

Rethinking repayment burden

Measurement issues and potential solutions

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Student loan repayment burden – why does it matter?

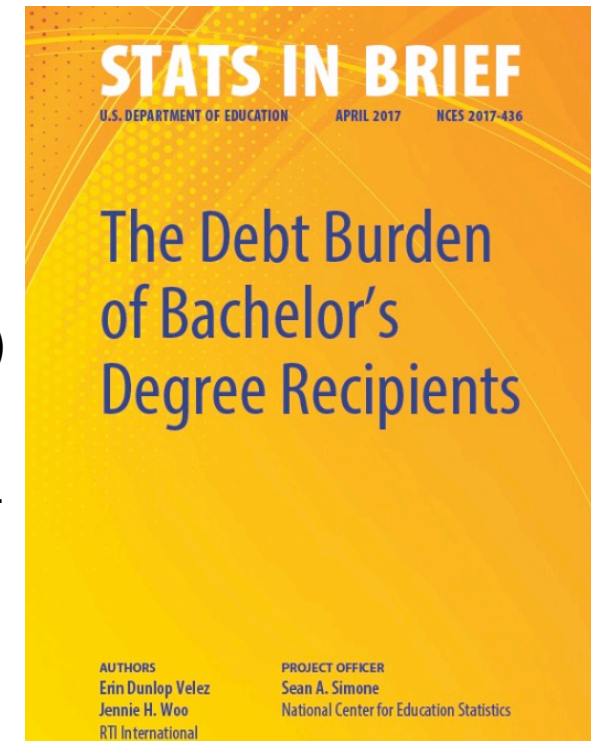
- ❖ Repayment burden reflects how difficult it is for debtors to repay the debt
- ❖ It is central to the analysis and design of student loans
 - ❑ For debtors, RB determines:
 - The consumption hardship associated with repaying debt (less money available for consumption)
 - The risk of default and credit reputation loss in case of severely high RB
 - Repayment anxiety associated with high expected RB
 - ❑ For government (as lender or guarantor), RB indicates:
 - How much government potentially needs to subsidize for defaults

How is RB currently measured?

$$RB_{it} = L_{it} / Y_{labor_it}$$

- ❖ Used by both governments and academics
 - ❑ To calculate RBs in various countries (Chapman & Doris 2017, Dearden 2017)
 - ❑ To define a manageable RB and proportion of graduates with unmanageable debts (Daniere 1969; Greiner 1996; Harrast 2004; Baum & Schwartz 2006)
 - ❑ To recommend policies to ease RB (Shireman *et. al.* 2006)
- ❖ Empirical application:
 - ❑ L_{it} : characterize a typical loan repayment due to either lack of loan data or heterogeneity of loans
 - ❑ Y_{it} : debtor's labor income at each age

*“Debt burden – the ratio of monthly loan repayments for all student loans to monthly salary”
(US Dept. of Education, 2017)*



Current measure of RB is problematic

$$RB_{lit} = L_{lit} / Y_{labor_it}$$

❖ Assumptions:

- ❑ Debtor has only labor income
- ❑ Debtor receives no financial support – individual based
- ❑ Ignore consumption needs

❖ Some empirical inconsistencies:

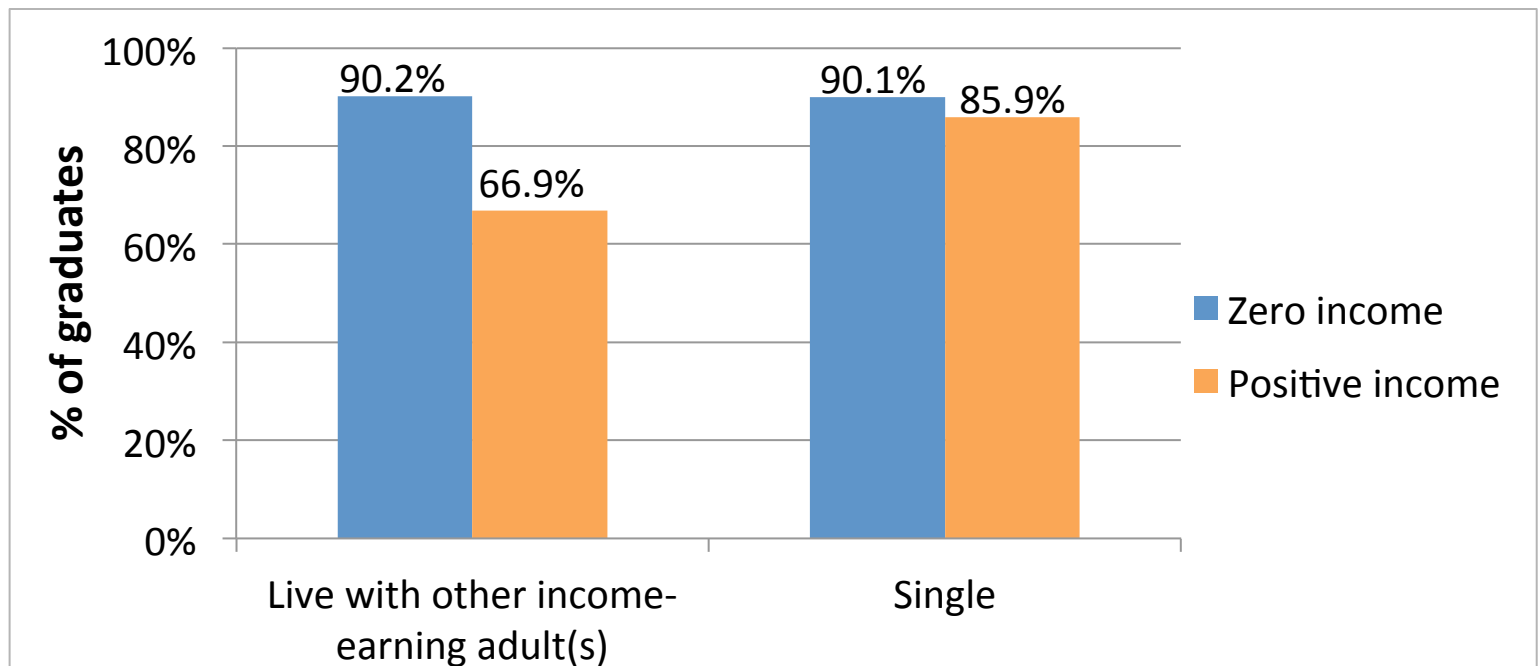
- ❑ Net income vs. gross income
- ❑ Consumption has been acknowledged but scantily considered

“It is useful to consider the scale of these payments in the context of other household expenses” (Akers 2016)

→ Incomplete picture of repayment ability

Intriguing findings on Korea

- ❖ Low loan delinquency rate (5.5%) despite:
 - ❑ 40% of graduates <30 yrs old reported zero earnings for last year
 - ❑ Bottom 20% of female graduates of all ages earn next to nothing
- ❖ But: 90% of zero-earnings young graduates live with other earning adult(s)



Rethinking debtor's repayment problem

- ❖ The repayment-to-income ratio is not about affordability
 - ❖ It only indicates the maximum liquidity a debtor can pay out
- ❖ Capturing the intra-household allocation of income, consumption, and repayment obligation is both a conceptual and empirical issue
- ❖ Re-visit the meaning of RB:
 - ❑ Who actually repays the debt?
 - ❑ Whose welfare is affected by the repayment obligation?
 - ❑ From what sources does the money come from?
 - ❑ What is an excessive level of RB, i.e. when does consumption hardship happen?

Two alternative measures

1

$$\frac{\sum Y_{it} - \sum C_{it}}{\sum L_{it}}$$

Assumptions: Incomes and debts are pooled and shared in the same way among HH members

Interpretation: The % of HH income net consumption required to repay the debt(s).

- If $\leq 100\%$: the HH can fully repay their debt(s) after spending on consumption.
- If $> 100\%$: the HH must cut their consumption to repay the debt, i.e. the debt causes consumption hardship for the whole HH.

Caveat: Unit of analysis is the HH. Ambiguous whether the debtor's share of HH resource can fully cover the debt.

2

$$\frac{L_{it}}{1/hhsize} \div (\sum Y_{it} - \sum C_{it})$$

Assumption: Incomes are pooled and shared among HH members, but debt is not. The debtor receives his/her share of HH income net consumption and uses it to repay the debt

Interpretation: The % of the debtor's share of HH income net consumption required to repay a typical debt.

- If $\leq 100\%$: the debtor can meet repayment obligation after paying for his consumption, without affecting other HH members.
- If $> 100\%$, the debtor needs additional money from others' share to cover his/her debt, i.e. the debt directly affects not only the debtor, but also his/her family.

Caveat: Sensitive to equivalence scale, but more conservative than Measure 1

The challenges of measuring consumption

- ❖ What goods and services should be included in the consumption basket?
 - ❖ Cost of the consumption basket: actual cost vs. cost of a representative basket that represents the cost of a “basic living standard”
- Depends on how stringent we define consumption hardship and the impact of loan repayment on debtors' welfare

The challenges of measuring consumption

- ❖ If consumption hardship = having consumption below a certain threshold → use cost of a representative basket
 - ❑ Empirically, a quick way is to use the national poverty line.
 - ❑ In this way, Measure 1 or 2 being above 100% means that repaying the debt drives debtors into poverty

- ❖ If consumption hardship = a reduction in the wellbeing that debtors would experience in the absence of the debt and given their income → use actual cost to reflect variation in quality and prices
 - ❑ In this case, Measure 1 or 2 being above 100% does not necessarily mean loan repayment drives debtors into poverty, but it signifies a sacrifice of consumption nevertheless.

Illustration using Korean data

- ❖ Do the proposed measures tell different stories from the conventional one?
- ❖ How important is non-labor income?
- ❖ How important is consumption?
- ❖ How much would the story change if we use poverty line instead of actual household consumption?

Korea's time-based repayment student loan

- ❖ Coverage: approx. 29% of students (as of 2014)
- ❖ Average loan size of a 4-year degree (2016): 33 mil KRW (\approx AU\$38k or \approx 120% average annual after-tax income of graduates)
- ❖ Interest rate: 2.25% per annum (since 2017)
- ❖ Repayment duration:
 - ❑ max 10 years of grace period (interest payment only), plus
 - ❑ max 10 years of repayment (interest and principle)

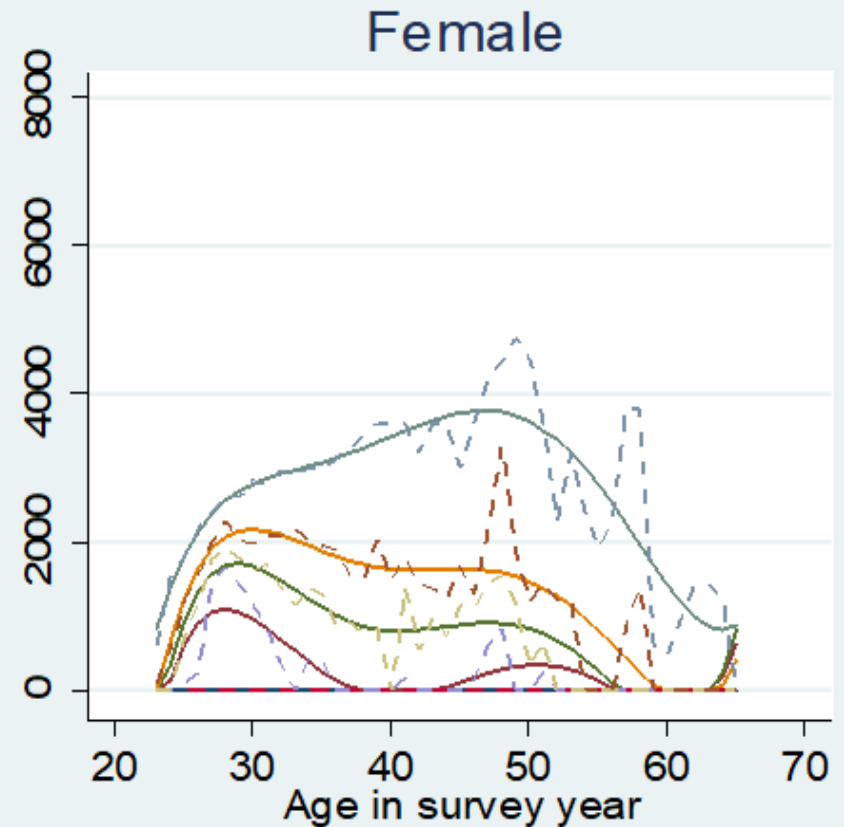
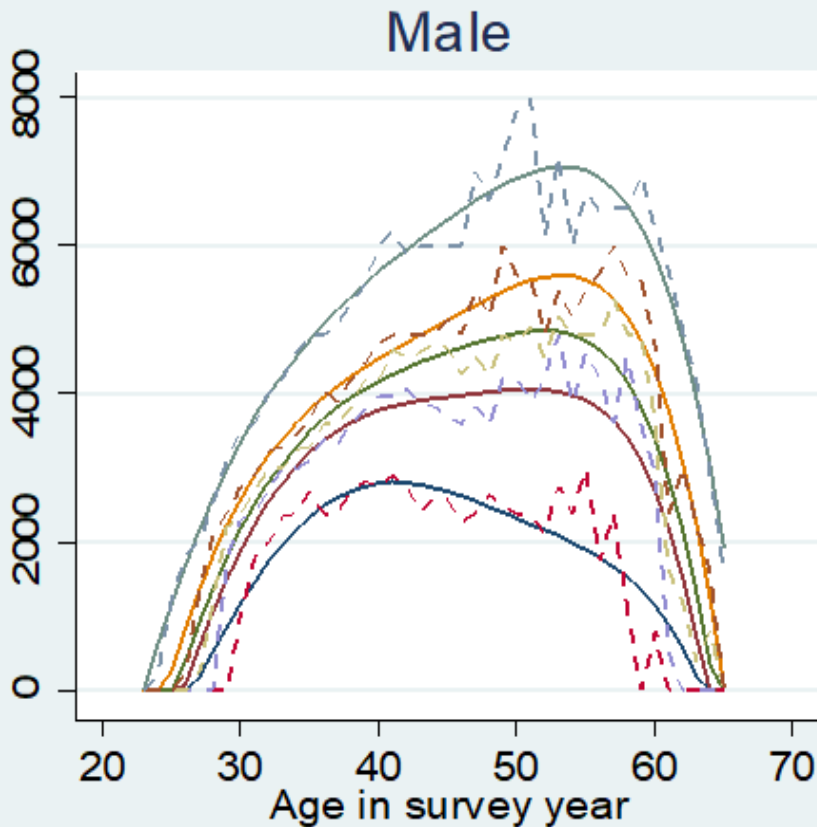
Data

- ❖ Data: KLIPS 2011-2015 (pooled)
- ❖ Income:
 - ❑ **Include**: after-tax labor income + financial returns + rent + social assistance + pension + transfers from non-household members
 - ❑ **Exclude**: lumpy infrequent items (sale of property, insurance refund, lottery), in-kinds income and home-produced goods (due to lack of data)
- ❖ Consumption:
 - ❑ **Include**: Food + FAFH+ Clothing + Housing (rent, utilities, maintenance) + Car maintenance + Public transportation + Communication + Health insurance + Education + Recreation + Essential HH items
 - ❑ **Exclude**: durables, health care, pension contribution, pocket money, other lumpy infrequent expenses (donations, ceremonies)
- ❖ Korea's national poverty line: 40% of median household income

Methodology

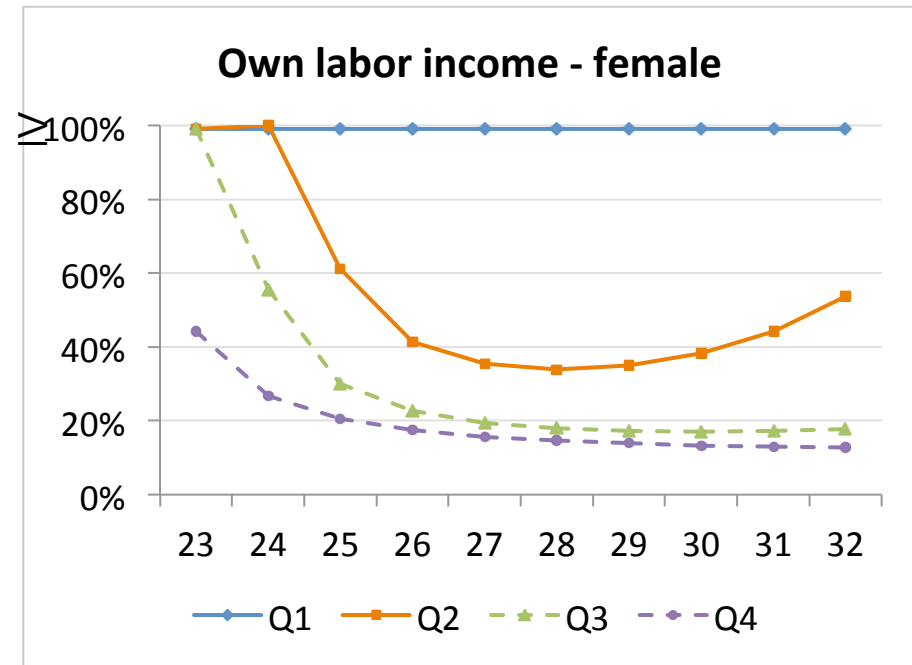
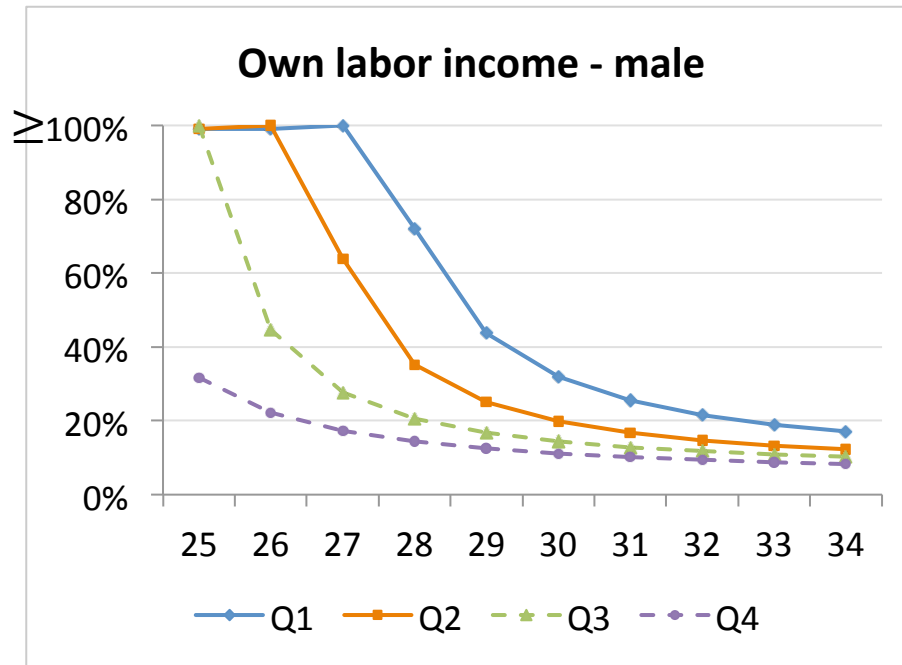
- ❖ Due to lack of loan data and heterogeneity of loan size, assume each graduate has an average loan that needs to be paid off within 10 years
- ❖ Age smoothing raw income quintiles to estimate individual and household incomes at each age over graduate's life time
- ❖ Adjust household size by OECD standard adult equivalent scale for Measure 2

Life-time income profiles of Korean graduates



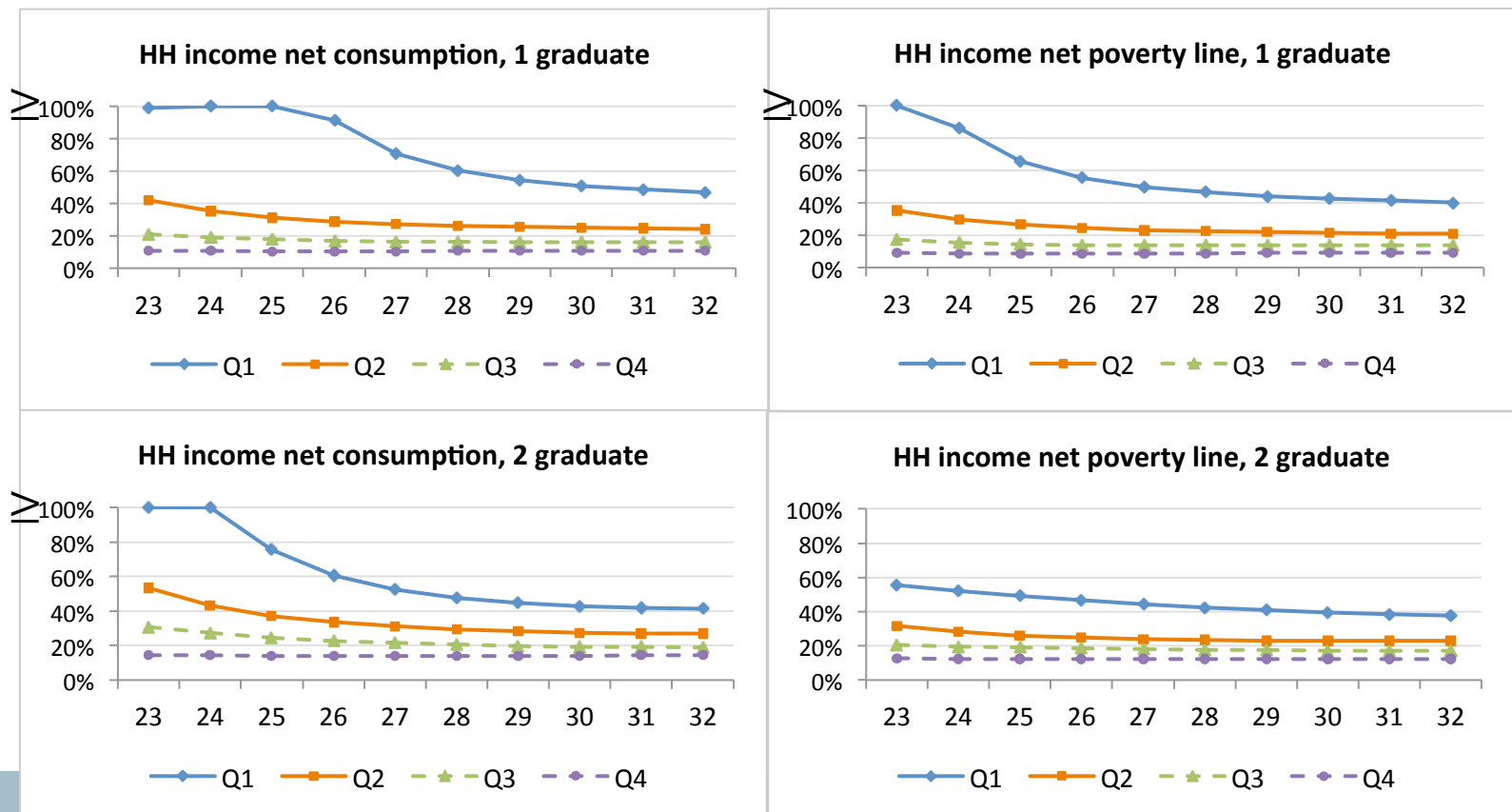
Repayment burden: Conventional measure

- ❖ Heavy RB with respect to own labor income, especially for graduates below 30 years old and the poorest 20% of female graduates regardless of their ages.
 - Imply high default risk



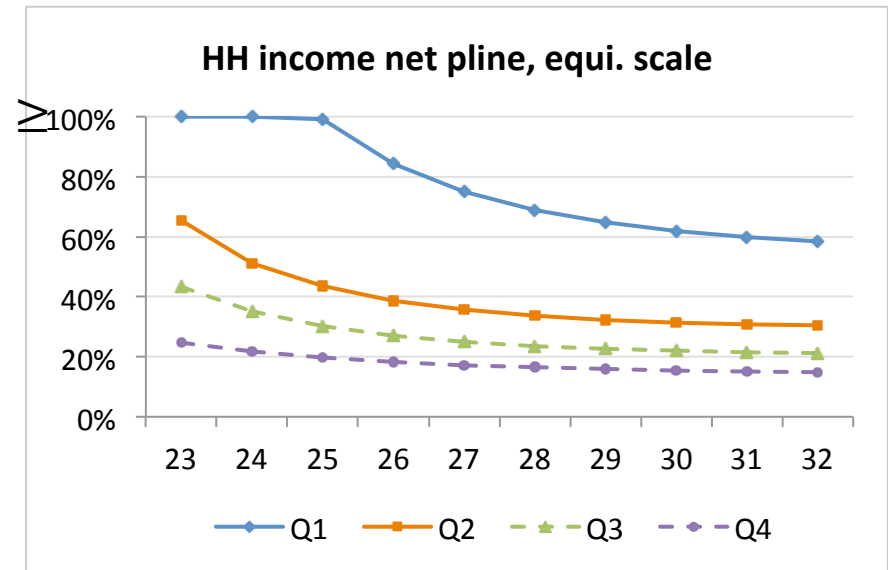
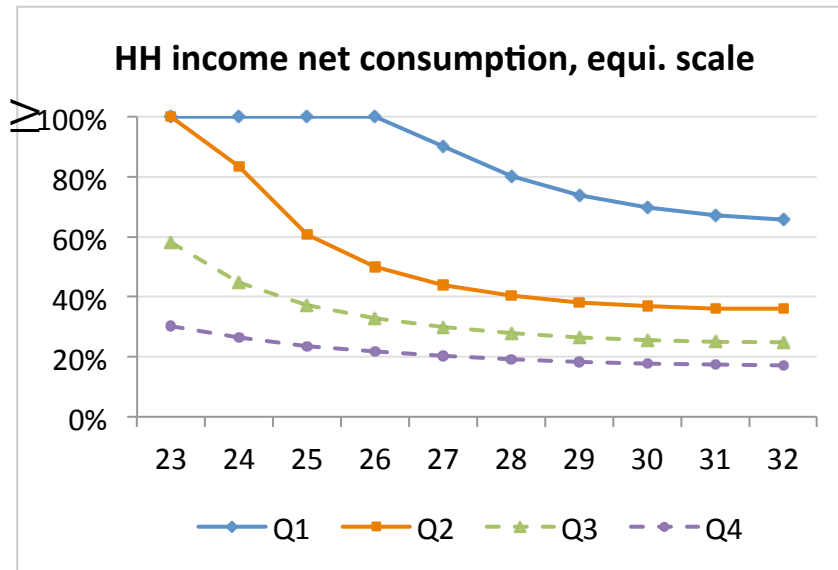
Repayment burden: Measure 1

- ❖ The poorest 20% of HH with graduates below 26 must cut their usual consumption to meet repayment obligations. But if they limit their consumption to the subsistent level of the poverty line, almost all debtors can repay.



Repayment burden: Measure 2

- ❖ The poorest 20% of graduates <27 yrs need additional support from their family on top of their share of HH income net consumption, to repay the debt.
- ❖ If HHs limit their consumption to the poverty line level, all graduates except those <26 yrs old from the poorest 20% can repay with just their share of HH resources
- ❖ Compared to the conventional measure: the proportion of debtors likely to be in trouble is much smaller



Conclusion

- ❖ The new measures both suggest a much lighter RB on Korea graduates than the conventional measure.
 - ❑ This is consistent with Korea's low loan delinquency rate and suggests that debtors indeed receive financial support from their families
 - ❑ The conventional repayment-to-income ratio might be misleading in countries where intra-household sharing is substantial
- ❖ Accounting for consumption is crucial
- ❖ Ignoring non-labor income considerably overestimates RB, esp. for the bottom 20%, who are less likely to work in the formal sector but more likely to receive social assistance and private transfers
- ❖ The notion of RB and consumption hardship should be interpreted with more nuance and clear research purpose



Thank you

Components of total income

Quintile of income per a.e.	Labor income	All non-labor incomes	Financial income	Social transfers	Rental income	Private transfers
Poorest 20%	81.2%	18.5%	0.9%	7.6%	1.1%	8.9%
Q2	91.3%	8.4%	0.6%	3.4%	1.5%	2.8%
Q3	93.0%	6.7%	0.5%	2.7%	1.2%	2.4%
Q4	93.6%	6.0%	0.7%	1.9%	1.7%	1.6%
Richest 20%	89.6%	8.8%	1.2%	2.3%	2.7%	2.7%

Measure 1 – when consumption data unavailable

❖ Definition:

$$RB\uparrow\downarrow t = HH \text{ total debt repayment} / HH \text{ total income} = \sum \uparrow \text{ } L\downarrow it / \sum \uparrow \text{ } Y\downarrow it$$

❖ Assumption:

- ❑ Both incomes and debt are pooled and shared in the same way among HH members
→ no need for per capita/per adult equivalence
- ❑ Empirically, without debt data: assume every graduate in the HH has a typical debt
→ HH total repayment = repayment for a typical debt x No. of graduates in the HH

❖ Interpretation:

- ❑ *The % reduction in income available to each HH member due to the debt repayment*
- ❑ This HH-based measure is similar to the conventional individual-based measure ($L\downarrow t / Y\downarrow t$), which measures the % reduction in debtor's own income after servicing the debt.
- ❑ The unit of analysis is the HH, not individual.

Measure 2 – when consumption data unavailable

❖ Definition:

$RB\uparrow 2 \downarrow t = \text{repayment for 1 debt/HH income per adult equivalent} = L\downarrow t / 1/HHsize \sum \uparrow \text{Y}\downarrow it$

❖ Assumption:

- ❑ Incomes are pooled and shared among HH member, but debt is not. The debtor receives his/her share of HH income and uses it to repay the debt.

❖ Interpretation:

- ❑ *The % of the debtor's per adult equivalence income required to repay a typical debt. Or the % reduction in per adult equivalence income available to the debtor after repaying the debt.*
- ❑ If >100%: the debtor's share of HH income is insufficient to repay the debt. He/she needs additional money from others' share to cover the debt. This means the debt directly decrease not only the debtor's welfare, but also his/her family's.
- ❑ If <100%: the debtor can repay the debt in full with his/her share of HH income without affecting other members' shares.

Measure 3 – with consumption data

❖ Definition:

$RB\uparrow 3 \downarrow t = HH \text{ total debt repayment} / HH \text{ total income net consumption} = \sum \uparrow \text{ } L \downarrow it / \sum \uparrow \text{ } Y \downarrow it - \sum \uparrow \text{ } C \downarrow it$

❖ Assumption: similar to Measure 1

- ❑ Both incomes and debt are pooled and shared in the same way among HH members
- ❑ Empirically, without debt data: assume every graduate in the HH has a typical debt

❖ Interpretation:

- ❑ The % of HH income net consumption required to repay the debt(s)
- ❑ If $\leq 100\%$: the household can fully repay their debt(s) after spending on consumption
- ❑ If $> 100\%$: the household must cut their consumption to repay the debt, i.e. the debt causes consumption hardship for the whole HH
- ❑ The unit of analysis is the HH, not individual.

Measure 4 – with consumption data

❖ Definition:

$RB\uparrow 4 \downarrow t = \text{repayment for 1 debt/HH income net consumption per adult equivalent} = L\downarrow t / 1 / HH\text{size}$
 $(\sum \uparrow \text{ } Y\downarrow it - \sum \uparrow \text{ } C\downarrow it)$

❖ Assumption: similar to Measure 2

- ❑ Incomes are pooled and shared among HH members, but debt is not. The debtor receives his/her share of HH income net consumption and uses it to repay the debt.

❖ Interpretation:

- ❑ *The % of the debtor's share of HH income net consumption required to repay a typical debt. Or the % reduction in per adult equivalent "saving" available to the debtor after repaying the debt.*
- ❑ If $\leq 100\%$: the debtor can meet repayment obligation after paying for his consumption, without affecting other HH members.
- ❑ If $> 100\%$, the debtor needs additional money from others' share to cover his/her debt. This means the debt directly affects not only the debtor, but also his/her family.

The under-estimation bias of ignoring consumption

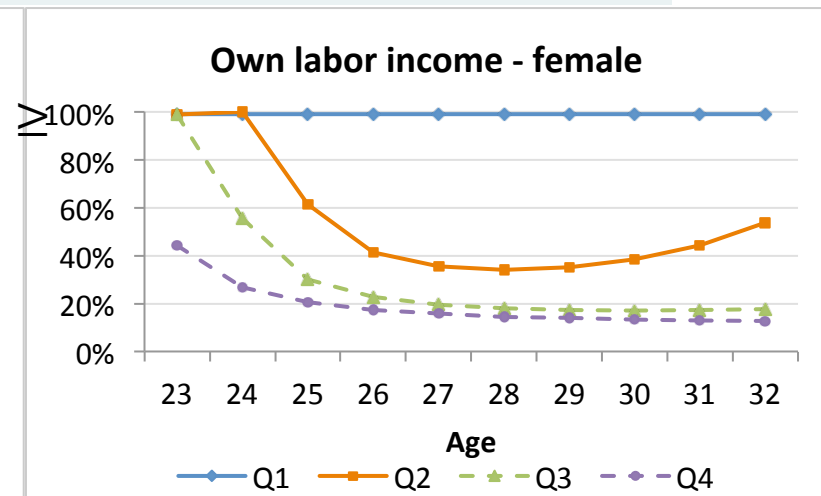
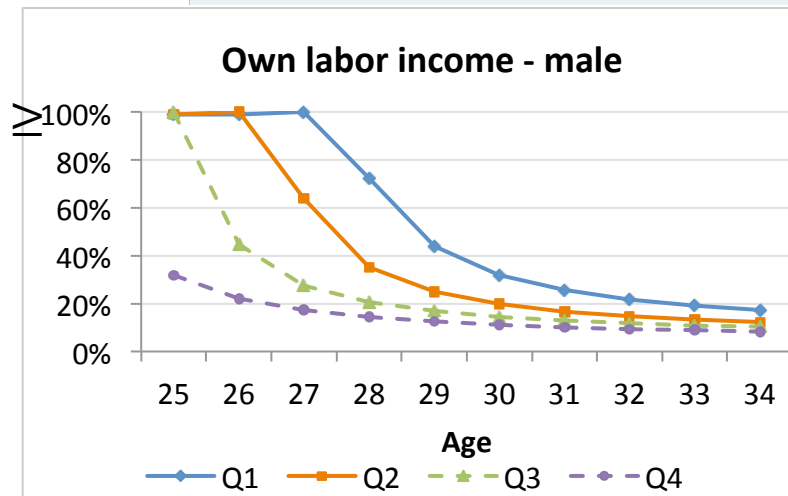
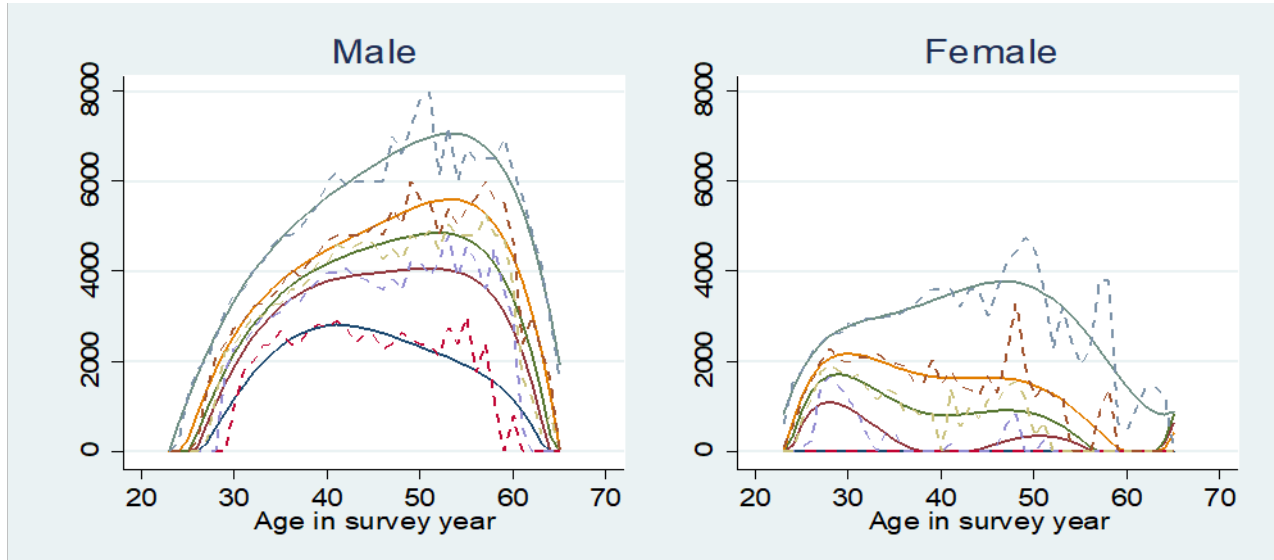
- ❖ Measure 1 and 2 both underestimate RB due to the exclusion of consumption

$$\frac{\sum_{it} L_{it}}{\sum_{it} Y_{it} - \sum_{it} C_{it}} \quad \text{vs.} \quad \sum_{it} Y_{it}$$

$$\frac{L_{it}}{hsize} \quad \text{vs.} \quad \frac{L_{it}}{hsize (\sum_{it} Y_{it} - \sum_{it} C_{it})}$$

- ❖ Absolute magnitude of the bias: $L/Y - C - L/Y = L \times C/Y(Y - C) = L \times \text{consumption budget share} / 1 (1 - \text{consumption budget share})$
- ❖ Relative magnitude of the bias, as % of the corresponding measure with consumption, is the consumption budget share (C/Y)
 - Intuitively, the larger the consumption budget share, the larger the bias.

Intriguing findings on Korea



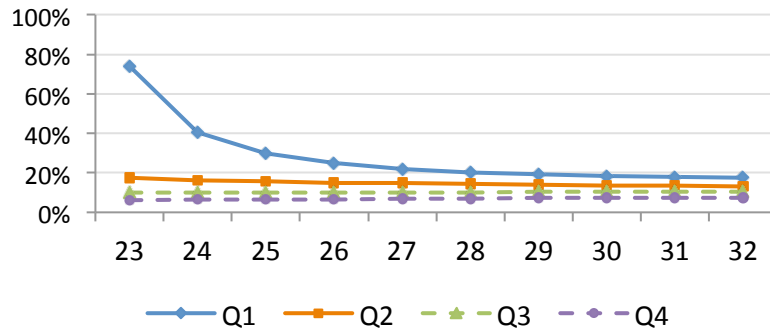
Repayment burden: Measure 1

1

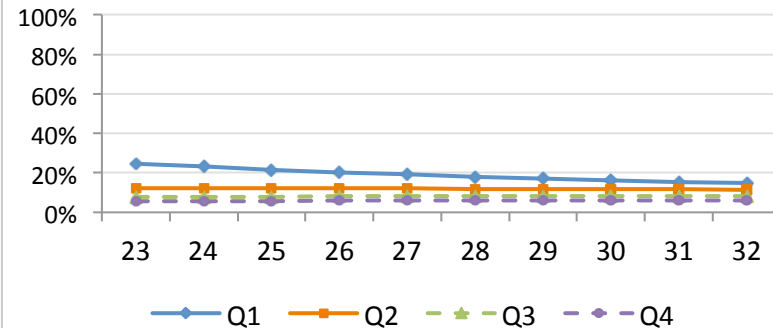
$$\frac{\text{HH total repayments}}{\text{HH total income}} = \frac{\sum \text{Lit}}{\sum Y_{lit}}$$

- ❖ Repayment amount is less than 25% of HH total income even among the Q20 → suggests much less repayment difficulty

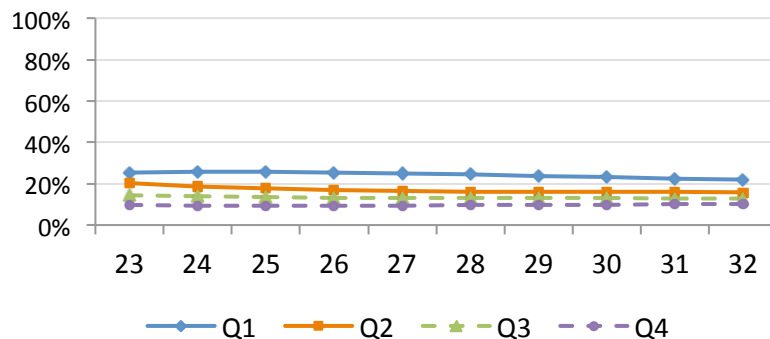
HH labor income, 1 graduate



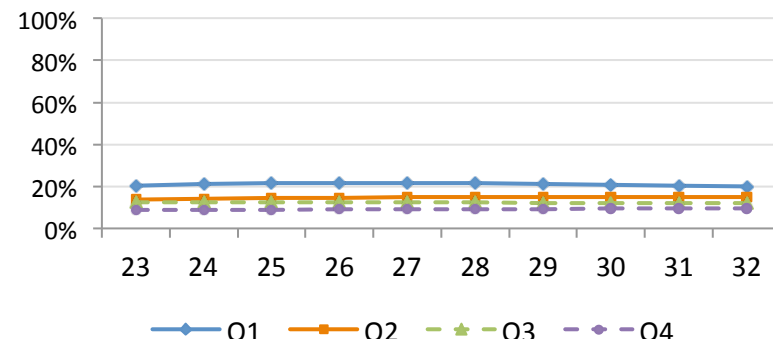
HH total income, 1 graduate



HH labor income, 2 graduate



HH total income, 2 graduate



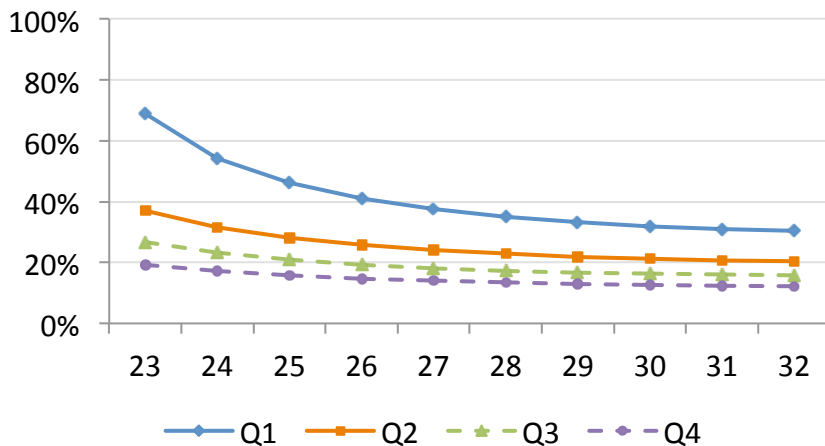
Repayment burden: Measure 2

2

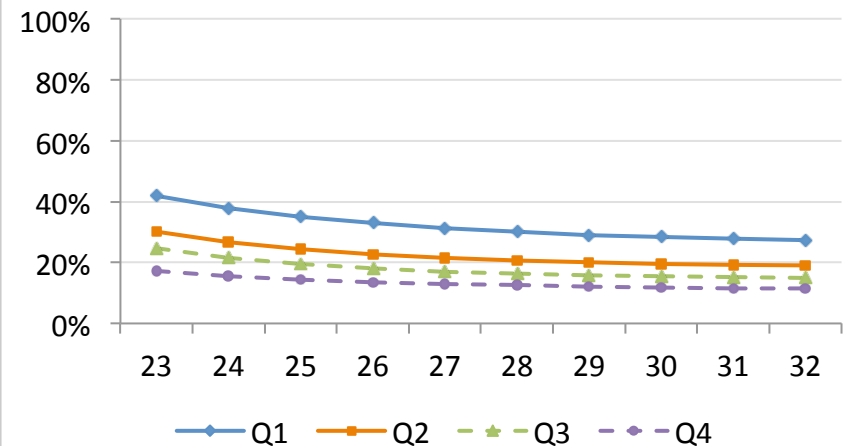
*repayment for 1 debt/
HH income pae = $L \downarrow t / 1 /$
hhsiz $\sum \uparrow \text{Y} \downarrow it$*

- ❖ Debtors in the Q40 need at most 40% of their share of HH income to meet repayment obligations
 - Again, suggests much less repayment difficulty
- ❖ Ignoring non-labor income considerably overestimates RB, esp. for bottom 20%

HH labor income, equivalent scale



HH total income, equivalent scale



Implication for ICL design

- ❖ Collection based on individual income might be costly for government when a larger proportion of graduates have no or little earnings but intra-household income sharing is substantial
 - ❑ Consider household-based collection
- ❖ Repayment threshold and repayment rate of ICL schemes should be based on consumption
 - ❑ They have been determined in a rather ad hoc manner, highly influenced by politics and partly the “8% rule”

Implication for ICL design

❖ To avoid consumption hardship:

❑ Individual-based collection: $Y_{lit} \geq L_{lit} + C_{lit}$

- threshold $> C_{lit}$
- repayment rate < 1 -budget share of basic consumption

❑ Household-based collection: $L_{lit} / 1/hhsize (\sum_{i \in hh} Y_{lit} - \sum_{i \in hh} C_{lit}) < 1$

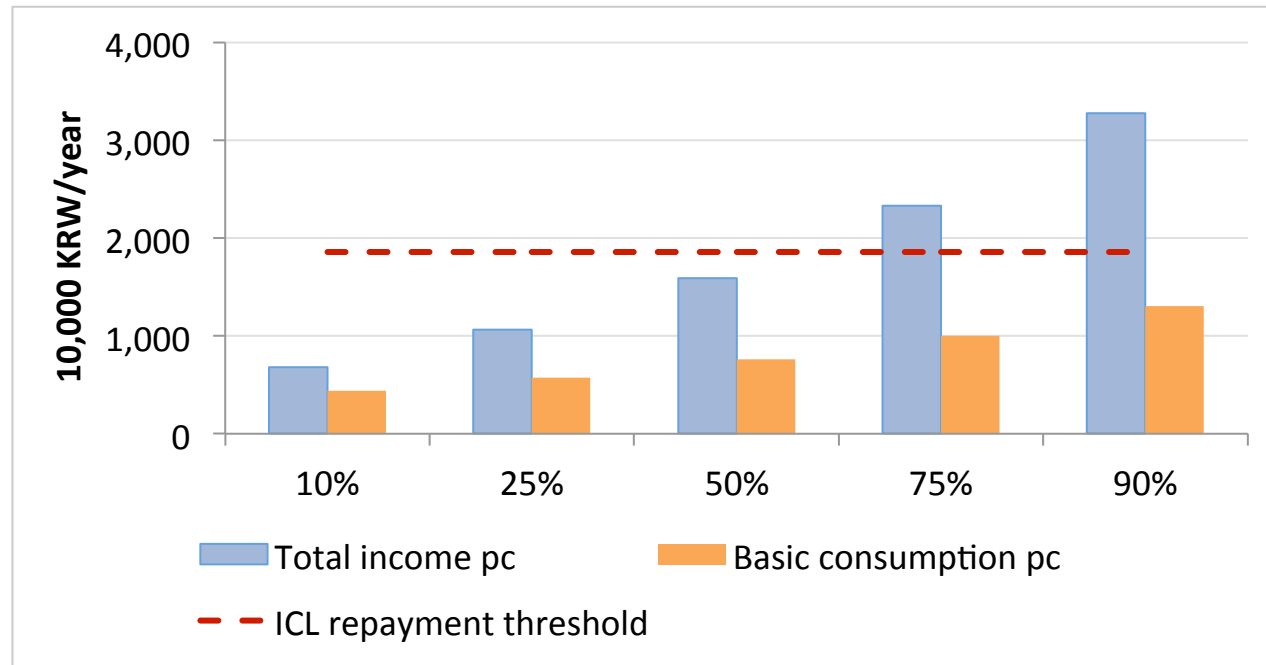
- threshold $> \sum_{i \in hh} C_{lit} / hhsize$
- repayment rate < 1 - budget share of “basic” consumption per adult equivalent scale

❖ Remaining debate: What is “basic” consumption for the purpose of loan collection?

- ❑ Balance between how much government wants to protect low-income debtors and how much they want to collect back

Implication for ICL design

- ❖ Current ICL repayment threshold in Korea is generous
 - above the median HH income per capita
 - above consumption per capita even among the richest 90%



Some empirical cautions

- ❖ Measuring income:
 - ❑ In-kind payment/transfers/gifts, food stamps

- ❖ Measuring consumption:
 - ❑ Imputed housing cost for home-owners: important to compare welfare across HHs or individuals, but maybe not necessary for RB analysis since we only need to calculate the amount of money available to pay student debt.
 - ❑ Consumption of own produces
 - Usually imputed using farm-gate price
 - Again, maybe not that important for RB analysis
 - ❑ Sensitivity of consumption to components of consumption baskets
 - Not straight-forward items, e.g. Health insurance, education
 - Best practice: follow the UN's COICOP and the national statistics office's practice

Issues with the current measure of RB

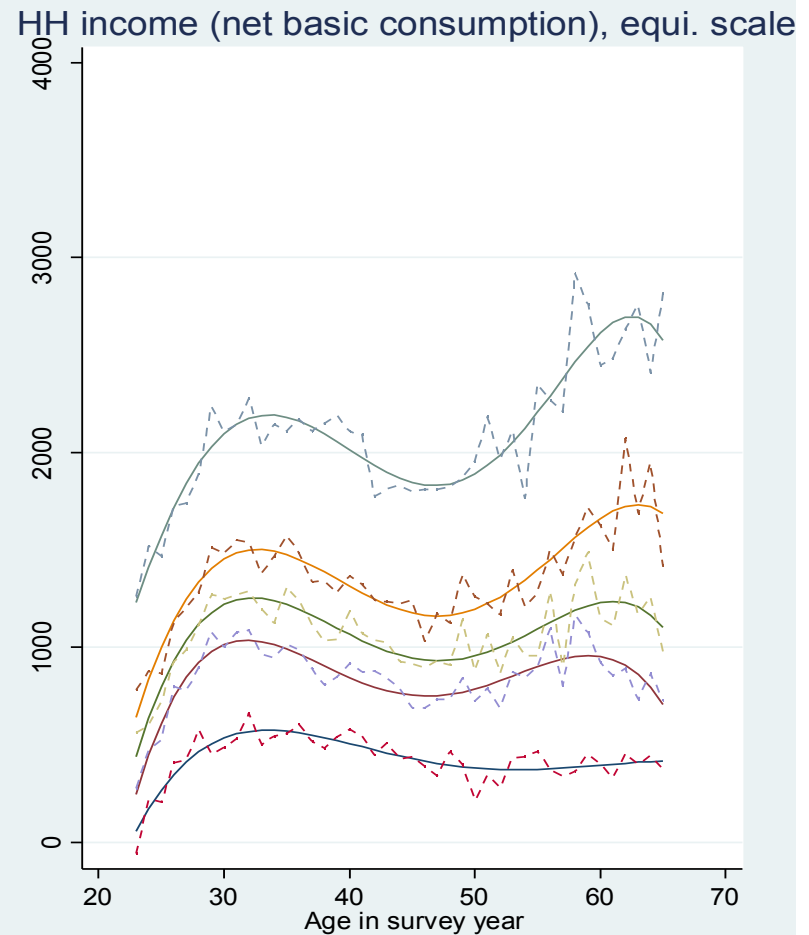
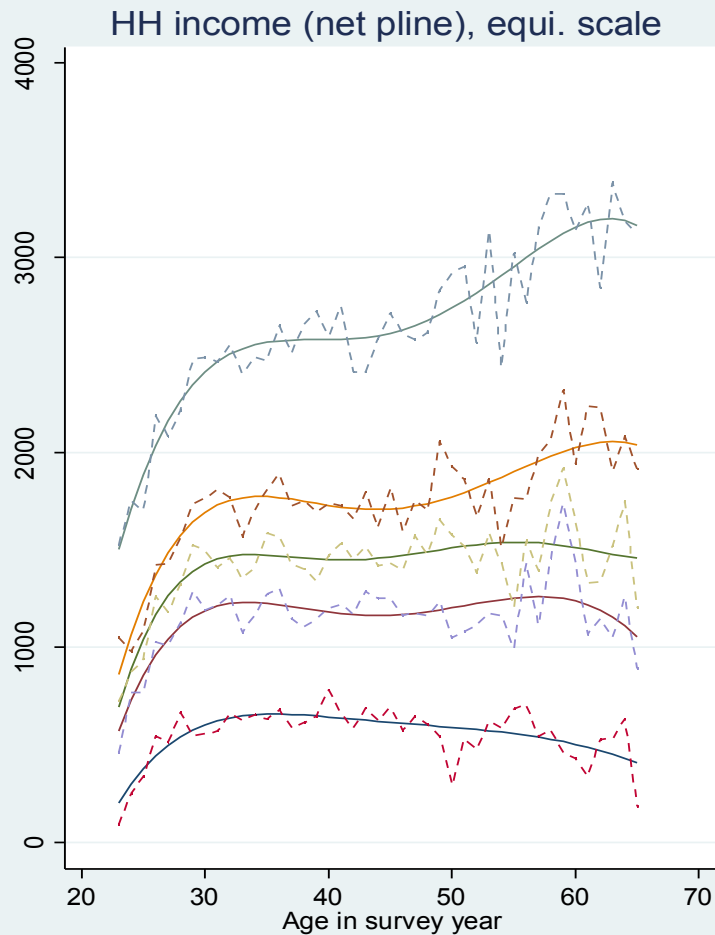
❖ Econometric issues: estimation of graduate income

- ❑ Until 2009, RB was calculated either at the mean graduate income or w.r.t. specific case studies.
- ❑ Since 2010, RB calculation using graduate income distribution by age and gender
- ❑ Conditional vs. unconditional quantile regression
- ❑ Static (assumes no income mobility across time) vs. dynamic
 - *Discussed and being improved in Higgins (2011), Higgins & Sinning (2013), Dearden (2017)*

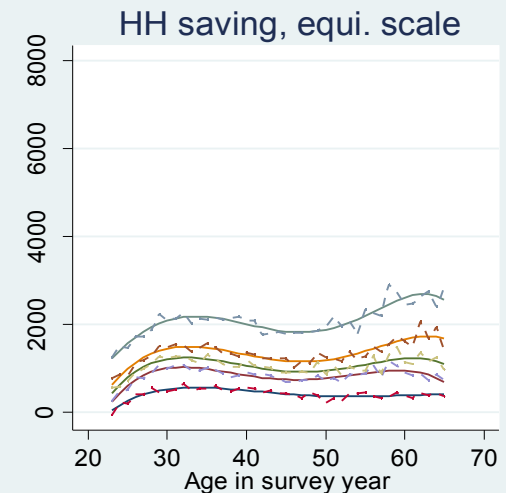
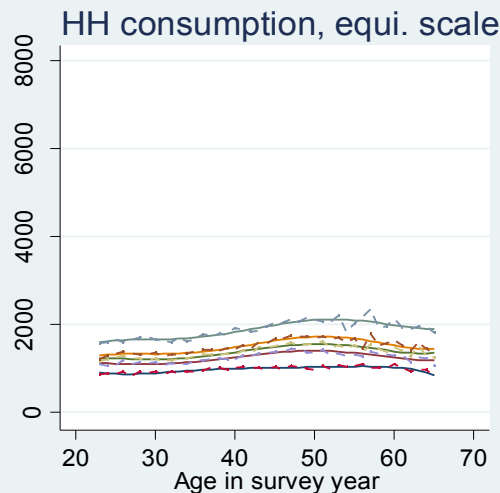
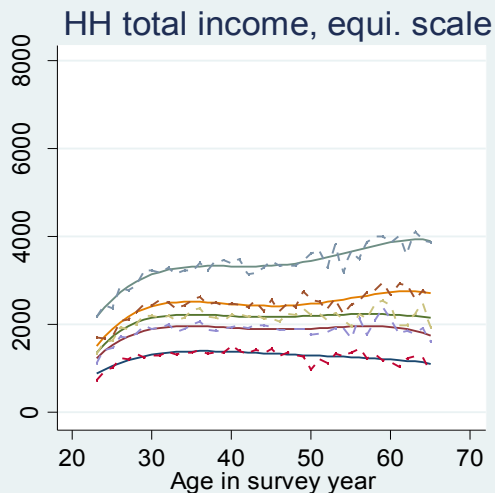
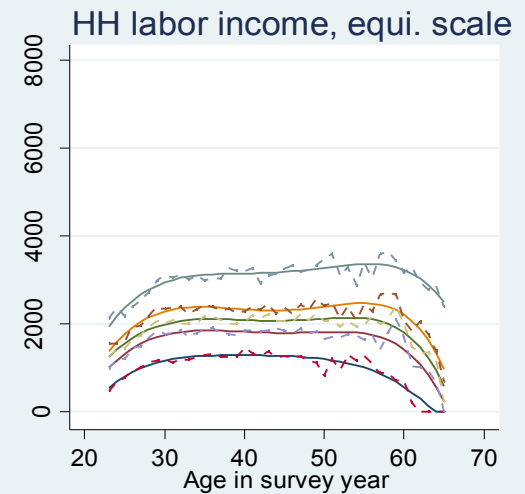
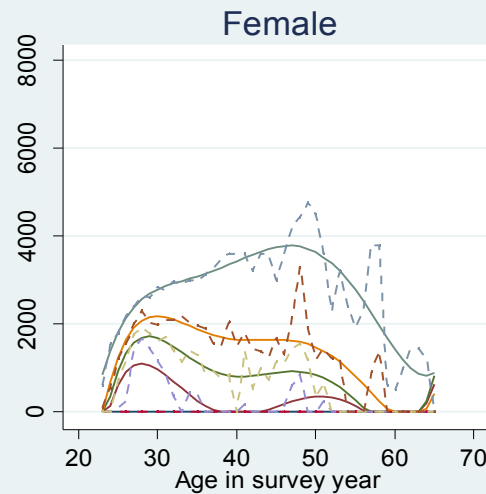
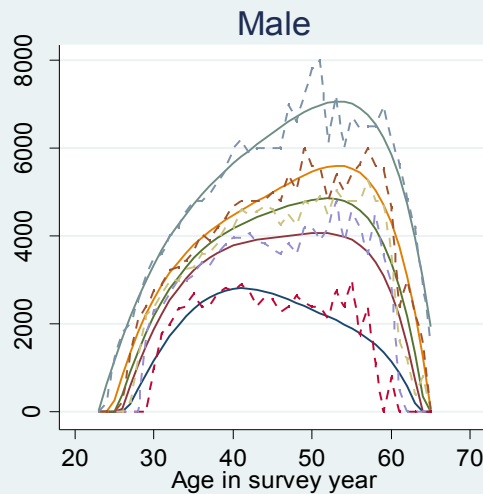
❖ Data issues:

- ❑ Impact of reference period on measurement of income
 - ❑ Other impacts of questionnaire design. E.g.
 - Income from secondary jobs?
 - In-kind earnings? Bonus, over-time payment?
 - Responded by each working-age individual in the HH or by only 1 respondent for the whole household?
 - Probing questions on employment status (to exclude self-employed)
- *survey-specific*

Income net actual consumption vs. income net poverty line

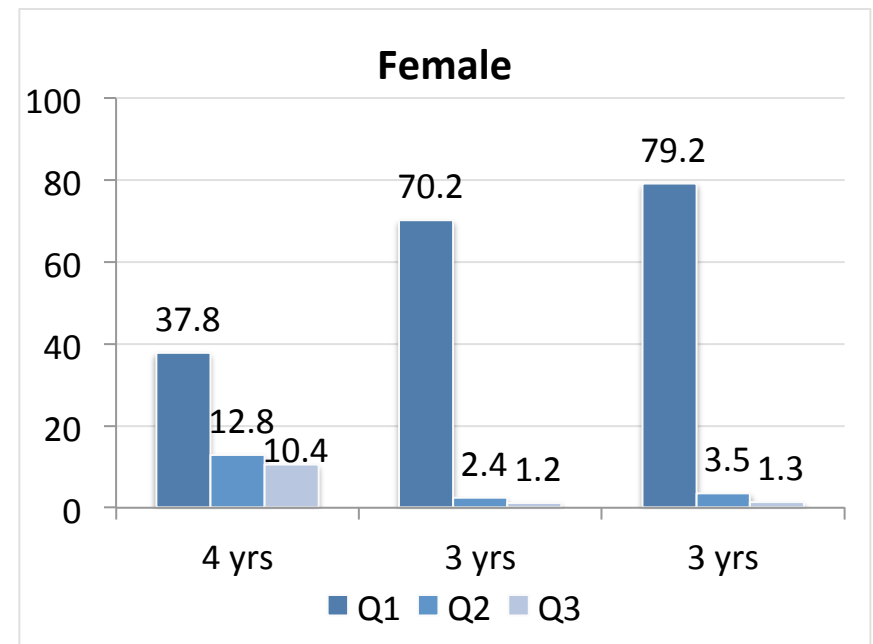
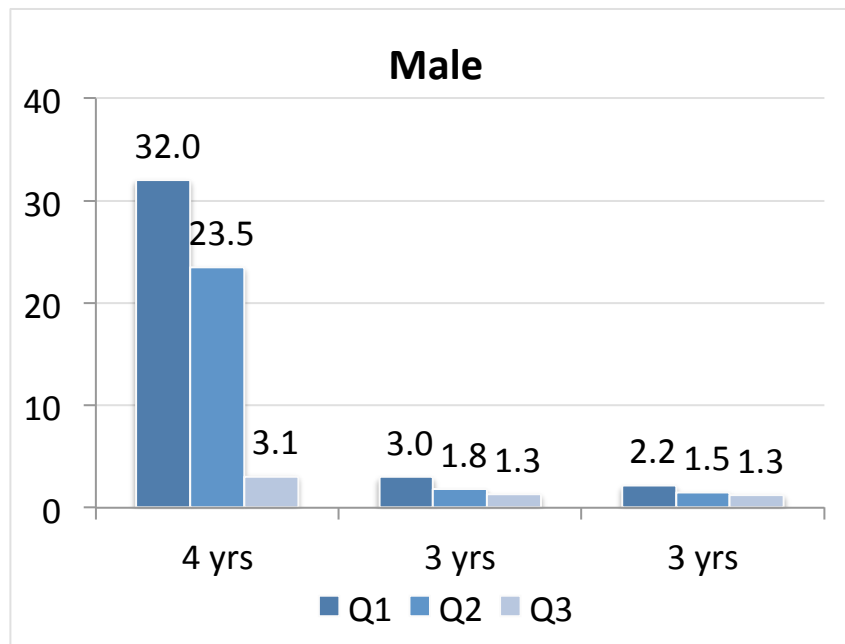


Own labor income and HH income per adult equivalent



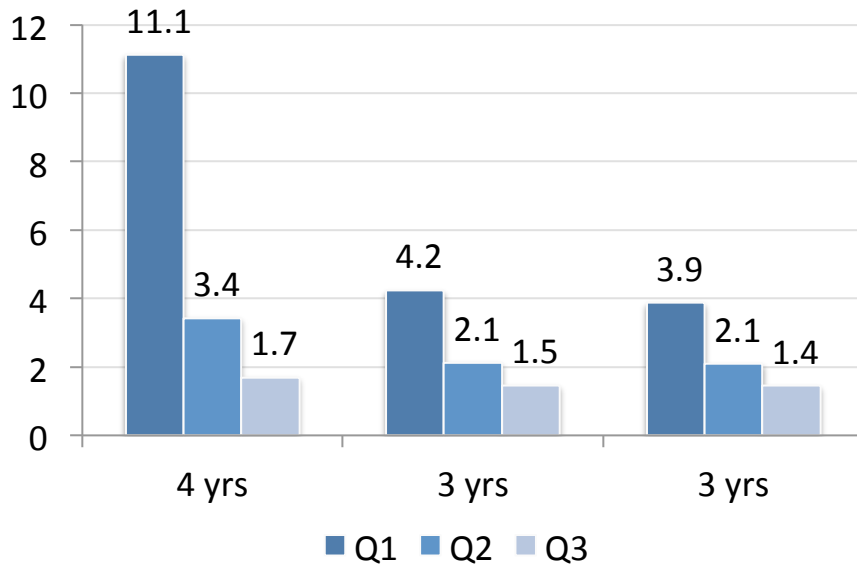
Inequality: Conventional measure

- ❖ Huge gaps in RB between the 80th percentile and the bottom 40% of the graduate earnings distribution
- ❖ Huge gap between the first 4 years and the remaining 6 years of a debtor's repayment period



Inequality: Measure 4

**HH total income net consumption,
equi. scale**



**HH total income net poverty line,
equi. scale**

