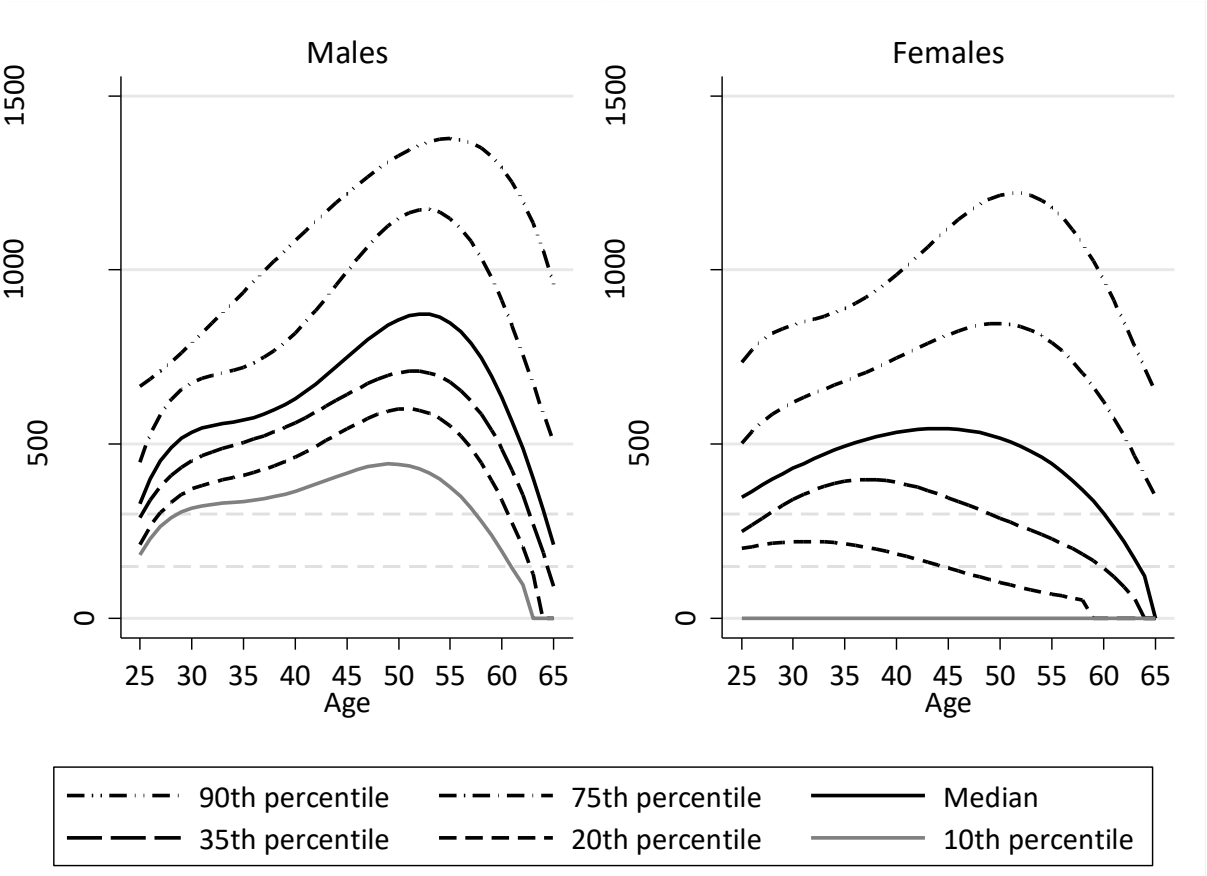


Figure 6 shows that when we limit the sample to non-married males and females, the BA gender wage gap narrows substantially and is the profiles and gender wage gap is similar to the gender gaps seen in other countries. At the bottom of the income distribution there is very little difference between men and women, and median earnings only significantly differ from the age of 40. This could be a cohort rather than an age effect. It is only single BA graduates in the bottom of the earnings distribution that will face potential hardship from repaying student loans. This is explored further in the next section.

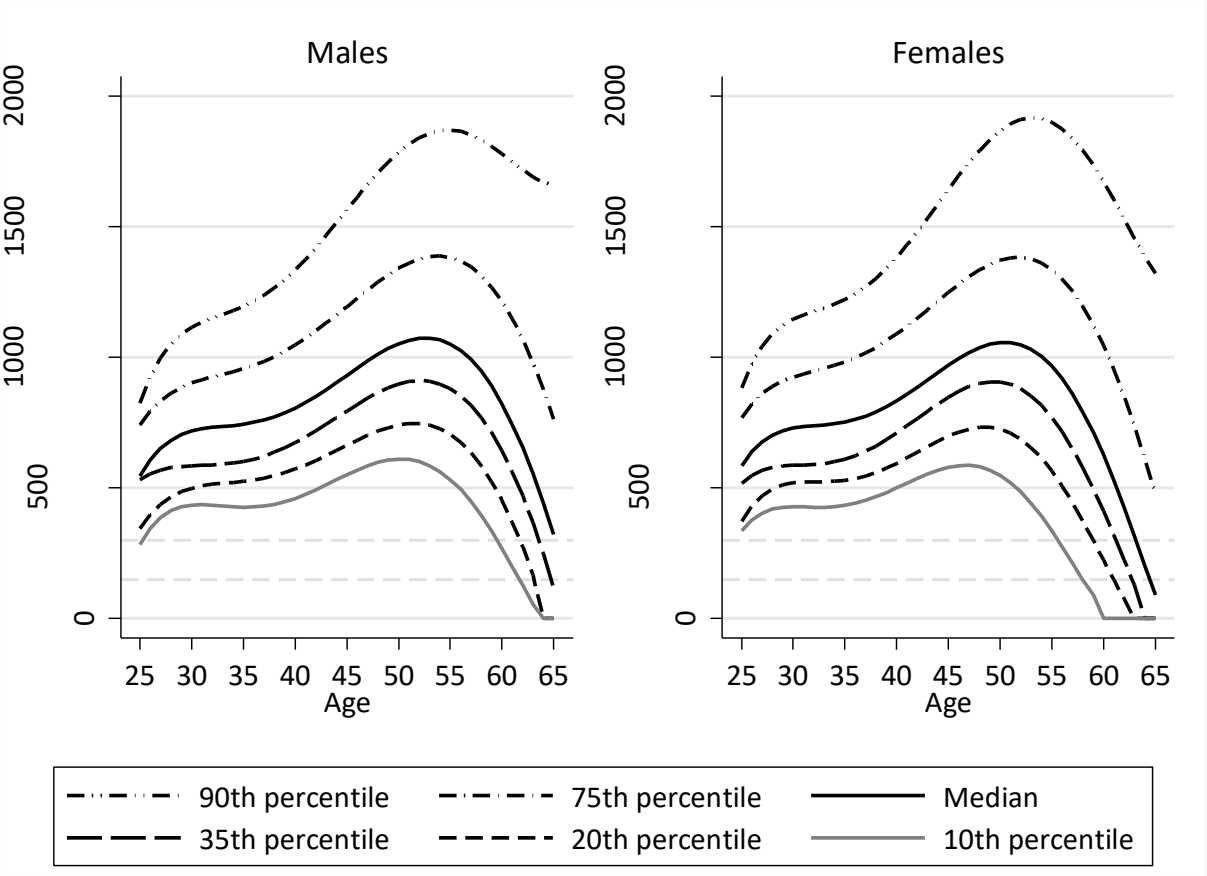
Next we look at the household income of BA graduates who are married to non-BA graduates by gender. This is shown in Figure 7.

Figure 7: Quantile estimates of household earnings of BA graduates married to non-BA graduates: LFS data



We see that for this group, there are differences by gender, though not as marked as when we only considered individual income of BA graduates. The profiles suggest that BA women married to non-BA graduates whose household is below the 20th centile per cent of the earnings distribution will face financial hardship in repaying student loans and this will not be nearly so severe for males married to non-BA females even in the 10th centile of the household earnings distribution. Finally we look at BA male graduates married to BA female graduates and this is shown in Figure 8. We see that the earnings profiles for this group, whether we do it by male BA age or female BA age is significantly higher than for our other groups and even couples in the 10th centile of the earnings distribution earn over 3 million yen per year until their late 50s. Of course, these couples could have two loans which would impact on the repayment burden but even this would only be problematic for a relatively small minority of such couples.

Figure 8: Quantile estimates of household earnings of BA graduates married to BA graduates: LFS data



3. Repayment burdens for Japanese student loans

Currently BA students in Japan are able to take out Type 1 (based on merit and need) and/or a Type 2 JASSO loan (based on need which has been gradually relaxed to include middle income families) as is outlined in Kobayashi and Armstrong (2017). Type 1 loans are interest free whilst Type 2 loans attract modest interest after university (currently 0.18 percent).

The repayment schedules for the different loans are shown in Table 2 of Kobayashi and Armstrong (2017) and the loan repayment length varies between 14 and 18 years for Type 1 loans and 13 to 20 for the more common Type 2 loans.

We concentrate on individuals or households in the bottom 20th centile of the earnings distribution and look at the repayment burdens associated with a Type 1 Jasso loan of 51,000 yen per month (the amount for an away from home individual at a national or local public university) and a Type 2 Jasso loan of 80,000 yen per month (a relatively high Type 2 loan).

The repayment schedule for these two loans are given in Table 2 of Kobayashi and Armstrong (2017). The type 1 loans involves a monthly repayment of 13,600 per month over 15 years whereas the type 2 loan we are examining involves a monthly repayment of 16,270 yen per month over 20 years at current interest rates.[5]

The repayment burdens for individuals and by household type are shown in Table 1 for BA males in the 20th centile of the earnings distribution and Table 2 for females in the 20th centile of the earnings distribution. We do not include married couples at ages 23 or 24 due to small sample sizes. We can see from Table 1, that for males in the 20th centile of the various earnings distributions, repayment burdens can be as high as 33.1 percent but are particularly high for male graduates who are not married and hover at around 10 percent from the age of 27 for the larger loan and 8 percent for the lower loan having peaked at between 24 to 29 percent at age 23. At young ages, most men are not married, so this is a particular concern.

Table 1: Repayment burdens (%) for Males BA graduates in the bottom 20th percentile of earnings distribution by different household types

Age	All Males own Income only		Household Income not married		Household income married to non-BA graduate		Household income married to BA graduate	
	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan
23	27.7	33.1	24.2	28.9				
24	13.8	16.5	14.5	17.3				
25	9.9	11.8	11.1	13.3	7.7	9.2	4.7	5.7
26	8.1	9.7	9.6	11.5	6.2	7.4	4.1	4.9
27	7.1	8.5	8.7	10.5	5.4	6.4	3.7	4.5
28	6.5	7.8	8.3	9.9	4.9	5.9	3.5	4.2
29	6.1	7.3	8.1	9.6	4.6	5.5	3.4	4.0
30	5.9	7.0	8.0	9.5	4.4	5.3	3.3	3.9
31	5.7	6.8	8.0	9.5	4.3	5.1	3.2	3.8
32	5.5	6.6	8.0	9.6	4.2	5.0	3.2	3.8
33	5.4	6.4	8.2	9.8	4.1	4.9	3.2	3.8
34	5.3	6.3	8.3	9.9	4.0	4.8	3.1	3.7
35	5.1	6.1	8.4	10.0	4.0	4.7	3.1	3.7
36	5.0	6.0	8.5	10.2	3.9	4.7	3.1	3.7
37	4.9	5.8	8.6	10.3	3.8	4.6	3.0	3.6
38		5.7		10.4		4.5		3.6
39		5.5		10.4		4.3		3.5
40		5.3		10.5		4.2		3.4
41		5.1		10.5		4.1		3.3

[5] Currently the interest rate on a Type 2 loan is 0.18% and the maximum that can be charged is 3%.

42		5.0		10.6		4.0		3.2

For women the problem seems much more extreme if we just base the RBs on a women's own income, but if we take into account the income of their spouse, women who are not married and in low earning jobs or those who marry non-BA spouses with low earnings face particular hardship. Again the majority of females are not married at young ages. This is not true for women who marry relatively low earning BA graduates, but the proportion of women who fall into this group is relatively low for women aged in the early or mid 20s.

Table 2: Repayment burdens (%) for Females BA graduates in the bottom 20th percentile of earnings distribution by different household types

Age	All Females own Income only		Household Income not married		Household income married to non-BA graduate		Household income married to BA graduate	
	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan	Type 1 Loan	Type 2 Loan
23	12.1	14.5	15.8	18.9				
24	12.2	14.6	12.2	14.6				
25	12.8	15.3	10.5	12.6	8.1	9.7	4.4	5.3
26	13.9	16.6	9.6	11.5	7.9	9.4	3.8	4.5
27	15.5	18.6	9.2	10.9	7.7	9.2	3.5	4.1
28	18.0	21.5	8.9	10.7	7.6	9.1	3.3	3.9
29	21.5	25.8	8.8	10.6	7.5	8.9	3.2	3.8
30	26.9	32.2	8.8	10.6	7.4	8.9	3.1	3.8
31	∞	∞	8.9	10.7	7.4	8.8	3.1	3.7
32	∞	∞	9.0	10.8	7.4	8.8	3.1	3.7
33	∞	∞	9.2	11.0	7.4	8.9	3.1	3.7
34	∞	∞	9.3	11.1	7.5	9.0	3.1	3.7
35	∞	∞	9.4	11.3	7.6	9.1	3.1	3.7
36	∞	∞	9.5	11.4	7.8	9.3	3.0	3.6
37	∞	∞	9.5	11.4	8.0	9.5	3.0	3.6
38		∞		11.4		9.8		3.5
39		∞		11.4		10.1		3.4
40		∞		11.4		10.5		3.3
41		∞		11.3		11.0		3.2
42		∞		11.3		11.5		3.1

In calculating there RBs, we have ignored the fact that JASSO loans since 2014 allow up to 10 year's forgiveness in repaying a JASSO loan for those on low income (see Kobayashi and

Armstrong (2017)). This deferral, however, is not automatic and has quite low take-up although the numbers seeking deferral has risen in recent years.

As mentioned earlier, graduates are single at the age of 23 and then either married or stay single at a later age and we need to model this properly to understand fully the nature of household RBs across the life-cycle and across the earnings distribution. We simulate these family formation transitions in next section in order to understand the fiscal implications of ICL loan systems based on household income and compare this to systems based on individual income.

4. Possible directions for reform: universal income contingent loans

In this section we look an possible ICL loan designs for Japan. As outlined in Dearden (2017), in order to do this we need to simulate graduate earnings across the life cycle. Like most other papers in this issue, we take a conservative approach and assume that graduates stay in the same percentile of the earnings distribution over their entire life. As highlighted in Dearden (2017), this will overestimate the cost of an ICL, particularly when there is high earnings mobility. Our simulations assume that 45% of graduates are females and 55% are males.

Longitudinal data from the *Japanese Longitudinal Survey of Adults in the 21st Century (2002 Cohort)* suggests this is not the case for 4 year university graduates in Japan. The data is a national cohort covering men and women and their spouses who were aged between 20 and 34 years at the end of October 2002. We limit ourselves to BA graduates aged over 23 years and pool together all transitions for this cohort. We divide earnings into quintiles by age and show the resulting transition matrices for earnings at adjoining ages in Table 3.

It is clear from the table that there is a lot less income mobility in Japan than in the US (see Dearden (2017)) and Australia (see Higgins and Sinning (2013). This suggests that whilst we will still over-estimate the costs of an ICL system, it will not be as much as with the estimates in Barr et. al. (2017) using the same assumptions with US data.

Table 3: Earnings transitions for BA graduates in Japan at adjoining ages

Quintile of earnings distribution at age *t*	Males					Females				
	Quintile of earnings distribution at age *t+1* *(percent)*					Quintile of earnings distribution at age *t+1* *(percent)*				
	1	2	3	4	5	1	2	3	4	5
1	74.99	19.20	4.15	0.96	0.70	89.18	7.74	1.66	0.54	0.89
2	12.17	60.35	23.40	3.30	0.77	11.43	58.53	22.30	6.23	1.50
3	2.72	15.79	58.18	19.46	3.85	4.95	11.06	63.61	18.15	2.22
4	1.3	2.87	18.40	55.99	21.43	3.33	3.39	11.37	68.28	13.63
5	0.80	0.90	3.2	12.93	82.17	2.67	1.88	3.48	14.66	77.31

For men there is very little earnings mobility and this is more prominent for high earning BA graduates than low earning graduates. 82% of men in the top quintile of the earnings distribution stay in the top earnings quintile in the following year. For females there is very little mobility but this is strongest at the bottom of the earnings distribution. This reflects the fact that once women move out of the labor market, they are unlikely to return in the following year.

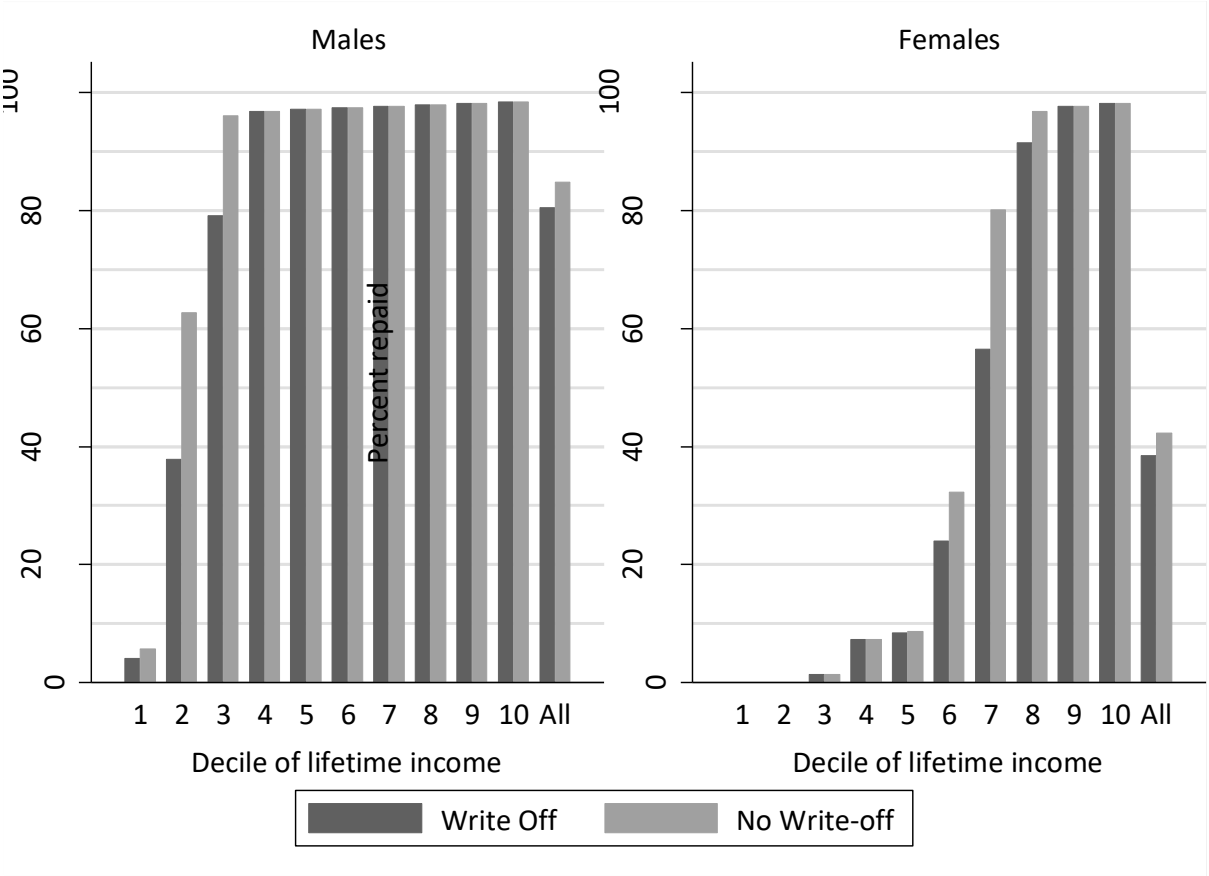
As Kobayashi and Armstrong (2017) outline, Japan introduced an income contingent style loan in 2017. This involved graduates paying back income at a repayment rate of 9% per year of after tax income. There is basic deduction, employment income deduction and social security contributions deductions that for example, for nominal 3 m yen, after tax income is 1.19 m yen for single individuals. However, the scheme also involved a minimum repayment of 2000 yen per month even when one has no afte tax income and a requirement for low earning graduates who have persistent low incomes to repay their loan in full (after a maximum 10 years deferral).

We begin by considering an ICL which has a marginal repayment rate of 9% above nominal £3m yen but also has a lower marginal repayment rate of 5% for incomes between nominal 1.5m and 3m yen (as a substitute for the minimum repayment). This means that relatively low earning graduates pay back part of their loan but ensures that the repayment burden remains low. There is no requirement for low earning graduates to pay off their loan if there is persistent low income. We begin by assuming:

- Debt of 244.8m yen (type 1 loan away from home)
- ICL with 5% *marginal* repayment rate above 1.5m yen and 9 % *marginal* repayment rate above 3.0m yen.
    - For example, after graduation, if a person earning 2.0 m yen per year would pay, 5% of 0.5m i.e. 25000 yen per year. For the JASSO ICL, they require payments of 24000 yen per year for all debtors with no taxable income, or nominal income of below around 1.44m yen.
- We compare the situation where the loan is written off after 25 years or where it is never written off
- We have a zero real interest rate and assume a government discount rate of 0.18%.
- The ICL is applied to individual BA graduate incomes and ignores the income of their spouse.

The distributional implications of the loan by decile of lifetime earnings and gender is shown in Figure 9.

Figure 9: Distributional implications of ICL based on individual income: basline ICL with 244.8m yen loan



With this ICL no graduate pays off their loan in full. This is because the real interest rate (0%) is below the government cost of borrowing (0.18%) so there is a small subsidy for all graduates. Overall males pay between 80% (with loan write-off after 25 years) and 85% of the loan (with no loan write-off). There is a very different story for women, with only those women in the top 30% of the earnings distribution coming close to paying off the full value of their loan. Overall, the ICL involves a subsidy of around 60% for women because of the low wages they earn during their lifetime. This baseline ICL involves an overall subsidy of 38% with a write-off and 34% without a write-off. Whilst this will be an over-estimate because of our no mobility assumption, it is clear that this scheme will involve a large taxpayer subsidy.

What happens if we base it on household income instead? To do this, we simulate BA household incomes over their lifetime. This involves simulating marriage dynamics and taking into account the debt of the spouse when they enter the marriage (particularly important for the case where two BA graduates marry. To do this we assume simulate

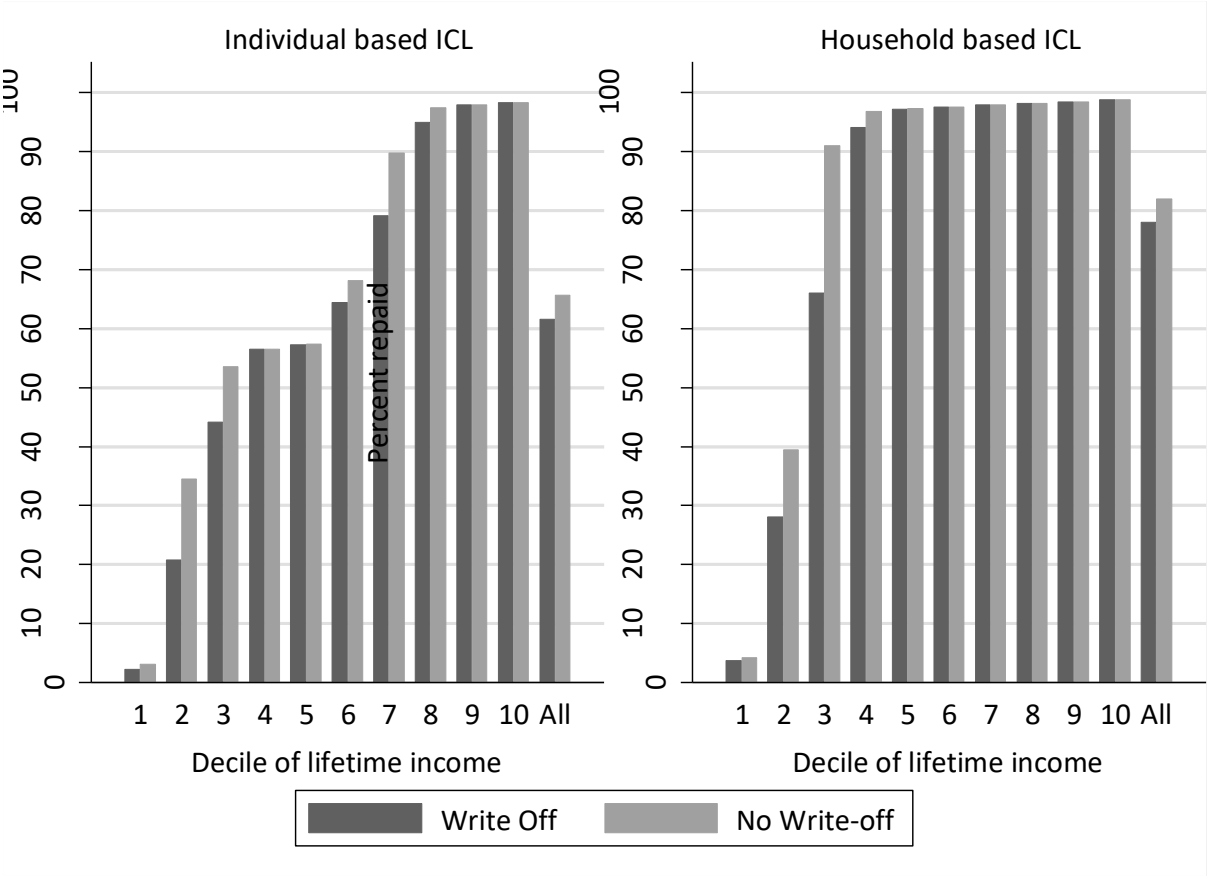
earnings for 900 female graduates (45% of all graduates) and 1100 male graduates (55% of all graduates) who will end up in 1,540 household units by the age of 40. Among these households:

- We assumed 51% of female BA graduates and 42% of male graduates will end up marrying each other (460 couples in our simulated sample)
- That 25% of male and 24% of female 4 year graduates will remain single
- That 32% of male and 25 % of female graduates will marry non-BA partners.
- At the age of 23 virtually all graduates are single and these steadily change until the age of 40. We assume that households do not change after 40 (so we ignore divorce, death etc).

For all BA graduates that stays single, we assume they stay in the same percentile of the earnings distribution throughout their life (like our individual analysis). We assume male graduates who marry stay in same percentile of the appropriate married household income distribution as they were in the single distribution. We assume that if they marry a BA female graduate or non-graduate, her prior earnings percentile is unrelated to his (is random) but remains fixed before her marriage. This is particularly important in order to simulate outstanding debt for a BA graduate when two BA graduates marry. We assume all females who marry get a husband whose earnings percentile is random and not related to their prior earnings.

How does this affect the estimated taxpayer subsidy for our baseline ICL? This is shown in Figure 10. In this diagram, we compare the overall subsidy when based on individual income (average of the Male and Female results from Figure 9) with the subsidy based on basing the ICL on household income.

Figure 10: Distributional implications of ICL based on individual versus household income: Baseline ICL with 244.8m yen loan



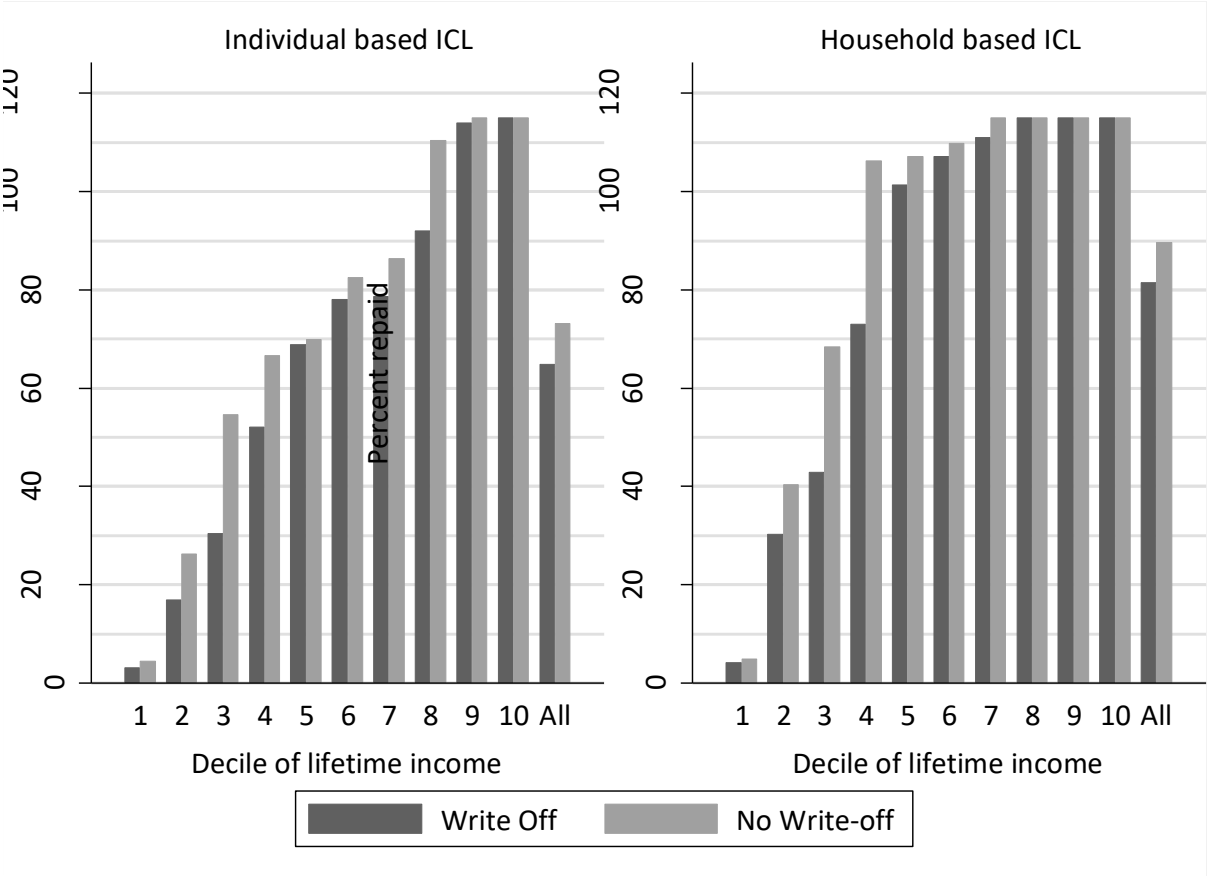
All of the analysis so far has been for relatively low debts and the ICL involves taxpayer subsidies that are likely to be just under 20 percent. From Barr et. al. (2017) we see that there are a number of ways to reduce the taxpayer subsidy of a loan. This includes increasing the interest rate and/or applying a loan surcharge. As a final illustration we illustrate an ICL with a real interest rate and surcharge where:

- Every person who goes to university takes out a loan of 3m yen (average of JASSO Type 1 Loan and Type 2 Loan during four years of university)
- Our ICL: 5% *marginal* repayment rate above 1.5m yen per year and 9% *marginal* repayment rate above 3.0m yen per year
- We compare the situation where the loan is written off after 25 years or where it is never written off

- A real interest rate of 0.18% is assumed. This is the same as the government assumed government discount rate and applies whilst at university and at low earnings
- 15% loan surcharge (i.e. 15% discount of the cost of loan if student doesn't take out loan). For a loan of 3m yen, the outstanding debt to be repaid is 3mx1.15=3.45m yen.

In Figure 11 we compare this ICL when based on individual and household incomes.

Figure 11: Distributional implications of and ICL based on individual versus household income: ICL with interest rate and surcharge (3m yen loan)



We see that the household based ICL collects between 81% (with 25 year write-off) and 90% (with no write-off) of the total value of the loans issued. This is likely to be an underestimate because of assumption of no earnings mobility. The average value of the loan repaid varies by household group measured at age 40 with the average being (for the case with no write-off):

- 101 percent for BA couples (despite having double the debt)
- 103 percent for BA males married to non-BA females

- 94 percent for BA females married to non-BA males
- 71percent for single males and
- 65 percent for single females.

This suggests that with a household based ICL those receiving the largest subsidies will be single graduate households. These same individuals would receive an identical subsidy under an ICL which is individual based. Hence a household based ICL appears to be an effective way of ensuring the university loans of women who marry rich partners are paid in full whilst protecting households where overall income is relatively low.

5. Conclusions

Kobayashi and Armstrong (2017) have highlighted the current problems with the Japanese university student loan system. In this paper we have used a variety of Japanese micro data sources to help understand the reasons behind the current problems.

One key issue identified is the unique nature of the Japanese labor market compared to other countries and in particular the low earnings of female university graduates once they get married and/or have a child. These low earnings appear in part to be driven by firm, tax and social security policy which gives generous tax breaks if wives earn no or low income. These policies are currently under scrutiny and there is some evidence of changing behavior for younger cohorts of women after marriage and having children, but it is likely to remain a feature of the Japanese graduate labor market for some time.

As Chapman (2017) makes clear, RB problems with most time based repayment student loan systems such as the current JASSO loans, can generally be solved in a fair and efficient way by introducing income contingent student loans. However, the unusual features of the Japanese graduate labor market make a traditional ICL based on individual income hard to design in a cost effective way and this means it is unlikely to be feasible or equitable in the current Japanese climate.

We have shown, however, that a household based ICL system could work in Japan, though further work is needed to get more realistic simulations of both earnings and household formation dynamics to better design the optimal ICL for Japan.

JASSO student loans are available to both two year college as well as four year university students and future work needs to ensure that any ICL design would also work for two year college graduates taking out loans. They have not been considered in our paper though it would be relatively simple to include them in our simulations.

Incorporating realistic dynamics as well as two year college graduates will form the next part of our research so that we can devise a self-sustaining universal student loan system that is equitable, affordable and ensures that all deserving students can take full advantage of post high school education in Japan without any financial barrier.

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