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Student Loan Reforms for German Higher Education: Financing Tuition Fees

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ABSTRACT

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It is generally agreed that the funding base for German universities is inadequate and perhaps the time has come for serious consideration of the imposition of non-trivial tuition charges. Against this background, this paper compares conventional and income contingent loans for financing tuition fees at German universities. With the use of unconditional age-income quantile regression approaches our analysis considers two critical aspects of the loan debate: the size of repayment burdens associated with normal mortgage-style loans, and the time structure of revenue to the government from a hypothetical income contingent loan scheme. It is found tuition fees at German universities could increase considerably with the use of an income contingent loan system based on current policy approaches used in Australia, England and New Zealand.

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1 Introduction

Despite the high demand for qualified people in the German economy, total spending on tertiary education in Germany is below the OECD average (OECD, 2010). Although the German government recognises the need for larger investments in higher education of young generations, the financial scope in the presence of unprecedented public debt and declining tax revenue is rather small. In response several German states introduced tuition fees of up to €500 per semester since summer 2007 to cover a small fraction of the annual cost of about €7,000 per student; publicly owned banks have started to offer student loans to finance these fees.[1]

The pressures to introduce or increase tuition fees are apparently inexorable and shared with many other countries. This is evidenced in the UK for example, with the history of debate concerning the role and introduction of income contingent loans for tuition[2] and from the controversial plans announced for English universities' tuition charges in late 2010.

A critical point for policy is that it is well known in a context of less-than trivial enrolment costs that student loan systems are essential for both efficiency and equity reasons.[3] It is a context in which significant increases in tuition charges are inevitable for Germany that motivates the discussion following concerning types and implications of expanded student loan schemes.

In this paper we analyse two different aspects of alternative student loan policies in a German context, which are: a normal "mortgage-style" system, such as those used in the US and Canada; and, an alternative approach to using income contingent loans (ICLs) for financing tuition fees, similar to Australia's Higher Education Contribution Scheme (HECS) and the student loan systems of England and New Zealand. We illustrate

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[1]According to the Federal Statistical Office (2008), the average annual public expenditure on tertiary education per student in 2005 was €7,180.

[2]See Barr (1993), Chapman (1997) and Greenaway and Hayes (2003).

[3]See Friedman (1955) and Chapman (2006).

salient issues for both schemes in the case in which annual tuition fees at German universities increase to €3,500 per student to cover about 50 percent of the total cost.[4]

As input the following analysis focuses on two important elements of the student loan debate: the likely "repayment burdens" (the share of a person's income that is needed to service a debt) associated with a typical loan, and the time structure of repayments of an alternative approach, an income contingent loan (ICL). These exercises are described in detail below, and they allow us to draw inferences about the efficacy for Germany of alternative tuition loan schemes.

Both aspects of the analysis require recent data concerning graduates' projected lifetime incomes and to this end we utilise the German Microcensus 2007, which includes a large representative sample of university graduates. It is necessary to estimate age-income profiles in a disaggregated way to allow insights into the underlying importance of graduate income distributions by age. Consequentially we use unconditional quantile regression models for four demographic groups, differentiating between men and women residing in East and West Germany.

The empirical findings highlight some potentially significant problems associated with repayment difficulties in the application of a mortgage-type loan system to assist in the financing of the imposition of tuition to German universities. We find also that a hypothetical income contingent loan system for Germany has significant elements of financial feasibility and seems to be workable in terms of repayment periods, even for most of the lowest income graduates. This suggests that the imposition of tuition fees at levels commensurate with those of other countries, paid through an income contingent loan, could be made to deliver considerable revenue for the government without disrupting the access of prospective university students.

The paper is organised as follows. Section 2 sets the scene through a description of some of the movements towards student loans in contemporary Germany and outlines relevant aspects of institutional conditions in the German context. Conceptual issues concerning the design of loan systems are considered in Section 3 and Section 4 reports

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[4]This amount is comparable to the current maximum tuition fee of £3,290 (about €4,000) for the 2010/2011 academic year in the UK, and similar to tuition levels in Australia, Canada and New Zealand.

projected repayment burdens with respect to a mortgage-type loan. Section 5 examines the repayment structures associated with a hypothetical income contingent loan system similar to those currently in operation in Australia, England and New Zealand.

2 Current Institutional Arrangements of German Student Loan Systems

In 2009/2010, around 250,000 students began study at one of the 110 universities in Germany. Less than 11,000 students currently attend one of the 10 private universities, while the total number of students at German universities is about 1.4 million. About 11 percent of the students at German institutions of higher education are foreign-born.[5]

Given that German universities had previously been free for all students (except for a lump-sum fee for administrative and other purposes), loan schemes have been designed only for the funding of student's living expenses.[6] However, since summer 2007 tuition fees of up to €500 per semester were introduced in the following seven states: Baden-Württemberg, Bavaria, Hamburg, Hesse, Lower Saxony, North Rhine-Westphalia and Saarland. While there has been political disquiet over these reforms to tuition there have also been concomitant institutional changes designed to assist students in financing their tuition.

Specifically, as a result of the introduction of tuition fees, some publicly owned banks now offer student loans to cover these fees, and Table 1 provides an overview of loan conditions.[7] Typically all students are eligible for a loan if general tuition fees are collected in their state, but there are maximum age limits in all states varying

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[5]Both the Federal Statistical Office (http://www.destatis.de) and the association of universities and other higher education institutions (Hochschulrektorenkonferenz, http://www.hochschulkompass.de) regularly publish the most recent student and university numbers on their websites.

[6]The Federal Training Assistance Act (*Bundesausbildungsförderungsgesetz* or *BAföG*) that regulates student loans for financing living expenses focuses on students from low-income households. The eligibility for these student loans typically depends on the parents' income. A more detailed discussion of these loans is beyond the scope of this paper.

[7]Detailed information about public loans for financing tuition fees at German universities is provided on http://www.studis-online.de and http://www.bafoeg-aktuell.de.

between 35 years in Lower Saxony and 60 years in North Rhine-Westphalia. In addition, students may only receive a loan for up to 2 years after their regular period of study (which depends on study field).

With the systems noted above loan repayments typically start after the end of a deferment period, which lasts between 1.5 and 2 years, and monthly repayments vary between €20 and €150. Interest rate charges also vary considerably across states and there are some upper debt limits (the maximum amount that has to be repaid), reported in Table 1. Since this debt limit may also include loans that were provided for financing living expenses, former students who have received a sufficiently high loan for their living expenses do not have to repay the loan they received to cover tuition fees.

<Table 1 about here>

This discussion highlights two critical aspects of current approaches to student financing in Germany. These are that currently: (a) there are disparate student loan schemes across Germany; and (b) the arrangements in place are insufficiently large or comprehensive to accommodate the major expansion in student financing which would be necessitated in a context of radical changes in tuition charges. A case can be made for institutional changes, highlighting the need for detailed consideration of the costs and benefits of student loan scheme alternatives, and this now follows.

3   Conceptual Issues Concerning the Choice Between Loan Schemes

3.1   The Need for Government Intervention in Higher Education Financing

A significant financing issue for higher education is that there is generally seen to be a case for both a contribution from students and a taxpayer subsidy (Barr, 2001; Chapman, 2006). An important question is: is there a role for government beyond the provision of the subsidy?

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An understanding of the issue is facilitated through consideration of what would happen if there were no higher education financing assistance involving the public sector. That is, a government could simply provide the appropriate level of taxpayer support to higher education institutions to reflect the presumed value of the externalities from the process, and leave market mechanisms to take their course, which would result in institutions charging tuition on enrolment for the service.

However, there are major problems with this arrangement, traceable in most instances to the potent presence of risk and uncertainty. This critical point was first raised in Friedman (1955). The argument can be best understood with reference to the nexus between labour markets and human capital investments. The essential point is that educational investments are risky, with the main areas of uncertainty being as follows:[8]

(a) Enrolling students do not know fully their capacities for (and perhaps even true interest in) the higher education discipline of their choice. This means in an extreme they cannot be sure that they will graduate with, in Australia for example, around 25 percent of students ending up without a qualification;

(b) even given that university completion is expected, students will not be aware of their likely relative success in the area of study. This will depend not just on their own abilities, but also on the skills of others competing for jobs in the area;

(c) there is uncertainty concerning the future value of the investment. For example, the labour market – including the labour market for graduates in specific skill areas – is undergoing constant change. What looked like a good investment at the time it began might turn out to be a poor choice when the process is finished; and

(d) many prospective students, particularly those from disadvantaged backgrounds, may not have much information concerning graduate incomes, due in part to a lack of contact with graduates.

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[8]As discussed by Barr (2001), Palacios (2004) and Chapman (2006).

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

It follows that, left to itself the market will not deliver propitious higher education outcomes in a context in which there are significant tuition charges. Prospective students judged to be relatively risky (for example, those without loan repayment guarantors), will not be able to access the financial resources required for both the payment of tuition and to cover income support. There would be efficiency losses (talented but poor prospective students would be excluded), and distributional inequities (the non-attainment of equality of educational opportunity). It is clear then that government intervention of some form is thus required.

The capital market failure with respect to higher education financing is apparently understood by the governments of most countries, given that public sector loan interventions are commonplace internationally. Until recently, government intervention often took the form of public sector guarantees for commercial bank provision of education loans, but over the last decade or so has increasingly involved income contingent loans. While quite different in practice, both approaches are motivated in part by the recognition that, left alone, a German higher education market with non-trivial tuition charges will function poorly.

3.2 The Costs and Benefits of Mortgage-type Loans

As noted, and most simply, international student loan schemes involve fixed repayments with a set time period[9] as, for example, with a house mortgage. While this seems to

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[9]These approaches are used in the US and Canada for example (see Chapman, 2006).

address the capital market failure, it raises other problems.

A first concern with mortgage-type loan systems is that students face an important default issue. This is that some may be reluctant to borrow for fear of not being able to meet future repayment obligations. Not being able to meet repayment obligations has the potential to inflict significant damage to a person's credit reputation (and thus access to future borrowing, for example, for the purchase of a house). These concerns imply that there will be less borrowing than there would be in the absence of this default concern.

A reluctance to borrow due to the uncertainty of repayment constitutes what might be labeled an ex ante default problem for prospective students. There is also an ex post problem, which is that a proportion of those students who took the credit risk of borrowing for a human capital investment will end up not being able to repay because of low incomes. In these circumstances default imposes a potentially large cost on those unlucky borrowers who do poorly in the labour market. Significantly, research suggests that members of the default group are predominantly those who ultimately experienced relatively high unemployment rates and relatively low earnings.[10]

A related problem for students with bank loans concerns possible consumption difficulties associated with fixed repayments. If the expected path of future incomes is variable, a fixed level of a debt payment increases the variance of disposable (after debt repayment) incomes. The point has been illustrated with examples based on the US[11] and Thailand[12], and is taken up empirically below with respect to prospective German experience. The consequences of a student defaulting on a loan obligation is a potentially critical issue for borrowing to finance human capital investments, due to the uncertainties noted above. A consequence is that some eligible prospective students will not be prepared to take bank loans. This problem can be traced essentially to the fact that mortgage-type loan repayments are insensitive to borrowers' financial

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[10]Dynarski (1994) used the National Post-secondary Student Aid Study and found strong evidence that experiencing low earnings after leaving formal education is a strong determinant of default. Importantly, borrowers from low-income households, and minorities, were more likely to default, as were those who did not complete their studies.

[11]See Chapman and Lounkaew (2010a).

[12]See Chapman et al. (2010).

circumstances.

A final possible practical problem of government guaranteed bank loans relates to the fact that, in many countries, loans of this type are not universally available, or available loan levels are limited.[13] This is because loan provision and/or amounts available are usually means-tested on the basis of family income. This raises the important issue explained by Carneiro and Heckman (2002), concerning the role of the sharing of financial resources within families. Some students will be unable to access necessary levels of borrowing and will face the same credit market failure as they would in the absence of a government guarantee of a bank loan. Making loans available on a means tested basis (as is the case in the US and Canada) suggests that some prospective students will have difficulties accessing the system.

The bottom line is that, even though government assisted conventional loans are a common form internationally of public sector involvement in higher education financing, such an approach has several apparently very significant weaknesses.

3.3   The Costs and Benefits of Income Contingent Loans

A different approach to student financing involves income contingent loans, such as Australia's HECS. The attraction of these schemes is that they can be designed to avoid many of the problems associated with having loan repayments set on the basis of time only.

First, given an efficient collection mechanism, there is no default issue as such for either students or the government. That is, if the tax system works well and is used to collect the debt, it is extremely difficult for the vast majority of graduates to avoid repayment. There is a form of a default issue in that some students will not pay back in full, because income contingent systems are designed to excuse some former student's payments because their lifetime incomes are too low.[14] Other reasons loans may not be

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[13]Eligibility for Canada student loans is limited to less than half of all students (Finnie and Schwartz, 1996).

[14]Evidence with respect to the Australian experience suggests that around 20 percent of the debt is uncollected, mostly because of the relatively low incomes of some former students (Chapman, 2006).

repaid include death and emigration.

Second, because repayments depend on income, there should be no concerns by students with respect to incapacity to repay the debt, or hardships associated with repayments. That is, once an individual's income determines repayment, and so long as the repayment parameters are sufficiently generous, it is not possible to default or hardship because of a lack of capacity to pay. This is the critical practical advantage of income contingent collection schemes – unlike any other form of assistance, there is insurance against default and repayment difficulties.

Third, there is no concern with intra-family sharing so long as the scheme is universal. That is, no student would be denied access through the imposition of means-testing arrangements that could exclude some whose parents or partners are unwilling to help.

The above discussion means that income contingent loan schemes have significant advantages over traditional financing arrangements, since they can be designed to avoid the major problems of their alternatives. This does not make such approaches a panacea generally, however for at least one critical reason: for an income contingent scheme to be made operational it is essential that there is an efficient administrative collection mechanism.[15] Unlike the situation in countries with poorly developed governance infrastructure, there should be little doubt that the German income tax system is sufficiently sophisticated to allow efficacious ICL collection.

4   Understanding Repayment Burdens in the Student Loan Debate

4.1   What Is a Loan Repayment Burden?

Education economists and others have examined the concept and implications of student loan repayment burdens for more than a quarter of a century.[16] Defined simply, a loan repayment burden is the proportion of a person's income that needs to be allocated to

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[15] For detailed discussion of this issue see Chapman (2006), pages 101-104.

[16] See Woodhall (1987), Ziderman (1999), Schwartz and Finnie (2002), Salmi (2003) and Baum and Schwartz (2006).

service a debt per period, or, formally:

$$\text{Repayment burden in period } t \quad = \quad \frac{\text{Loan repayment in period } t}{\text{Income in period } t}. \tag{1}$$

There are several policy design issues usually raised with respect to repayment burdens. The first is motivated by the importance of difficulties faced by debtors in meeting their obligations, it obviously being the case that – in a world in which borrowing against expected future earnings is difficult[17] – the higher is a debtor's repayment burden the less consumption and/or savings are possible at any given income. This is of importance in comparisons of different student loan policies, with mortgage-type loans being quite different to income contingent loans in this respect. This is due to the fact that the latter are explicitly designed to avoid high repayment burdens and this is achieved through per period debt servicing obligations as a proportion of income being capped by legislation (Chapman and Lounkaew, 2010a).[18]

A second is that greater repayment burdens are associated with higher prospects that debtors will be forced to default on loan repayments because of low incomes. This issue is substantiated by the finding of Dynarski (1994) and Gross et al. (2009) that student loan defaulters in the US are much more likely to have low levels of income. Typically student loan schemes (such as Stafford loans in the US) are associated with a government guarantee to cover the debts when a student defaults,[19] which means that taxpayers pay. An associated policy mechanism relates to the provision of interest rate subsidies on student loans,[20] which are presumably designed to diminish consumption hardship and default probabilities.

Woodhall (1987) integrates these concerns by stressing that governments face a balancing act in the design of mortgage-type loan schemes. This is that, ceteris paribus, the lower are interest rate subsidies the higher will be repayment burdens. The design

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[17]The issue of credit constraints is critical in understanding repayment burdens and is addressed in Rothstein and Rouse (2007) and Chapman (2006).

[18]In the Australian income contingent higher education loan scheme, for example, the maximum percentage of taxable income of the debt that is repaid is 8 percent per annum.

[19]It is commonly understood that the commercial financing sector will not provide loans to students because of their lack of collateral in the event of default (Friedman, 1955; Barr, 2003; Chapman, 2006).

[20]For recent analyses see Ziderman (2003) and Chapman and Lounkaew (2010a).

complexities do not end with this obvious trade-off because the lower are interest rate subsidies the greater is the prospect of default, with this adding to taxpayer contributions.

Important research is provided by Shen and Ziderman (2009) which offers calculations of taxpayer interest rate subsidies for a large number of student loan schemes from many countries, and Schwartz and Finnie (2002) which presents repayment burdens for hypothetical debtors in the Canada Student Loans scheme. As well, Chapman et al. (2010) illustrates taxpayer subsidies associated with the Thai Student Loan Fund. With this as policy background we now examine several empirical aspects of the debate.

4.2   Repayment Burdens: How Much Is Too Much?

Do we know what proportion of a debtor's income repayment burdens should be limited to? A definition of what this means in practice is illusory, and different terms are used to imply similar debtor experiences.

For example, Woodhall (1987) uses the term "manageable debt" and suggests that this depends "...partly on the level and pattern of graduates' expected earnings, and partly on what students and society regard as a 'reasonable' level of debt" (page 15). Second, Ziderman (1999) suggests that loan conditions need to be set so as "...to avoid imposing unduly harsh repayment burdens on borrowers..." (page 82). Third, it is argued in Baum and Schwartz (2006) that the policy design issue is to avoid repayments which would "...impose too heavy a burden on young people leaving school." (page 1). While there is not a clear concensus for assessing what constitutes an excessive repayment burden there are nevertheless several pointers for understanding what this might be in practice. The following provide useful indications of the range of views:

(a) "A rough yardstick, used in several countries, is that loan repayments should not exceed 8 to 10 percent of a graduate's income, and that this should determine the maximum debt that students may incur" (Woodhall, 1987, page15); and

(b) Salmi (2003) notes that in Venezuala the government loan agency "...has established 15 percent as the ceiling for monthly repayments." (page 15), and goes on

to suggest that "Experience shows that no repayment schedule can be sustainable when the monthly debt exceeds 18 percent of income".

The most comprehensive analysis is in Baum and Schwartz (2006), which refers to the so-called "8 percent rule", a standard suggesting that "...students should not devote more than 8 percent of their gross income to repayment of student loans." (page 2). Their paper quotes an extensive literature in support, albeit recognizing the validity of a range in suggested boundaries. In what follows we apply the rough rule of thumb to suggest that less than 8 percent repayment burdens are manageable, and that beyond about double this proportion should be considered to be quite excessive.[21]

4.3 Measuring Expected Incomes in Calculations of Repayment Burdens

The denominator of equation (1), the per-period income received by student loan debtors, is critical to the exercise. An important point is that until recently significant research has used very aggregate proxies of incomes, such as that received on average by graduates. Ziderman (2003), for example, in an analysis of the repayment burdens associated with the Thai Student Loan Fund, compared debt servicing obligations to the earnings of graduates using average Thai graduate earnings by age and sex.

From this Ziderman concludes that "The annual repayment burden in terms of annual income is very light, in the region of only 2-4 percent annually" (page 83), and adds that "...the Thai student loan scheme is overly generous...which may be effortlessly repaid out of higher income received on courses of schooling." (page 83). However, beyond average graduate earnings there are wide dispersions of income received by graduates.[22] Like many issues in economics, some of the most interesting empirical

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[21]The issue should not be considered to be only about the welfare difficulties experienced by those with high burdens. It is also about the likelihood that high burdens lead to loan defaulting and thus longer term costs for both debtors and taxpayers.

[22]This fact is highlighted by the relatively low explanatory power for OLS earnings function models. For example, Chapman and Lounkaew (2010a) found an R^2 of around 0.4 for Thai earning functions; a plethora of other earnings function studies typically explain no more than 20-30 percent of the variance.

aspects concern the tails of the distributions.

Chapman et al. (2010) analyse earnings distributions by age of Thai graduates and find that repayment burdens differ by extraordinarily high amounts; the range is between 1 percent for the top 25 percent of earners and 70 percent for the bottom 10 percent of earners. Chapman and Lounkaew (2010a) repeat these exercises for the US and also find a very large range of burdens across the earnings distribution in that country.[23] These are significant findings for what follows.

5 Estimating Repayment Burdens for a German Student Loans System

5.1 A Hypothetical Loans Scheme Described

In our empirical examination of potential repayment burdens with respect to a German mortgage-type student loan scheme, we require two separate pieces of information, which are estimates of the numerator and denominator of Equation (1). The numerator is given by the loan repayment figure per year which applies from an assumed level of borrowing for tuition in combination with an assumed repayment period and real rate of interest. For illustrative purposes we propose a hypothetical loan characterised by the following dimensions:

(a) A total debt of €17,500 which comes as a result of a student undertaking a five-year degree with tuition charges of €3,500 per full-time year per annum;

(b) a ten year repayment period for the debt, with repayments beginning two years after graduation;

(c) graduation occurs at age 26 and thus repayments begin at age 28;

(d) a real interest rate on the debt of 3 percent per annum[24], which applies at the

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[23]For example, it is found that the repayment burden for female lawyers working in the public sector in the bottom 25% of their income distribution will be required to repay 93%.

[24]That is, CPI inflation plus 3 percent. This is about what is charged with Stafford Loans in the US (Chapman and Lounkaew, 2010b).

time of disbursement of the monies, assumed to be at the beginning at each year of study; and

(e) a 10 year period of repayment.[25]

In order to derive a structure of expected repayment burdens for a typical student/graduate, we need also to construct a hypothetical education/work experience and this relies on the following assumptions:

(a) Students enrol in higher education for the first time at age 21;[26]

(b) the degree takes five years and the student is assumed to complete the course in the minimum time; and

(c) graduates enter the labour force immediately after completing the degree, at age 26.

Figure 1 shows the expected repayments for the hypothetical debtor, and the amounts at each age become the numerator of Equation (1). The amounts in real terms are assumed to decline by 2 percent per annum, reflecting our assumption of expected German annual CPI increases.[27]

<Figure 1 about here>

5.2 Income Data

For different calculations of the denominator of Equation (1) we use data from the German Microcensus 2007, an annual representative cross-sectional survey of 1 percent of all German households collected by the German Federal Statistical Office. The data set includes information concerning the economic and social situation of individuals

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[25]Based on typical repayment periods for student loans currently in operation in Germany and the figure which applies to most Stafford Loans in the US (Chapman and Lounkaew, 2010b).

[26]In this scenario high school is assumed to be completed at age 19 and this is followed by a year of military/civil service. Although the enrolment age is likely to decline in the near future, an enrolment age of 21 years was quite common among current university graduates.

[27]This figure is about the average inflation rate for the period after the German reunification (http://www.destatis.de).

and households, and includes, among other things, information on sex, education, age, income and employment status.

The Microcensus constitutes an excellent data source for the purpose of our analysis, because it includes a large sample of university graduates and allows the construction of all relevant variables. However, due to the design of the survey and the questionnaire, assumptions have to be made to determine the annual income variable that is needed for the empirical analysis. We use the self-reported monthly net income from all income sources (including wages and salaries, bonus payments, business income, unemployment and social benefits, child allowance, interest income, etc.) of non-employed individuals and approximate the monthly gross income of employed individuals – using an online income tax calculator[28] for the year 2007 – to calculate the annual (gross) income of employed and non-employed individuals.[29] The Microcensus further includes information concerning the year in which the highest degree was obtained and this allows us to calculate the years of potential labour market experience for each individual.

We restrict our sample to university graduates with German citizenship aged between 26 and 65 years of age, and we have excluded persons who are in the military or recorded as having zero income even though they are employed. After dropping all observations with missing values on one of the relevant variables, our sample includes 7,847 male and 7,200 female graduates residing in West Germany and 2,567 male and 2,428 female graduates in East Germany. Of these, 7,109 male and 5,973 female graduates in West Germany as well as 2,170 male and 2,009 female graduates in East Germany are employed. Table 2 includes summary statistics for the sample of both employed and not employed individuals.[30]

<Table 2 about here>

The numbers do not only reveal sizeable differences between men and women, but also between West and East Germany, it being clear that differences in the labour

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[28]See http://www.parmentier.de/steuer/incometax.htm. Monthly gross income is calculated separately for single and married households with and without children.

[29]We define annual income as 12 times the monthly income.

[30]The labour force status of debtors is irrelevant in our calculation of repayment burdens since debts are owed on the basis of time.

markets of the two regions persist two decades after the German reunification. Other points of interest are that: the average income of male graduates in West Germany are much higher than those of male graduates in East Germany; while female graduates have lower incomes than male graduates, the income differential between female graduates in West and East Germany is quite small; female labour force participation among graduates is about 83 percent in both regions; and the employment rate among male graduates is about 91 percent in West Germany and 85 percent in East Germany. Overall, these data highlight considerable differences between men and women in the two regions which explains why we have chosen to perform our empirical analysis separately for the four groups.

5.3   Predicted Income Functions

In order to calculate the repayment flow of an income contingent loan, we estimate the age-income profile for each subgroup by employing a standard income regression model, which includes a quadratic function of potential labour market experience. We are particularly interested in the age-income profile of graduates who are at least 28 years old because we assume that individuals typically graduate at age 26 and that loan repayment begins after the end of a 2-year deferment period. We use the estimates of the potential labour market experience to predict incomes, taking into account that a typical 28-year old university graduate will have 2 years of potential labour market experience.

A methodological problem arises from the nonlinear nature of the dependent variable because income is measured in brackets rather than on a continuous scale. For that reason, interval regressions represent the most appropriate way of estimating our income functions. However, the interval regression model inhibits distributional analyses because it may only be used to estimate mean effects of the regressors on the dependent variable. Fortunately, the number of income brackets is sufficiently large (there are 24 categories) to justify the use of mean points and to estimate linear rather than interval regression models.[31]

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[31]A comparison of linear and interval regression estimates suggests that there are no quali-

Since the profiles may differ considerably across the income distribution, we extend our calculation of profiles beyond the mean. This is a critical aspect of our exercise because it allows the calculation of a large number and range of repayment burdens for individuals predicted to be significantly different to the mean.

To estimate age-income profiles at particular quantiles of the distribution we employ unconditional quantile regressions based on so-called "re-centered influence functions" (Firpo et al., 2009). Since unconditional quantile regression estimates capture the effect of the change in the regressors on the quantile of the unconditional distribution of the dependent variable, they can be used to predict age-income profiles at different quantiles of the distribution. A distributional analysis is crucial in the context of student loans because repayment burdens are typically most important for debtors with low incomes.

The predicted age-income profiles of the four groups are presented in Figure 2.[32] Within each of these groups, we differentiate between the 25th, 50th and 75th percentiles.

<Figure 2 about here>

The main broad features of the data are as follows. First, all figures show that predicted incomes increase over the life cycle at a decreasing rate. Second, incomes are highest among male graduates in West Germany, with annual incomes of this group increasing to almost €120,000 at the 75th percentile, while the annual incomes of East German male graduates do not even reach €70,000 at the top of the distribution. Third, annual incomes of female graduates are below €70,000 in West Germany and below €60,000 in East Germany at the 75th percentile of the respective distribution.

The profiles of the four groups also differ considerably at the median and the bottom of the income distributions, in the following ways. First, we find that the median annual income of male graduates increases to about €80,000 in West Germany but remains below €50,000 in East Germany, while the median annual income of female graduates

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tative differences in the results between the two approaches and that quantitative differences are rather small. Both linear and interval regression estimates are available from the authors upon request.

[32]The age-income profiles were adjusted by 1.5 percent per annum to capture productivity growth. A growth rate of about 1.5 percent is in line with usual indicators (OECD, 2008).

in West and East Germany is lower than €40,000. Second, annual incomes of male graduates at the 25th percentile are below €50,000 in the West and below €30,000 in the East, while the incomes of female graduates at the bottom of the distribution reach about €20,000 in West Germany and about €25,000 in East Germany.

In summary, while the predicted age-income profiles have the properties familiar to exercises of these types, they also illustrate that there is substantial heterogeneity across the four groups with respect to both the level and the spread of annual incomes. These profiles constitute the starting point for the calculation of the loan repayment burdens now considered.

5.4   Repayment Burdens of the Conventional Loan Scheme

What now follows considers the repayment burdens for the hypothetical loan scheme described above, for West and East German graduates assumed to receive quite different lifetime incomes. The results are presented in Table 3.

Some major findings are that: university graduates with average income would face repayment burdens of 7.8-14.1 percent in the first year of the repayment period, which for most clearly exceeds the "8 percent rule" advocated by Baum and Schwartz (2006); as anticipated, repayment burdens are much higher at the 25th percentile of the income distribution, ranging from 14.2-26.8 percent at the beginning of the repayment period; in contrast, the repayment burdens are relatively low (between 6.0 and 10.0 percent in the first year of the repayment period) at the 75th percentile of the income distribution, implying that many university graduates at the top of the distribution could repay their student loans much faster without difficulties.

<Table 3 about here>

A very important point for policy from the above repayment burden results is that if a conventional student loan scheme is used to help German students finance higher levels of tuition charges, there will be significant adverse consequences for a significant minority of those using the scheme. Practically all of the women will face difficulties, and for some – East German women in the bottom 25 percent of graduates in this group,

for example – repayment burdens of as high as 26.8 percent would imply extremely high probabilities of defaulting on loans. There would then be severe adverse consequences for both the credit reputations of the individuals involved and with respect to taxpayer financed subsidies.[33]

6   An Income Contingent Loan for Germany?

The potential for there being significant problems with the use of a conventional student loans system for future German tuition payment raises the possibility of the use of an alternative financing mechanism, income contingent loans (ICL). The conceptual differences between mortgage-type loans and ICL have been considered above, with the main point being that the maximum repayment burden of an ICL is set by legislation. Thus the essential difference between loan policies is that because repayments of an ICL are defined by capacity to pay and mortgage-type repayments depend on time, the former implicitly offers insurance against repayment hardships and are thus presumed to minimise defaults due to hardship.

For the policy debate it is useful to speculate on what an ICL for Germany might look like and what sort of repayment paths might result. To this end we have designed a hypothetical and very simple ICL for Germany, in which repayment obligations are assumed to be 8 percent of a debtor's total annual income.[34] Assuming the same level of debt as for the repayment burden exercises reported above, it is possible to calculate the time periods associated with repayment for the various income groups defined by both demography and expected lifetime incomes. These are shown in Table 4, and

[33]Since repayment burdens are highest at the lower end of the distribution, we have also estimated the age-income profiles at the 10th percentile. These estimates reveal that graduates at the 10th percentile would face extreme repayment burdens in the first year of the repayment period. Specifically, we obtain repayment burdens of 37.3 percent for male and 30.6 percent for female graduates in West Germany and 44.8 percent for male and 59.7 percent for female graduates in East Germany.

[34]The assumed ICL can be compared to those in operation in Australia, in which there is a threshold of income below which no repayments are required, after which given progressive proportions of income are required for repayment and these range from 4 to 8 percent. In the English and New Zealand schemes there are also thresholds for repayment with the basis being a set proportion of additional income above this level (Chapman, 2006).

presented diagrammatically in the Appendix.

<Table 4 about here>

The main results of Table 4 are: (i) for those receiving average graduate incomes the length of time of a simple ICL are between 7 and 12 years; (ii) the time taken to repay for those in the top 75 percent of graduate incomes is a low 6-9 years; (iii) the lowest income recipients in these exercises will take 11-22 years to repay. These results are roughly comparable to the Australian experience for similar levels of debt (Chapman, 2006). They imply that it would seem to be straightforward to design an ICL for Germany which would result in a range of repayment experiences consistent with those already being experienced in those countries with apparently successful ICL arrangements.

7   Conclusion

It is very likely that in the near future the political and economic circumstances of Germany will lead to significant increases in higher education tuition charges. For reasons that are well understood in the economics literature, this possibility highlights the need for an important expansion in the availability and sizes of student loans. Two possibilities currently used internationally are mortgage-type and income contingent loans.

Against this background, and through reference to the conceptual differences between these approaches to student loans, this paper explores empirically some of the important consequences of different loan schemes. Our method involved analyses of data from the German Microcensus 2007 from which we are able to derive a large range of expected future income streams using linear and unconditional quantile regression models. We differentiate between men and women residing in East and West Germany and calculate separate repayment burdens for university graduates in each of these groups.

With the use of the income profiles our major contribution is to illustrate that, with the likely level of debts, a significant issue emerges with respect to expected repayment

burdens (the proportion of a graduate's income required to repay the loan). This is that for many graduates the burdens will be at levels considered in the literature to be excessive, and for those with quite low incomes these burdens will be extremely high. For many debtors under such a scheme the prospects of both consumption hardship and loan defaults look large.

Income contingent loans do not allow high repayment burdens and this is their most important feature. We have modelled a very simple ICL for Germany, and with the use of the income profiles used in the earlier exercise we illustrate the time periods associated with this type of loan repayment. The results suggest that an ICL would deliver experiences similar to those of other countries using such an approach to student financing.

Tables and Figures

Table 1: Tuition Fees and Public Loans

State	Tuition Fees p.a.	Bank	Nominal Interest	Maximum Debt	Minimum Net Income
Baden-Württemberg	€1,000	L-Bank	3.78% (max. 5.5%)	€15,000	€1,060
Bavaria	€1,000	KfW Förderbank	2.69% (max. 7.75%)	€15,000	€1,060
Hamburg (until summer 2008)	€750	KfW Förderbank	2.87% (max. 7.5%)	€17,000	€1,060
Hesse (until summer 2008)	€1,000	Landes- treuhandstelle	6.16% / 0% (max. 7.5%)	€15,000	€1,260
Lower Saxony	€1,000	KfW Förderbank	3.06% (max. 7.5%)	€15,000	€1,060
North-Rhine Westfalia	€1,000	NRW.Bank	3.896% (max. 5.90%)	€10,000	€1,040
Saarland (until winter 2009/2010)	€1,000	KfW Förderbank	0% <2.85% (-)	€15,000	€1,060

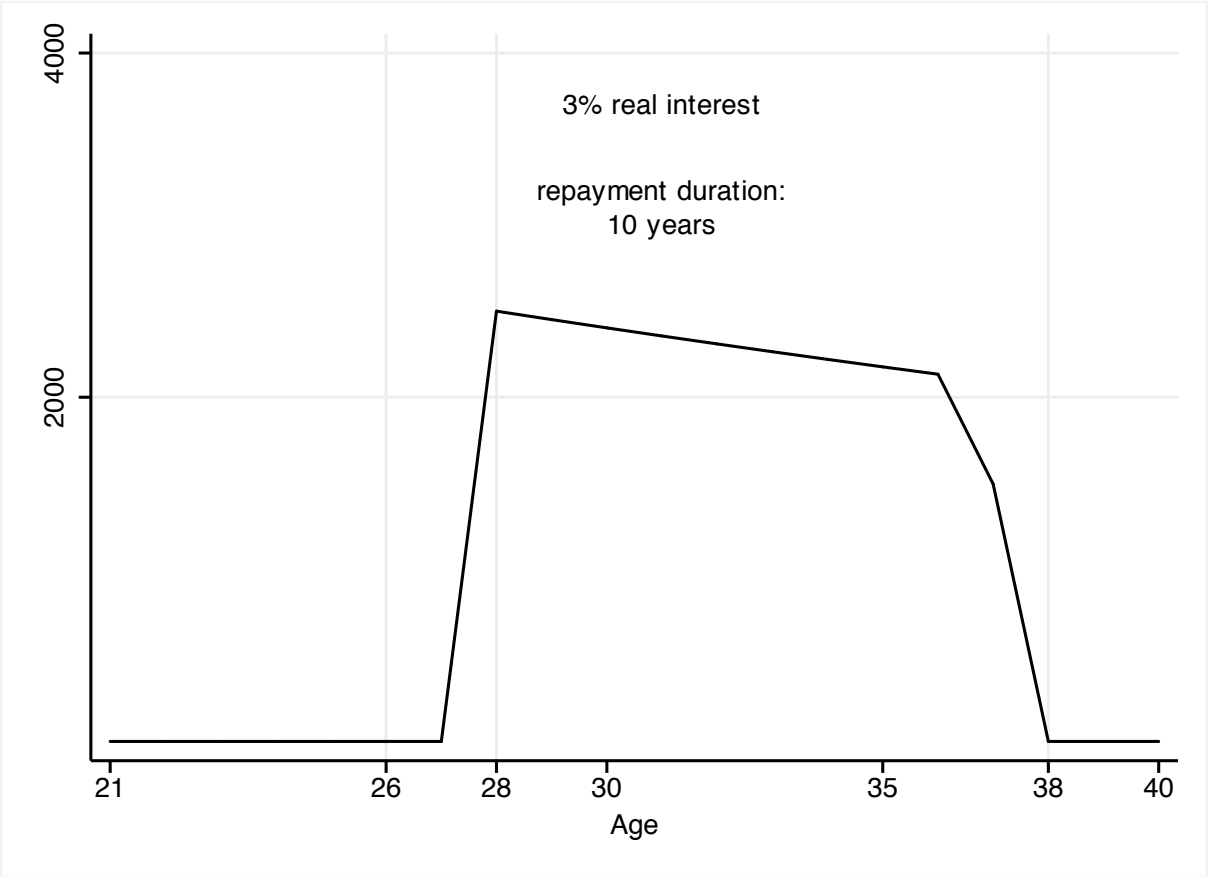Figure 1: Conventional Loan Repayment Scheme (in Real Terms)

3% real interest

repayment duration:
10 years

Table 2: Summary Statistics for Sample of University Graduates

	Men		Women	
	Mean	Std. dev.	Mean	Std. dev.
	WEST GERMANY			
Annual gross income	51,525	39,880	26,930	22,408
Employed	0.908	0.289	0.833	0.373
Age	45.2	10.6	43.0	10.6
Potential labour market experience	17.7	11.0	16.4	11.4
Number of observations	7,847		7,200	
	EAST GERMANY			
Annual gross income	33,629	30,136	24,600	18,245
Employed	0.849	0.358	0.834	0.372
Age	46.8	10.8	45.0	10.5
Potential labour market experience	19.8	11.5	19.3	11.5
Number of observations	2,567		2,428	

Note: Weighted numbers based on weights provided by the Microcensus.
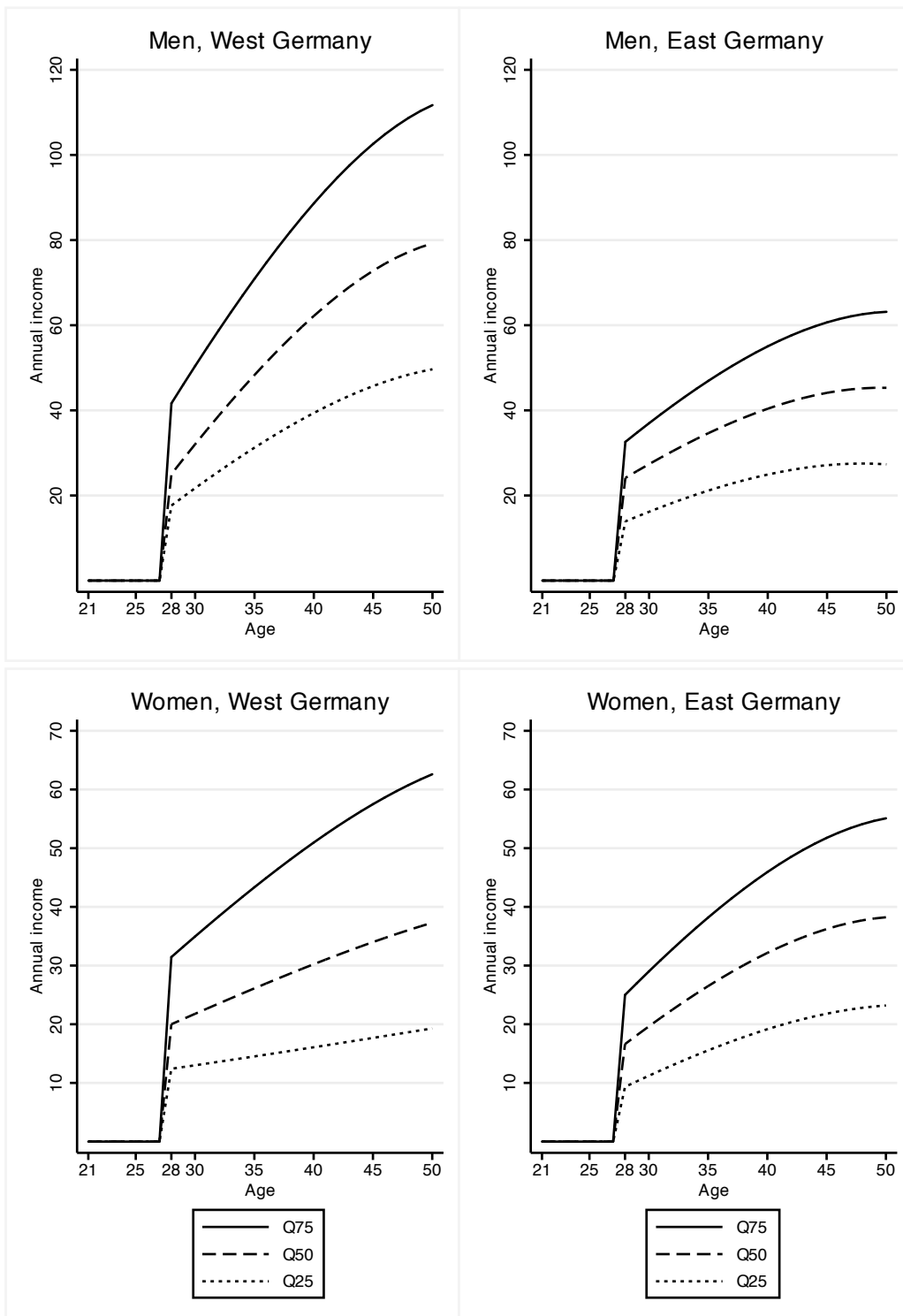
Figure 2: Age-Income Profiles (in Thousands of €)

Table 3: Repayment Burdens of Conventional Loan Repayment Scheme (Percent)

| | West Germany | | | | East Germany | | | |
	Mean	Q25	Q50	Q75	Mean	Q25	Q50	Q75
MEN								
Year 1	7.88	14.17	9.99	6.00	9.62	17.96	10.36	7.67
Year 2	6.96	12.44	8.58	5.32	8.71	16.27	9.51	7.04
Year 3	6.21	11.06	7.50	4.77	7.95	14.85	8.78	6.50
Year 4	5.60	9.93	6.65	4.31	7.31	13.65	8.14	6.03
Year 5	5.08	9.00	5.95	3.92	6.75	12.63	7.59	5.61
Year 6	4.65	8.21	5.39	3.59	6.27	11.74	7.10	5.25
Year 7	4.28	7.54	4.91	3.31	5.85	10.97	6.67	4.92
Year 8	3.96	6.97	4.51	3.07	5.48	10.29	6.28	4.64
Year 9	3.68	6.47	4.16	2.86	5.15	9.69	5.94	4.38
Year 10	2.46	4.31	2.76	1.91	3.48	6.55	4.03	2.97
Average	5.08	9.01	6.04	3.91	6.66	12.46	7.44	5.50
WOMEN								
Year 1	11.60	20.14	12.50	7.95	14.10	26.81	15.05	10.00
Year 2	10.81	19.29	11.73	7.38	12.81	23.85	13.52	9.08
Year 3	10.10	18.48	11.04	6.88	11.72	21.43	12.25	8.29
Year 4	9.46	17.71	10.40	6.42	10.78	19.43	11.18	7.62
Year 5	8.88	16.98	9.82	6.02	9.97	17.74	10.27	7.04
Year 6	8.36	16.29	9.28	5.65	9.26	16.31	9.49	6.54
Year 7	7.88	15.62	8.79	5.32	8.63	15.07	8.81	6.09
Year 8	7.44	14.99	8.34	5.02	8.07	14.00	8.22	5.70
Year 9	7.04	14.39	7.92	4.75	7.58	13.07	7.69	5.35
Year 10	4.77	9.88	5.38	3.22	5.10	8.76	5.17	3.61
Average	8.63	16.38	9.52	5.86	9.80	17.65	10.16	6.93

Table 4: Repayment Duration (in years)

	West Germany		East Germany	
	Men	Women	Men	Women
8% COLLECTION RATE				
Mean	7	11	9	12
Q25	11	22	15	20
Q50	8	12	10	13
Q75	6	8	7	9

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Appendix

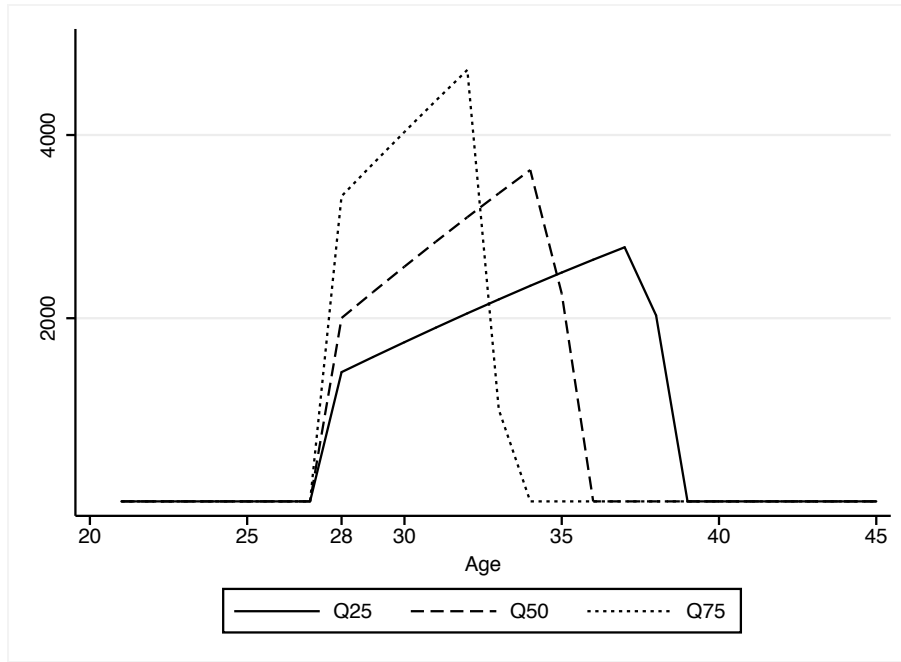Figure A1: Annual Income Contingent Loan Repayment – Men, West Germany

Figure A2: Annual Income Contingent Loan Repayment – Women, West Germany
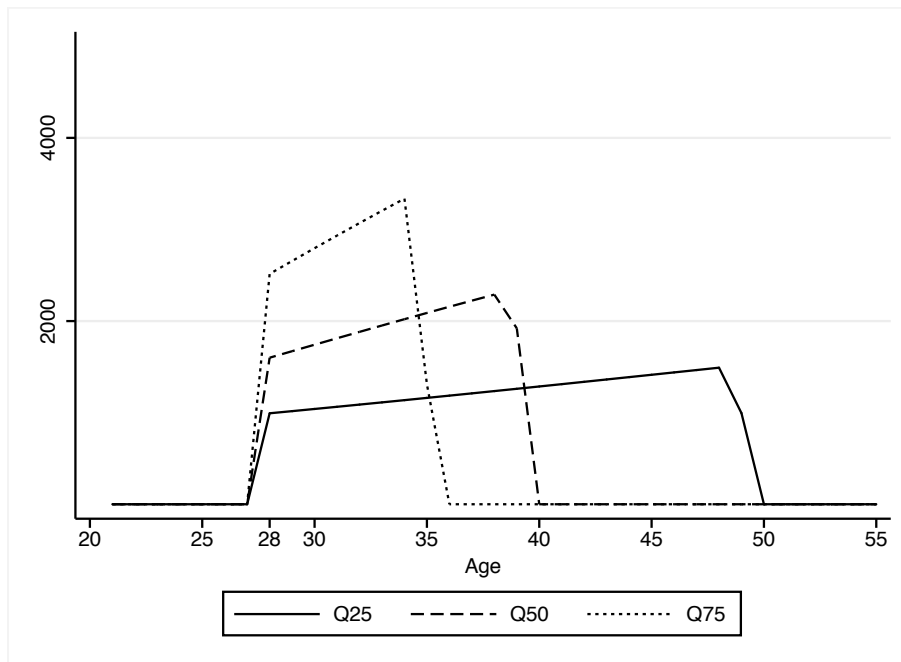
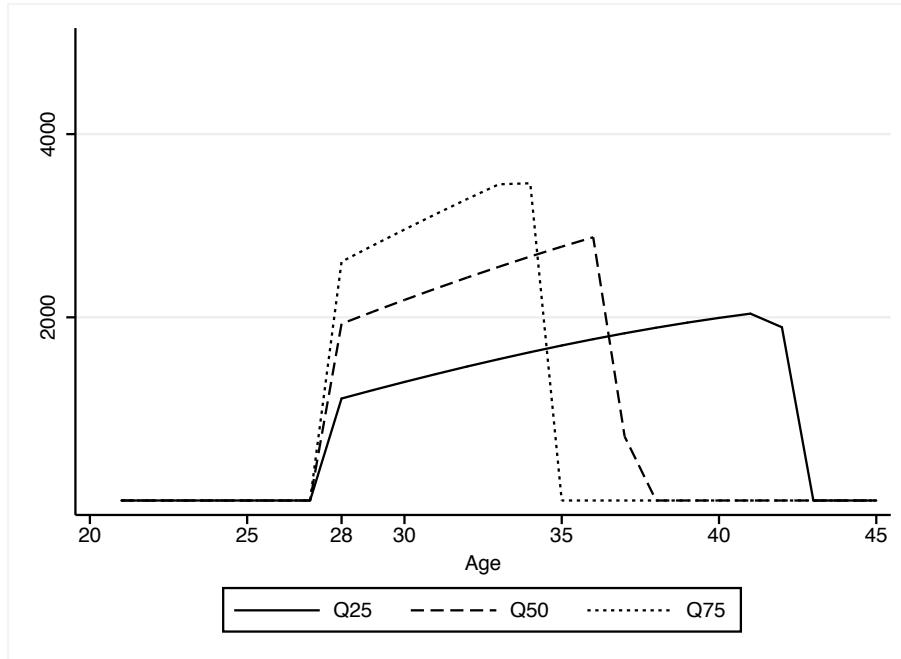Figure A3: Annual Income Contingent Loan Repayment – Men, East Germany

Figure A4: Annual Income Contingent Loan Repayment – Women, East Germany