General Equilibrium Effects of Schooling Policy

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Now that we have estimated the model we want to use it for Policy Simulation

To see how this works, start with the basic supply and demand model

The price here will be return to schooling and the quantity will be college attenders
Labor market skills are just an example of a good that can be put into this framework

Workers supply skill

Employers demand skills

Prices paid are wages
Now let’s think about policy analysis in this really simple context.

Suppose that current price is $P$

Government now offers a price subsidy of $\pi$

Firm acts as if it faces a price of

$$\hat{P} = P + \pi$$
“Partial Equilibrium Analysis”

Ignore the fact that the return to schooling will change
“General Equilibrium Policy Analysis”

Producer acts as if she faces \( \hat{P} = P + \pi \)

But, consumer still acts as if she faces price \( P \)
Now put it all together
More generally, Partial Equilibrium effects are larger than General Equilibrium effects (as long as demand curves slope down)

Absolute and relative sizes depend on the slopes of these curves (elasticities)

Some examples:
In the end, whether general equilibrium is important is an empirical question

Depends on elasticity of supply and elasticity of demand
One goal of my work with Heckman and Lochner is to measure the effects of tuition subsidies.

Government helps pay some of the costs of college.

There are numerous examples of subsidies to education: Pell Grants, GI Bills, Georgia Hope Scholarship, Federal tax credits (Hope Scholarship Credit, Lifetime Learning Credit).

This is very similar to the examples we looked at above: price of college is reduced.
We use estimates from the same model

Recall that in making college decisions individuals worry about 4 things

- Earnings if they went to College
- Earnings if they went to High school
- Cost of attending college
- “Tastes” for college

For the partial equilibrium analysis of the tuition subsidy the key question is how sensitive schooling decisions are to tuition

This is like the slope of the supply curve above
We estimate this using the NLSY

We find that a $500 tuition subsidy would lead to an increase in college attendance of 5.3%

These estimates are large, but well within the range of the literature

Most research would stop here and claim this was the estimate of the effect of tuition subsidies on schooling
We worry about general equilibrium effects

Namely:

- In response to tuition subsidies more people go to college
- This makes high school graduates more “scarce” and college graduates more common
- As a result wages of college graduates will fall and wages of high school graduates will rise (moving along the demand curve)
- This “general equilibrium effect” causes fewer individuals to attend college mitigating the original “partial equilibrium effect”
The key question now is how do you estimate the slope of the demand curve?

That is how much do the relative wages of high school and college educated workers change in response to the shift in college attendance

This is dictated by the elasticity of substitution between high and low skilled workers
We essentially took advantage of the baby boom to answer this question.

In the 1970s there was a huge influx of college graduates into the economy for two reasons:

- Baby boom was large and there has been a big increase in college attendance over the 20th century. As a result, people entering the labor market had higher college than people exiting.
- Because of the draft exemption of Vietnam War, baby boom also had particularly high level of education.

We look at how much relative wage respond do to these changes (controlling for trend).
The next goal is to put them all together to see how much it matters

- Partial Equilibrium Effect: 5.3%
- General Equilibrium Effect: 0.49%

You can argue with many of the details of our model

You can also argue about how we estimated the parameters (they aren’t cooked though-these are well within the range of literature)

However, it would be hard to argue with our basic claim that "General Equilibrium Effects can be important"

As a result ignoring equilibrium effects could lead to very misleading policy evaluation and researchers interested in national education policies need to worry about them
A full analysis of the policy effect on different individuals is more complicated (and more interesting)

There are really four separate things going on

- Tuition subsidy itself
- Wages of College graduates fall (GE effect)
- Wages of High school grads rise (GE effect)
- Subsidy must come from somewhere: Taxes

We analyze the case in which taxes are financed by a flat tax on labor earnings from everyone
In our model we assume that there are four ability types (based on AFQT test scores)

There are also essentially 3 different types of people within each ability group

- High School subsidy or not
- College subsidy or not
- High school no subsidy/ College subsidy
- College no subsidy/ High School subsidy (GE)

The full analysis looks at the effect of the program on everyone.
<table>
<thead>
<tr>
<th>Group</th>
<th>(i) After-tax earnings using base tax</th>
<th>(ii) After-tax earnings</th>
<th>(iii) After-tax earnings net of tuition</th>
<th>(iv) Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-school-high-school</td>
<td>9.512</td>
<td>-0.024</td>
<td>-0.024</td>
<td>-0.024</td>
</tr>
<tr>
<td>(0.528)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-school-college</td>
<td>-4.231</td>
<td>-13.446</td>
<td>1.529</td>
<td>1.411</td>
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<tr>
<td>(0.025)</td>
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<tr>
<td>College-high-school</td>
<td>-46.711</td>
<td>-57.139</td>
<td>-53.019</td>
<td>-0.879</td>
</tr>
<tr>
<td>(0.003)</td>
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<tr>
<td>College-college</td>
<td>-7.654</td>
<td>-18.204</td>
<td>0.420</td>
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<tr>
<td>(0.444)</td>
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</tr>
<tr>
<td>Parameter</td>
<td>(i) Prices fixed</td>
<td>(ii) Prices vary</td>
<td>(iii) Percentage of sample</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------------------</td>
<td></td>
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<tr>
<td>Average treatment effect (ATE)</td>
<td>0.281</td>
<td>1.801</td>
<td>100</td>
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<tr>
<td>Treatment on treated (TT)</td>
<td>0.294</td>
<td>3.364</td>
<td>44.7</td>
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<tr>
<td>Treatment on untreated (TOU)</td>
<td>0.270</td>
<td>-1.225</td>
<td>55.3</td>
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<tr>
<td>Marginal treatment effect (MTE)</td>
<td>0.259</td>
<td>0.259</td>
<td>—</td>
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</tbody>
</table>

**LATE, $5,000 subsidy:**

<table>
<thead>
<tr>
<th>Partial equilibrium GE (HS→COL)</th>
<th>0.255</th>
<th>—</th>
<th>23.6</th>
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<tbody>
<tr>
<td>GE (COL→HS)</td>
<td>0.250</td>
<td>0.24</td>
<td>2.48</td>
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<tr>
<td>LATER</td>
<td>0.393</td>
<td>0.365</td>
<td>0.34</td>
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<tr>
<td>GE net TLATE</td>
<td>—</td>
<td>0.244</td>
<td>2.82</td>
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</tbody>
</table>

**LATE $500 subsidy:**

<table>
<thead>
<tr>
<th>Partial equilibrium GE (HS→COL)</th>
<th>0.254</th>
<th>—</th>
<th>2.37</th>
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<tbody>
<tr>
<td>GE (COL→HS)</td>
<td>0.250</td>
<td>0.247</td>
<td>0.24</td>
</tr>
<tr>
<td>LATER</td>
<td>0.393</td>
<td>0.390</td>
<td>0.03</td>
</tr>
<tr>
<td>GE net TLATE</td>
<td>—</td>
<td>0.264</td>
<td>0.27</td>
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