

**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 bequesting 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 $Y = K^eH^{1\alpha}$.
- $H$ aggregates imperfectly substitutable high- and low-skilled → 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

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Fixed</th>
<th>ICL control $h_e$</th>
<th>ICL control $h_e$ &amp; $h_l$</th>
<th>ICL control SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average cons.-eq. welfare gain</td>
<td>$+0.82%$</td>
<td>$+0.90%$</td>
<td>$+1.02%$</td>
<td>$1.14%$</td>
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<tr>
<td>Share due to insurance</td>
<td>$\leftrightarrow 46%$</td>
<td>$\leftrightarrow 37%$</td>
<td>$\leftrightarrow 34%$</td>
<td>$\leftrightarrow 20%$</td>
</tr>
<tr>
<td>Share of college enrollees</td>
<td>$75.3%$</td>
<td>$78.6%$</td>
<td>$78.6%$</td>
<td>$78.5%$</td>
</tr>
<tr>
<td>Share of college graduates</td>
<td>$32.3%$</td>
<td>$33.1%$</td>
<td>$33.1%$</td>
<td>$33.1%$</td>
</tr>
<tr>
<td>Skill premium (SP)</td>
<td>$90.0%$</td>
<td>$86.4%$</td>
<td>$86.5%$</td>
<td>$85.8$</td>
</tr>
<tr>
<td>Educational effort $h_e$</td>
<td>$23.7%$</td>
<td>$23.2%$</td>
<td>$23.2%$</td>
<td>$22.9%$</td>
</tr>
<tr>
<td>Mean ability of enrollees</td>
<td>$5.15$</td>
<td>$5.14$</td>
<td>$5.14$</td>
<td>$5.14$</td>
</tr>
<tr>
<td>Labor hours $h_l$ of CG</td>
<td>$36.5%$</td>
<td>$35.5%$</td>
<td>$35.6%$</td>
<td>$36.2%$</td>
</tr>
<tr>
<td>Labor hours $h_l$ of CD</td>
<td>$33.3%$</td>
<td>$33.0%$</td>
<td>$33.0%$</td>
<td>$33.0%$</td>
</tr>
<tr>
<td>Labor hours $h_l$ of HS</td>
<td>$31.6%$</td>
<td>$31.5%$</td>
<td>$31.6%$</td>
<td>$31.6%$</td>
</tr>
<tr>
<td>Labor income tax rate</td>
<td>$35.2%$</td>
<td>$35.6%$</td>
<td>$35.6%$</td>
<td>$35.5%$</td>
</tr>
</tbody>
</table>

**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 heterogeneous 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.