Is College Still Worth It?
The New Calculus of Falling Returns
May 24, 2018

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*These are our views alone and not necessarily those of the Federal Reserve Bank of St. Louis or the Federal Reserve System.*
Is College Still Worth It?  
The New Calculus of Falling Returns

- Pooled aggregate Survey of Consumer Finances (SCF) data show large and increasing college income and wealth premiums.

- Matching 4-year & post-grad degree holding families to non-grad families of same race/ethnicity & birth cohort weakens income, eliminates wealth premium for non-white 1980s cohort.

- New SCF data suggest that a substantial part of even our small premiums are spurious, due to inherited characteristics.

- Declining college wealth premiums may be due to luck of your birth year (asset prices); financial liberalization; rising college costs.
## Pooled SCF Data: Large and Growing College Premiums

### Income

**Income Premiums of Median Bachelor’s and Median Post-Graduate Degree Holders over Median Non-Grads**

<table>
<thead>
<tr>
<th>Year</th>
<th>Graduate Median-income premium</th>
<th>Post-graduate Median-income premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>1992</td>
<td>150</td>
<td>250</td>
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<tr>
<td>1995</td>
<td>200</td>
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<tr>
<td>1998</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>2001</td>
<td>300</td>
<td>400</td>
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<tr>
<td>2004</td>
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<td>450</td>
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<tr>
<td>2007</td>
<td>400</td>
<td>500</td>
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<tr>
<td>2010</td>
<td>450</td>
<td>550</td>
</tr>
<tr>
<td>2013</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>2016</td>
<td>550</td>
<td>650</td>
</tr>
</tbody>
</table>

### Wealth

**Median-Net Worth Premiums of Bachelor’s and Post-Graduate Degree Holders over Non-Grads**

<table>
<thead>
<tr>
<th>Year</th>
<th>Graduate median-net worth premium</th>
<th>Post-graduate median-net worth premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>1992</td>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>1995</td>
<td>200</td>
<td>300</td>
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<tr>
<td>1998</td>
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<tr>
<td>2001</td>
<td>300</td>
<td>400</td>
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<tr>
<td>2004</td>
<td>350</td>
<td>450</td>
</tr>
<tr>
<td>2007</td>
<td>400</td>
<td>500</td>
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<tr>
<td>2010</td>
<td>450</td>
<td>550</td>
</tr>
<tr>
<td>2013</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>2016</td>
<td>550</td>
<td>650</td>
</tr>
</tbody>
</table>

Includes SCF families of all races and ethnicities, all ages and all birth years.
Our Estimates: Small, Shrinking College Premiums

Non-Hispanic White

Income

Wealth

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Our Estimates: Small, Shrinking College Premiums

Non-Hispanic Black

Income

Wealth

Predicted Income by Education and Birth Decade: Non-Hispanic Black

Predicted Net Worth by Education and Birth Decade: Non-Hispanic Black

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Our Estimates: Small, Shrinking College Premiums

Hispanic of Any Race

### Income

**Predicted Income by Education and Birth Decade:**

<table>
<thead>
<tr>
<th>Decade</th>
<th>Terminal bachelor's degree</th>
<th>Post-graduate degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930s</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>1940s</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>1950s</td>
<td>100</td>
<td>200</td>
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<tr>
<td>1960s</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>1970s</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>1980s</td>
<td>175</td>
<td>350</td>
</tr>
</tbody>
</table>

- Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.

### Wealth

**Predicted Net Worth by Education and Birth Decade:**

<table>
<thead>
<tr>
<th>Decade</th>
<th>Terminal bachelor's degree</th>
<th>Post-graduate degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930s</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>1940s</td>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>1950s</td>
<td>60</td>
<td>200</td>
</tr>
<tr>
<td>1960s</td>
<td>80</td>
<td>250</td>
</tr>
<tr>
<td>1970s</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>1980s</td>
<td>120</td>
<td>350</td>
</tr>
</tbody>
</table>

- Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Our Estimates: Small, Shrinking College Premiums

All Other Races and Ethnicities Including More than One

Income

Wealth

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Estimating College Income and Wealth Premiums


- Split the sample into four: 1) non-Hispanic white; 2) non-Hispanic African-American or black; 3) Hispanic of any race; 4) all other races and ethnicities, including more than one.

- Family classified by survey respondent’s first identification.

- Divide family income/family wealth by square root of family size.

- Extract the average life-cycle component of income (wealth) using Age, Age Squared and Age Cubed.
Estimating College Income and Wealth Premiums

- Education of respondent: Binary variables for terminal bachelor’s degree or post-graduate degree; excluded category is families without at least a four-year college degree.

- Birth year of respondent: Decadal cohort binary variables for 1930s, 1940s, 1950s, 1960s, 1970s, 1980, all other birth years; omitting binary variables sequentially across six specifications.

- Interaction terms (Education x Birth decade) to capture possible changes in income or wealth returns to education over time.

- Transformed to Log(Income) and Inverse Hyperbolic Sine(NW)
The Transformations and Estimating Equations

**Usual income adjusted for family size**

\[ U_i = \frac{u_i}{\sqrt{H_i}} \]

*Log of size-adjusted usual income is a function of age, education, birth cohort and E x BC interactions.*

\[ \ln(U_i) = \beta_0 + \beta_1 A_i + \beta_2 A_i^2 + \beta_3 A_i^3 + \beta_4 G_i + \beta_5 P_i + \beta_6 C_{i,1} + \cdots + \beta_{6+k-1} C_{i,k-1} + \beta_{6+k} C_{i,1} \ast G_i + \cdots + \beta_{6+2k-1} C_{i,k-1} + \beta_{6+2k} C_{i,1} \ast P_i + \cdots + \beta_{6+3k-1} C_{i,k-1} + \epsilon \]

**Net worth (wealth) adjusted for family size**

\[ W_i = \frac{w_i}{\sqrt{H_i}} \]

*Inverse Hyperbolic Sine (IHS) of adjusted NW*

\[ \sinh^{-1}(\theta W_i) = \ln \left[ \theta W_i + (\theta^2 W_i^2 + 1)^{\frac{1}{2}} \right] / \theta \]

*IHS of size-adjusted net worth is a function of age, education, birth cohort and E x BC interactions.*

\[ \text{IHS}(W_i) = \beta_0 + \beta_1 A_i + \beta_2 A_i^2 + \beta_3 A_i^3 + \beta_4 G_i + \beta_5 P_i + \beta_6 C_{i,1} + \cdots + \beta_{6+k-1} C_{i,k-1} + \beta_{6+k} C_{i,1} \ast G_i + \cdots + \beta_{6+2k-1} C_{i,k-1} + \beta_{6+2k} C_{i,1} \ast P_i + \cdots + \beta_{6+3k-1} C_{i,k-1} + \epsilon \]
White Bachelor’s Premiums: Weak for 1980s Cohort

Non-Hispanic White

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
White Post-Grad Premiums: Weak for 1980s Cohort

**Non-Hispanic White**

**Income**

Expected Income Premium, White Postgrads, by Cohort

**Wealth**

Expected Wealth Premium, White Postgrads, by Cohort

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Black Bachelor’s Wealth Premiums: Indistinguishable from Zero for 1970s & 1980s Cohorts

Non-Hispanic Black

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Black Post-Graduate Wealth Premiums: Indistinguishable from Zero for 1960s, 1970s, 1980s

Non-Hispanic Black

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
Wealth Premiums for Hispanic, Other: 1980s Near Zero

Model includes SCF families of a particular race or ethnicity adjusted for family size and life cycle.
2016 SCF Data Suggest Even the Premiums We Find Are Overstated As Measures of College Returns

- College graduates are self-selected from the population, not randomly selected.

- Inherited characteristics, such as your parents’ education, contribute to your educational outcomes.

- College “mediates” or channels some of your inherited characteristics into adult outcomes like income and wealth.

- Partly innate measures of financial acumen (financial knowledge, saving habits, risk tolerance) also shape outcomes.

- Some amount of measured college returns are spurious.
How Much of Estimated College Premiums Are Spurious?

Non-Hispanic White

**Income**

Share of Estimated White College and Post-Graduate Income Premiums Due to Omitted Inherited Variables

- Terminal bachelor's degree: 8% (Parents' education) + 32% (Parents' education and financial acumen)
- Post-graduate degree: 8% (Parents' education) + 29% (Parents' education and financial acumen)

**Wealth**

Share of Estimated White College and Post-Graduate Wealth Premiums Due to Omitted Inherited Variables

- Terminal bachelor's degree: 13% (Parents' education) + 55% (Parents' education and financial acumen)
- Post-graduate degree: 18% (Parents' education) + 61% (Parents' education and financial acumen)

Model includes 4,479 non-Hispanic white 2016 SCF families adjusted for family size and life cycle.
Why Have College Wealth Premiums Collapsed While Income Premiums Persist? Basic Facts

- College and post-grad *income* premiums generally have declined since the 1930s cohort...

- … but all *eight* 1980s-cohort income premiums are positive.

- College and post-grad *wealth* premiums also generally have declined since the 1930s cohort...

- … *resulting in seven of eight* 1980s-cohort wealth premiums being indistinguishable from zero (all except white bachelor’s holders).

- All black and Hispanic 1970s wealth premiums are near zero, too.
What Must A Plausible Explanation Do?

- Differentiate between income and wealth outcomes—in particular, wealth-premium declines have been steeper and deeper.
- Be consistent with long-term trends in income and wealth.
- Avoid demographic explanations for which we control in our estimates, such as race and ethnicity or family size.
Examples of Implausible Explanations

- Stagnation of the college wage premium, college-grad “underemployment” or other job-market problems.
  - Why not? Incomes have held up much better than wealth.
- The Great Recession and declining asset prices.
  - Why not? Youngest cohort had very little wealth to lose in 2007.
- Discrimination.
  - Why not? We find similar patterns within all races and ethnicities.
- Declining quality of college graduates (oversupply).
  - Why would it affect wealth much more than income?
Explanations We Find Plausible: 1) Unlucky Birth Years

- Asset valuations vary significantly over time.
- When you invest affects your eventual capital gains and losses.
- We simulate dollar-cost averaging investment outcomes for all cohorts between 1965 and 2017.
- Our proxy for asset valuation: (Household Wealth / Disposable Income).
- Best time to invest in U.S. assets: 1970s and early 1980s.
Simulated Capital Gains Match 1930s to 1970s Wealth

Ratio of Net Worth to Disposable Personal Income:
Households and Non-Profits

Estimated Cumulative Wealth Revaluation per Dollar Invested:
Invest $1 at Ages 30, 40, 50, 60, 70, 80
Explanations We Find Plausible: 2) Financial Liberalization

- Consumer finance has become increasingly deregulated and available to riskier borrowers.
- Young people are inexperienced and may make many financial mistakes, like over-borrowing or paying excessive interest rates and fees.
- Consumer borrowing can be expensive and dangerous.
- Successive cohorts of college graduates have increased their borrowing by large amounts.
Every College Cohort Borrows More than Its Predecessor

Median Debt-to-Income Ratios of Terminal Bachelor's Degree Holders

Average age of cohort at time of observation

Source: Survey of Consumer Finances; some points interpolated
Explanations We Find Plausible: 3) Rising College Costs

- College tuition and fees have increased more than three times as fast as the all-items CPI since 1978 (14x vs. 4x).
- This includes discounts received so sticker prices went up even more.
- Excess tuition inflation increased after 2000, when 1980s cohort was in college.
In Sum: Is College Still Worth It?
The New Calculus of Falling Returns

- College *income* premiums have declined for recent cohorts but remain positive.

- College *wealth* premiums have plummeted across cohorts.

- Nearly all 1980s college cohorts’ wealth premiums are indistinguishable from zero; true also for 1970s black & Hispanic.

- Declining college wealth premiums may be due to the luck of your birth year; financial liberalization; and rising college costs.

- On current wealth trends, college may not be worth it for many.