Returns to Schooling in the US: 1940 to 2000

Lance Lochner

Department of Economics
University of Western Ontario

June 2008
What do Private Returns to Schooling Reflect?

- Includes all personal benefits from additional schooling:
  - increased lifetime earnings
  - better health outcomes
  - personal satisfaction
  - more enjoyable jobs
What do Private Returns to Schooling Reflect?

- Includes all personal benefits from additional schooling:
  - increased lifetime earnings
  - better health outcomes
  - personal satisfaction
  - more enjoyable jobs

- Must subtract personal costs:
  - foregone earnings
  - tuition payments
  - higher tax payments
  - any distaste for school
What do Private Returns to Schooling Reflect?

- Includes all personal benefits from additional schooling:
  - increased lifetime earnings
  - increased health outcomes
  - personal satisfaction
  - more enjoyable jobs

- Must subtract personal costs:
  - foregone earnings
  - tuition payments
  - higher tax payments
  - any distaste for school
Social vs. Private Returns

- Social returns also include benefits and costs to society at large:
  - public education expenditures
  - higher tax revenues
  - changes in public health care expenditures
  - crime reduction
  - spillover effects from more educated co-workers
  - increased innovation

- Private returns determine individual decisions
- Social returns determine value to society as a whole
Discounting the Future

- Most schooling costs are up front, while benefits accrue throughout life
Discounting the Future

- Most schooling costs are up front, while benefits accrue throughout life
- Need a way to compare the value of different streams of lifetime benefits and costs

Note: investing a dollar today to receive a dollar 10 years later is a bad investment. You could have put today's dollar in the bank and earned interest for 10 years at a 5% interest rate, the return would be $1.63. This concept applies to education investments (tuition and foregone earnings) in the same way it applies to other investments. Discounting future income more than today's is a central issue in evaluating the returns to school.
Discounting the Future

- Most schooling costs are up front, while benefits accrue throughout life.
- Need a way to compare the value of different streams of lifetime benefits and costs.
- Note: investing a dollar today to receive a dollar 10 years later is a bad investment.
  - could have put today’s dollar in the bank and earned interest for 10 years.
  - at a 5% interest rate, the return would be $1.63.
Discounting the Future

- Most schooling costs are up front, while benefits accrue throughout life.
- Need a way to compare the value of different streams of lifetime benefits and costs.
- Note: investing a dollar today to receive a dollar 10 years later is a bad investment.
  - could have put today’s dollar in the bank and earned interest for 10 years.
  - at a 5% interest rate, the return would be $1.63.
- This concept applies to education investments (tuition and foregone earnings) in the same way it applies to other investments.
Discounting the Future

- Most schooling costs are up front, while benefits accrue throughout life.
- Need a way to compare the value of different streams of lifetime benefits and costs.
- Note: investing a dollar today to receive a dollar 10 years later is a bad investment.
  - could have put today’s dollar in the bank and earned interest for 10 years.
  - at a 5% interest rate, the return would be $1.63.
- This concept applies to education investments (tuition and foregone earnings) in the same way it applies to other investments.
- Discounting future income more than today’s is a central issue in evaluating the returns to school.
How can we Measure the Private Returns to School?

- Compare discounted present value (DPV) of lifetime net benefit streams
  - typically assume a (risk-appropriate) interest rate
How can we Measure the Private Returns to School?

- Compare discounted present value (DPV) of lifetime net benefit streams
  - typically assume a (risk-appropriate) interest rate
- Calculate internal rates of return (IRR)
  - discount rate that equates the DPV of two different lifetime benefit streams
  - if the IRR exceeds the (risk-appropriate) interest rate, then the ‘investment’ is considered profitable
How can we Measure the Private Returns to School?

- Compare discounted present value (DPV) of lifetime net benefit streams
  - typically assume a (risk-appropriate) interest rate
- Calculate internal rates of return (IRR)
  - discount rate that equates the DPV of two different lifetime benefit streams
  - if the IRR exceeds the (risk-appropriate) interest rate, then the ‘investment’ is considered profitable
- Analysis takes into account differences in earnings, tuition costs, and taxes (Heckman, Lochner, and Todd, 2007)
Earnings for by Education and Experience (White Men, 2000 Census)
Earnings for by Education and Experience (African American Men, 2000 Census)

- HS Dropout
- HS Graduate
- Some College
- College Graduate

Lance Lochner
Returns to Schooling in the US
## Rates of Return to HS Completion and College vs. HS (2000 Census)

<table>
<thead>
<tr>
<th>Return</th>
<th>White Men</th>
<th>African American Men</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HS Completion</td>
<td>College vs. HS</td>
</tr>
<tr>
<td>5% Interest Rate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diff. in DPV Income</td>
<td>74,000</td>
<td>121,000</td>
</tr>
<tr>
<td>Increase in DPV Income</td>
<td>28%</td>
<td>32%</td>
</tr>
<tr>
<td>10% Interest Rate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diff. in DPV Income</td>
<td>30,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Increase in DPV Income</td>
<td>26%</td>
<td>11%</td>
</tr>
<tr>
<td>Internal Rate of Return</td>
<td>46%</td>
<td>13%</td>
</tr>
</tbody>
</table>
Consider returns for the following schooling levels:

- High school completion
- Attending some college
  - two-year or three-year post-secondary degrees
  - dropouts from four-year BA/BS programs
- Completing college
  - compares two-years of college with four-years
- Completing college vs. completing high school
Returns to Schooling in the US

Lance Lochner
Returns to College Relative to High School (1940-2000 Censuses)

Internal Rate of Return

White Men
African American Men

Lance Lochner
Returns to Schooling in the US
Returns to College (1940-2000 Censuses)

**College Completion**

- White Men (College Completion)
- African American Men (College Completion)

**Some College**

- White Men (Some College)
- African American Men (Some College)

Year:
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000

Internal Rate of Return:
- 0
- 5
- 10
- 15
- 20
- 25

Data source: Lance Lochner, Returns to Schooling in the US
Average tuition levels rose considerably over the years
Average marginal tax rates have also risen over the years
Both of these factors reduce returns by a few percentage points in recent years but have little effect on overall time trends
Average Tuition and Marginal Tax Rates (1940-2000)
Effects of Taxes and Tuition on Returns to College vs. High School (White Men)

- No Taxes or Tuition
- Accounting for Tuition
- Accounting for Taxes & Tuition

Year:
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000

Internal Rate of Return:
- 0
- 5
- 10
- 15
- 20
- 25
- 30

Lance Lochner

Returns to Schooling in the US
Effects of Taxes and Tuition on Returns to College vs. High School (African American Men)

Year

Internal Rate of Return

No Taxes or Tuition
Accounting for Tuition
Accounting for Taxes & Tuition

Tuition

Taxes

Lance Lochner

Returns to Schooling in the US
Summarizing Returns for White Men

Returns to High School and College for White Men

Year
Internal Rate of Return
H.S. Completion
Some College
College vs. No College
College Completion

Lance Lochner
Returns to Schooling in the US
Summarizing Returns for African American Men

Returns to High School and College for African American Men

Year
Internal Rate of Return
H.S. Completion
Some College
College vs. No College
College Completion

Lance Lochner
Returns to Schooling in the US
How have American Youth Responded?

- Continuous and sizeable rise in college attendance and graduation rates despite modest long-run changes in college returns

Source: Heckman and LaFontaine (2008)
How have American Youth Responded?

- Continuous and sizeable rise in college attendance and graduation rates despite modest long-run changes in college returns
- Rising high school completion rates until 1970s with small *decline* thereafter
  - recent decline is puzzling given sizeable increase in returns over recent decades
- Source: Heckman and LaFontaine (2008)
Educational Attainment for High School Classes 1940-2000

- **Graduate High School**
- **Attend College**
- **Graduate College**

High School Class Percentage

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>College Attendance</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>College Graduation</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
High School Returns & Graduation Rates (1940-2000)

- Graduate High School
- IRR

Lance Lochner
Returns to Schooling in the US
College Returns and Attendance (1940-2000)

- **Attend College**
- **Graduate College**
- **IRR**
Can analyze college attendance by family income and ‘ability’ for high school classes from the early 1980s (NLSY79) and early 2000s (NLSY97)
Can analyze college attendance by family income and ‘ability’ for high school classes from the early 1980s (NLSY79) and early 2000s (NLSY97)

‘Ability’ measured by scores on AFQT
- Test used to determine eligibility for military
- Primarily measures math and reading skills
- Not innate ability – ‘ability’ or ‘achievement’ during teenage years

Source: Belley and Lochner (2007)
Can analyze college attendance by family income and ‘ability’ for high school classes from the early 1980s (NLSY79) and early 2000s (NLSY97)

‘Ability’ measured by scores on AFQT
- Test used to determine eligibility for military
- Primarily measures math and reading skills
- Not innate ability – ‘ability’ or ‘achievement’ during teenage years

Family income measured around ages 16-17 but not a ‘lifetime’ measure

Source: Belley and Lochner (2007)
Figure 2a: College Attendance by AFQT and Family Income Quartiles (NLSY79)
Figure 2b: College Attendance by AFQT and Family Income Quartiles (NLSY97)
Changes in College Attendance Rates (1980s to 2000s)

-0.05
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40
AFQT Quartile 1 AFQT Quartile 2 AFQT Quartile 3 AFQT Quartile 4
Family Income Quartile 1 Family Income Quartile 2
Family Income Quartile 3 Family Income Quartile 4

Lance Lochner

Returns to Schooling in the US
Conclusions

- **College:**
  - Returns to 4-year college completion generally exceed returns to attending fewer years (including 2-year programs)
  - Modest increase in returns to college in recent decades
  - Continuous increase in college attendance and graduation rates over time
  - Recent attendance increases greatest for youth from higher income families
Conclusions

- **College:**
  - Returns to 4-year college completion generally exceed returns to attending fewer years (including 2-year programs)
  - Modest increase in returns to college in recent decades
  - Continuous increase in college attendance and graduation rates over time
  - Recent attendance increases greatest for youth from higher income families

- **High School:**
  - Returns to high school are substantially higher than college and have increased more rapidly in recent decades
  - High school graduation rates actually declined in recent decades
Conclusions

- **College:**
  - Returns to 4-year college completion generally exceed returns to attending fewer years (including 2-year programs)
  - Modest increase in returns to college in recent decades
  - Continuous increase in college attendance and graduation rates over time
  - Recent attendance increases greatest for youth from higher income families

- **High School:**
  - Returns to high school are substantially higher than college and have increased more rapidly in recent decades
  - High school graduation rates actually declined in recent decades

- Returns are generally slightly higher for African Americans