



COLLEGE EDUCATION AND INCOME CONTINGENT LOANS IN EQUILIBRIUM

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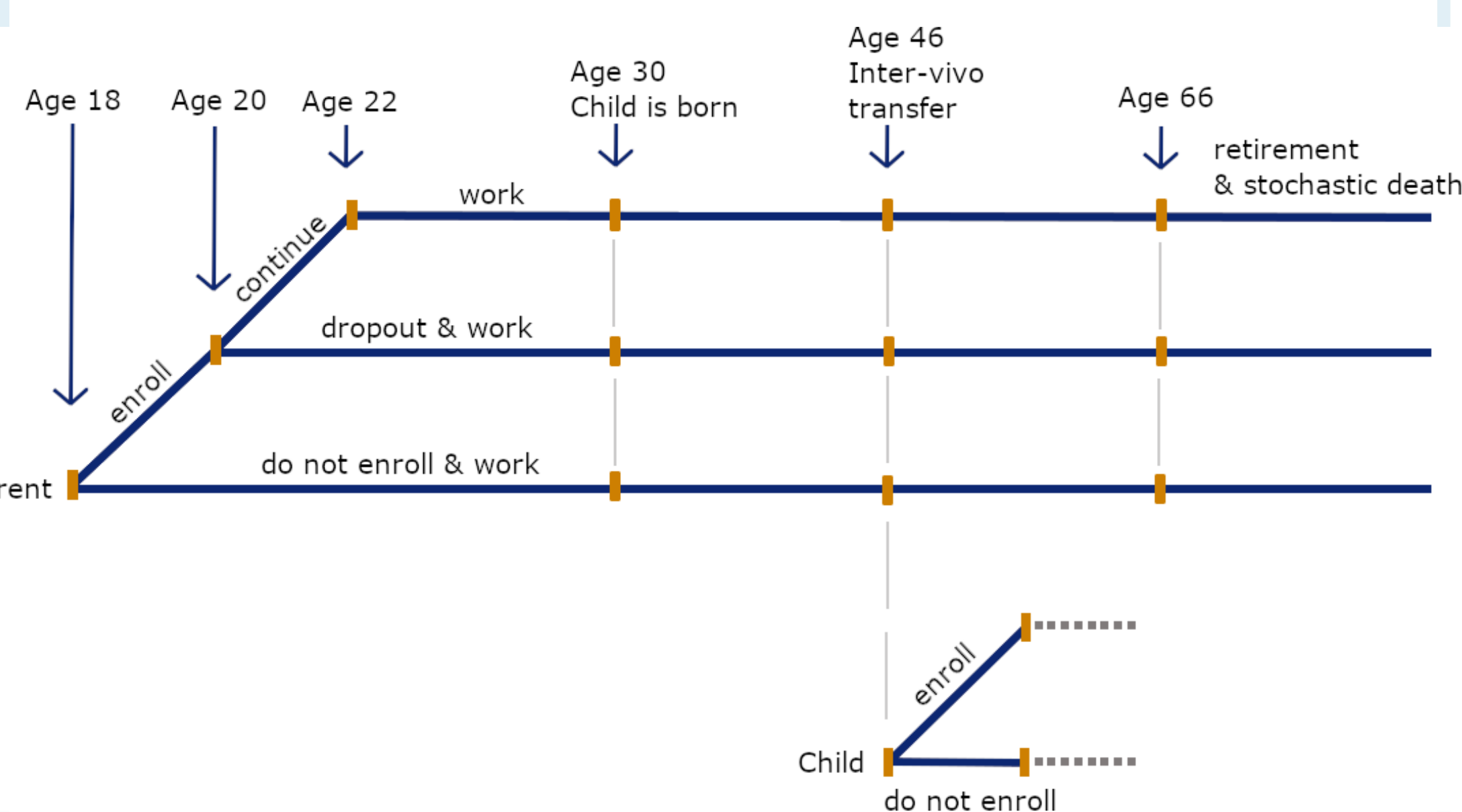
RESEARCH QUESTION & KEY TAKE-AWAYS

What are the welfare effects of the reform introducing income contingent loans (ICLs) in US?

- By insuring dropout and labor income shocks, the reform increases college enrollment and graduation.
- The reform triggers moral hazard by reducing incentives for educational effort and labor supplied (insurance-incentives trade-off). We show that these distortions are mild.
- The endogeneity of skill premium crowds-out a substantial share of ICLs positive impact. Hence, these long-run general equilibrium effects are relatively important to account for by policy-makers.

MODEL ECONOMY

- Heterogenous agents w.r.t. in-born ability, college taste, education, wealth and productivity.
- Life cycle stages of education, labor & pension:
 - College graduation is risky with higher edu. effort increasing prob. of success.
 - Labor productivity depends on age, ability, education and idiosyncratic productivity shocks.
- Overlapping generations with parents bequeathing children at age 18 when they become independent. Child's in-born ability is correlated with parent's.
- Representative firm employing physical K & human capital H to produce using $Y = K^\alpha H^{1-\alpha}$:
 - H aggregates imperfectly substitutable high- and low-skilled \rightarrow endogenous skill premium.
 - Dropouts work as low skilled labor (but earn wage premium over high school graduates).
- General equilibrium effects through market prices.
- Incomplete markets (only self-insurance and adjustments in labor hours available).
- Government raising tax revenue to finance student loans (net of repayments), college subsidies, pensions & wasteful consumption.



2009 REFORM IN THE US

Before the reform college debt was repaid under the "Fixed Repayment Scheme" requiring constant repayments over time, with very little flexibility.

The reform introduced:

- Poverty threshold exempting borrowers with income below \approx \$30,000 annually from repayments.
- Repayment rate of 10% on income above the poverty threshold.
- Protection from upside risk (switching back to the Fixed Repayment Scheme is always possible).
- Residual debt is cancelled after 20 yrs of payments.

CALIBRATION

We calibrate the model in stages:

- **First**, we set externally a number of parameters based on literature and institutional setup in US.
- **Second**, we use micro-data from NLSY and PSID to estimate the labor productivity process over life-cycle separately for each education group (graduates, dropouts and high school).
- **Third**, we derive further moments from NLSY, PSID, CPS and literature and employ Simulated Method of Moments to finalize the calibration. We target 18 moments with 15 parameters.

Validation:

- The fit of moments matched is very good.
- We match well a number of non-targeted moments, such as the mean number of hours spent studying, overall progressivity of the tax system, and life cycle patterns.
- We show that responses of enrollment and graduation margins in 2 experiments (increasing subsidies and borrowing limit) compare very well with evidence from the applied literature.

RESULT #1: ICLs EVALUATION & ROLE OF MORAL HAZARD AND GE

We study effects of the reform by comparing outcomes between different stationary equilibria (w/o accounting for transitions). We find that the reform:

- generates a welfare improvement equivalent to 0.82% increase in consumption in every period,
- by reducing riskiness of college education, it triggers higher enrollment and graduation,
- is not self-financing, but requires a tiny increase of labor income tax rate,
- triggers a 4% reduction in skill premium due to increased supply of skill,
- allows for more leisure (lower labor supply).

Statistic	Fixed	ICL	ICL control h_e	ICL control h_e & h_l	ICL control SP
Average cons.-eq. welfare gain		+0.82%	+0.90%	+1.02%	1.14%
\hookrightarrow Share due to insurance		\hookrightarrow 46%	\hookrightarrow 37%	\hookrightarrow 34%	\hookrightarrow 20%
Share of college enrollees	75.3%	78.6%	78.6%	78.5%	78.0%
Share of college graduates	32.3%	33.1%	33.1%	33.1%	33.6%
Skill premium (SP)	90.0%	86.4%	86.5%	85.8	88.3%
Educational effort h_e	23.7%	23.2%	23.2%	23.2%	22.9%
Mean ability of enrollees	5.15	5.14	5.14	5.14	5.14
Labor hours h_l of CG	36.5%	35.5%	35.6%	36.2%	35.5%
Labor hours h_l of CD	33.3%	33.0%	33.0%	33.0%	32.9%
Labor hours h_l of HS	31.6%	31.5%	31.6%	31.6%	31.3%
Labor income tax rate	35.2%	35.6%	35.6%	35.5%	35.4%

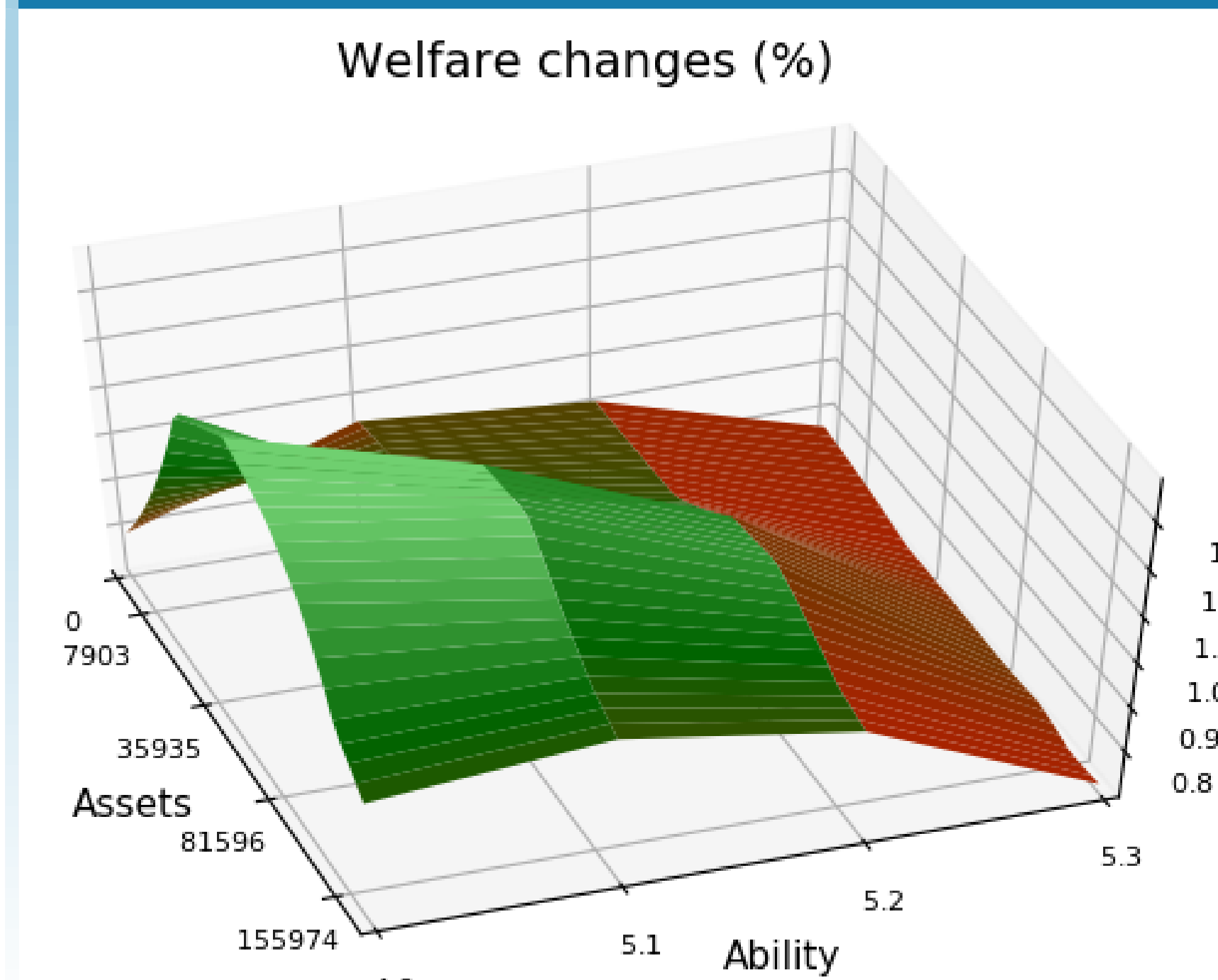
Role of moral hazard:

- Reform triggers an insurance-incentives trade-off.
- In the college: lower incentives for exerting educational effort.
- In the labor market: lower incentives for supplying labor (since repayments are income contingent).
- Controlling for both sources of moral hazard increases the welfare impact of ICLs only by 20%.

Role of GE effects through skill premium:

- Reform increases supply of high skilled workers.
- This reduces the skill premium, providing additional redistribution and insurance through market forces.
- As such, GE effects compete with the ICL reform.
- Controlling for endogeneity of skill premium raises the positive impact of ICL reform by 40%.

RESULT #2: HETEROGENEOUS IMPACT OF THE REFORM



The reform affects newborn population differently, depending on agents parental wealth and in-born ability.

- We find that all agents benefit from the reform (upon averaging out heterogenous college taste).
- The reform allows for higher college enrollment among the most risk averse agents.
- As such, the highest gains accrue to disadvantaged agents with lowest ability and low-to-middle asset positions.