A Degree in Science:
What’s the Price? What’s the Cost?

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The Issues
Two Major Higher Education Policy Issues

- **Issue 1:** The need for more STEM workers; the need for more college graduates with degrees in STEM
- **Issue 2:** Rising tuitions; the rising price of attending college

- Issues rarely, if ever, connected in discussions
- Issues made more complicated by additional need to broaden participation of underrepresented groups
A Third Issue Underlying STEM Needs & Rising Tuitions

- What colleges and universities spend to educate students; what it costs institutions to produce a STEM degree

- Discussions of college affordability need to understand institutional spending
Issue 1: More STEM Workers Needed

- Obama’s call for 1 million new STEM workers in next decade
- Brookings report: 20% of all U.S. jobs require high level of knowledge in any one STEM fields
- 2.4 million STEM job vacancies between 2008 & 2018
- 65% of projected vacancies will require bachelor’s and graduate degrees
- Meeting STEM needs requires broadening participation to all groups
Issue 2: Tuition Is Increasing
Discussions of college affordability often ignore how colleges & universities spend money.

College affordability can’t be solved by looking at revenue alone – e.g., tuitions, state appropriations, endowments.

Delta Cost Project focuses on college spending.
The Delta Cost Project

• Focus on four key questions:
  • Where does the money come from?
  • Where does the money go?
  • What do tuitions pay for?
  • What is the relationship between spending and outcomes?

• Products
  • Data briefs
  • Issue briefs, commentaries
  • Website – deltacostproject.org
  • Online analysis system – tcs-online.org
The Price of Science
Where Do STEM Students Get Undergraduate Degrees?

Source: Integrated Postsecondary Education Data System (IPEDS), 2010-2011 academic year.
Where Students Get STEM & SBE Degrees & What They Pay

Type of Institution

- Public research ($8,340)
  - Non-STEM/SBE Bachelor’s Degrees: 12%
  - SBE Bachelor’s Degrees: 14%
  - STEM Bachelor’s Degrees: 16%
  - Total: 23%

- Public master’s ($6,405)
  - Non-STEM/SBE Bachelor’s Degrees: 19%
  - SBE Bachelor’s Degrees: 13%
  - STEM Bachelor’s Degrees: 13%
  - Total: 45%

- Public bachelor’s ($5,792)
  - Non-STEM/SBE Bachelor’s Degrees: 19%
  - SBE Bachelor’s Degrees: 11%
  - STEM Bachelor’s Degrees: 11%
  - Total: 41%

- Private research ($34,553)
  - Non-STEM/SBE Bachelor’s Degrees: 23%
  - SBE Bachelor’s Degrees: 11%
  - STEM Bachelor’s Degrees: 11%
  - Total: 45%

- Private master’s ($23,855)
  - Non-STEM/SBE Bachelor’s Degrees: 18%
  - SBE Bachelor’s Degrees: 11%
  - STEM Bachelor’s Degrees: 11%
  - Total: 40%

- Private bachelor’s ($25,280)
  - Non-STEM/SBE Bachelor’s Degrees: 16%
  - SBE Bachelor’s Degrees: 16%
  - STEM Bachelor’s Degrees: 5%
  - Total: 37%

- Private 4-year For-profit ($13,418)
  - Non-STEM/SBE Bachelor’s Degrees: 16%
  - SBE Bachelor’s Degrees: 16%
  - STEM Bachelor’s Degrees: 5%
  - Total: 37%

Number of Bachelor’s Degrees (2010-2011 Academic Year)
Undergraduate Net Price for STEM Majors

Source: National Postsecondary Student Aid Study (NPSAS), 2007.
# Undergraduate Debt – STEM Majors

<table>
<thead>
<tr>
<th>Type of Institution</th>
<th>% with Debt &gt; $30,000</th>
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<tbody>
<tr>
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<td>URMs</td>
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<td>Public research</td>
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<td>Public master’s</td>
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<td>Private research</td>
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<td>Private bachelor’s</td>
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<td>For-profit private</td>
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Undergraduate Debt – SBE Majors

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<tr>
<th>Type of Institution</th>
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<td>URMsWith</td>
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<td>Private master’s</td>
<td>32</td>
</tr>
<tr>
<td>Private bachelor’s</td>
<td>20</td>
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Undergraduate Debt – STEM Ph.D.s

- 9% Over $30,000
- 7% $20,001-$30,000
- 12% $10,001-$20,000
- 9% Under $10,000
- 63% None
Undergraduate Debt – SBE Ph.D.s

- Over $30,000: 63%
- $20,001-$30,000: 10%
- $10,001-$20,000: 8%
- Under $10,000: 9%
- None: 10%
Graduate Debt: STEM & SBE by Race

- Non-URM SBE: 35% Over $30,000, 21% $1-$30,000, 44% None
- Non-URM STEM: 17% Over $30,000, 73% $1-$30,000, 10% None
- African American SBE: 21% Over $30,000, 58% $1-$30,000, 21% None
- African American STEM: 24% Over $30,000, 51% $1-$30,000, 25% None
- Hispanic SBE: 44% Over $30,000, 23% $1-$30,000, 34% None
- Hispanic STEM: 14% Over $30,000, 64% $1-$30,000, 22% None
The Cost of Science
Estimating the Cost of Science

- National data not available

- Very few states and institutions collect data at discipline level

- Considerable “cross subsidization” in higher education
Undergraduate Cost Per Degree

<table>
<thead>
<tr>
<th>Field</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Engineering*</td>
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<tr>
<td>Architecture and Related Services</td>
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<tr>
<td>Agriculture, Agriculture Operations, and Related Sciences*</td>
<td></td>
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<tr>
<td>Visual and Performing Arts</td>
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<tr>
<td>Liberal Arts and Sciences, General Studies, and Humanities</td>
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<tr>
<td>Natural Resources and Conservation*</td>
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<tr>
<td>Engineering Technologies/Technicians*</td>
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<tr>
<td>Computer and Information Sciences and Support*</td>
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<td>Physical Sciences*</td>
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<tr>
<td>Biological and Biomedical Sciences*</td>
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<tr>
<td>Health Professions and Related Clinical Sciences</td>
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<tr>
<td>AVERAGE</td>
<td>$60,301</td>
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<tr>
<td>Education</td>
<td></td>
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<tr>
<td>Communication, Journalism, and Related Programs</td>
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<tr>
<td>Business, Management, Marketing, and Related Support</td>
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<tr>
<td>English Language and Literature/Letters</td>
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<tr>
<td>Foreign languages, Literatures, and Linguistics</td>
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<tr>
<td>Mathematics and Statistics*</td>
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<tr>
<td>Social sciences (and history) **</td>
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<tr>
<td>Psychology **</td>
<td></td>
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<tr>
<td>Security and Protective Services</td>
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* STEM discipline (orange bars)
** SBE discipline (green bars)

E& R Spending per Degree by Level & Major

Source: Desrochers, 2011.
Cross Subsidies in Higher Education

- Some majors subsidize other majors
- Undergraduate education generally subsidizes graduate education
- Institutional “cash cows” on some campuses
The Policy Response & Unanswered Questions
Some Policy Responses

- **Differential tuition policies**
  - Charge more for programs that cost institutions more
  - In use in about 25% of public 4-year colleges
  - Most common programs not necessarily STEM fields

- **STEM Florida task force recommendation**
  - Charge STEM majors *less*
  - Legislation not passed but generated much discussion nationally

- **Charging more for credits beyond degree requirements**
Unanswered Questions

- “STEM” is not a uniform entity; what are some differences in price and cost across the different fields that STEM encompasses?

- To what extent is debt a deterrent:
  - In majoring in STEM?
  - In pursuing a graduate degree?

- What types of institutions are sending STEM bachelor’s recipients to graduate school?
Unanswered Questions (2)

- What is the role of minority-serving institutions?
  - What price are students paying to attend?
  - What are debt levels of graduates
  - What are their costs to produce STEM degrees?

- What is the cost of attracting & retaining minority students?

- What is the cost of not attracting and retaining minority students?
Unanswered Questions (3)

- What is the role of community colleges?
- How can developmental education be improved, particularly in math, to ensure students equitable access and opportunity in STEM?
- What is the cost of developmental education to students?
- What is the cost of developmental ed to institutions?
Unanswered Questions: Instructional Environment

- STEM academic environments can be unwelcoming to underrepresented groups
- STEM instruction often not engaging
- Efforts to change culture, restructure curriculum often met with resistance
  - Student- vs Instructor-centered pedagogy
  - Talent development vs. “weeding out”
- Online STEM education
  - When does it work? For whom? How much does it cost?
Unaddressed Issues Related to $$

- Impact of Federal and State budget cuts on STEM & SBE education
  - Research funding
  - Funding for graduate programs
  - Faculty composition

- Impact of the Job Market on STEM & SBE
The Price and Cost of STEM

- Solutions to increase number of STEM degrees must consider:
  - Cost to students (tuition, financial aid, debt)
  - Cost to institutions
  - Cost to society, particularly if demand for STEM workers not met