

A Degree in Science:

What's the Price? What's the Cost?

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Center for **STEM**
EDUCATION & INNOVATION

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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

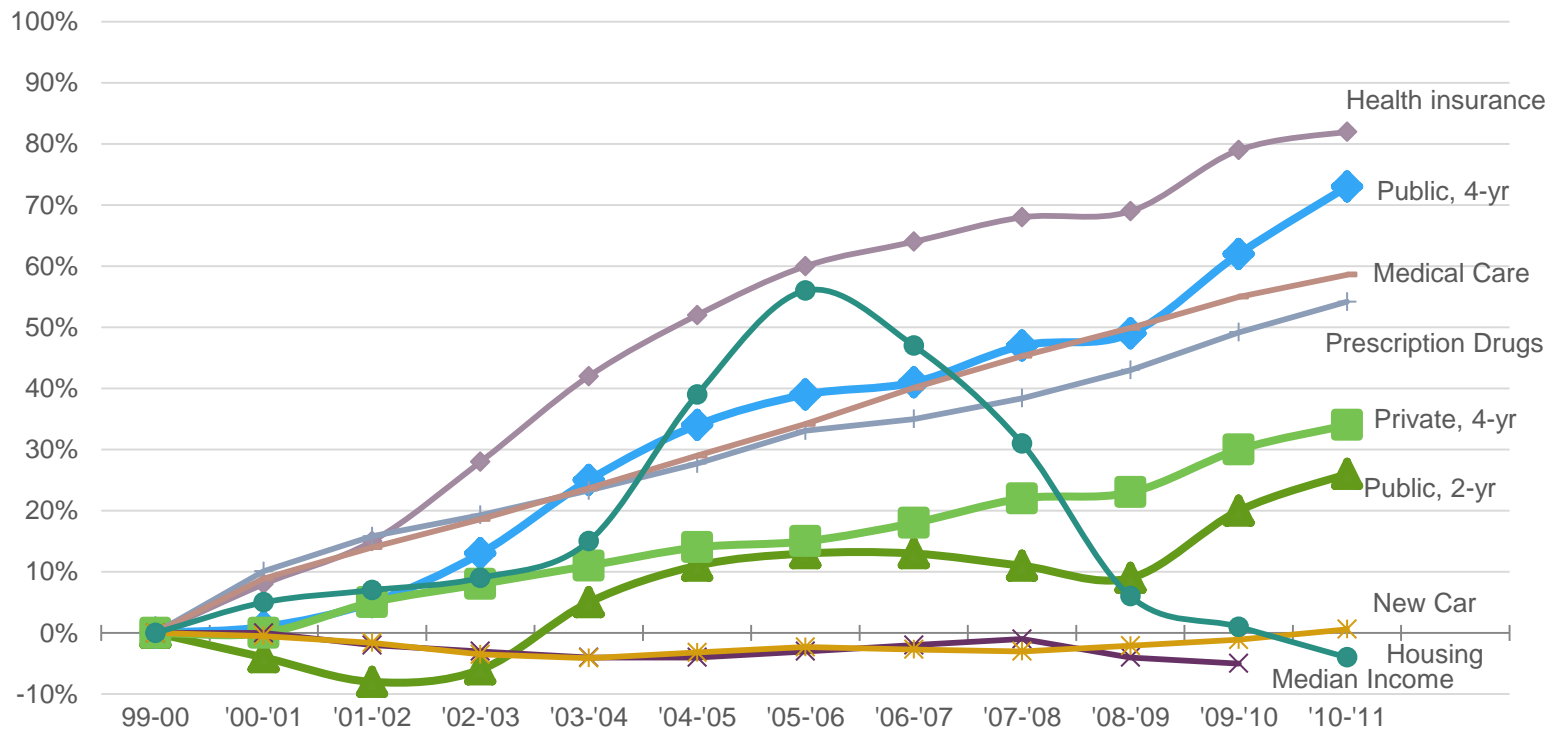
A Third Issue Underlying STEM Needs & Rising Tuitions

- 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



Issue 3: College Affordability & Spending

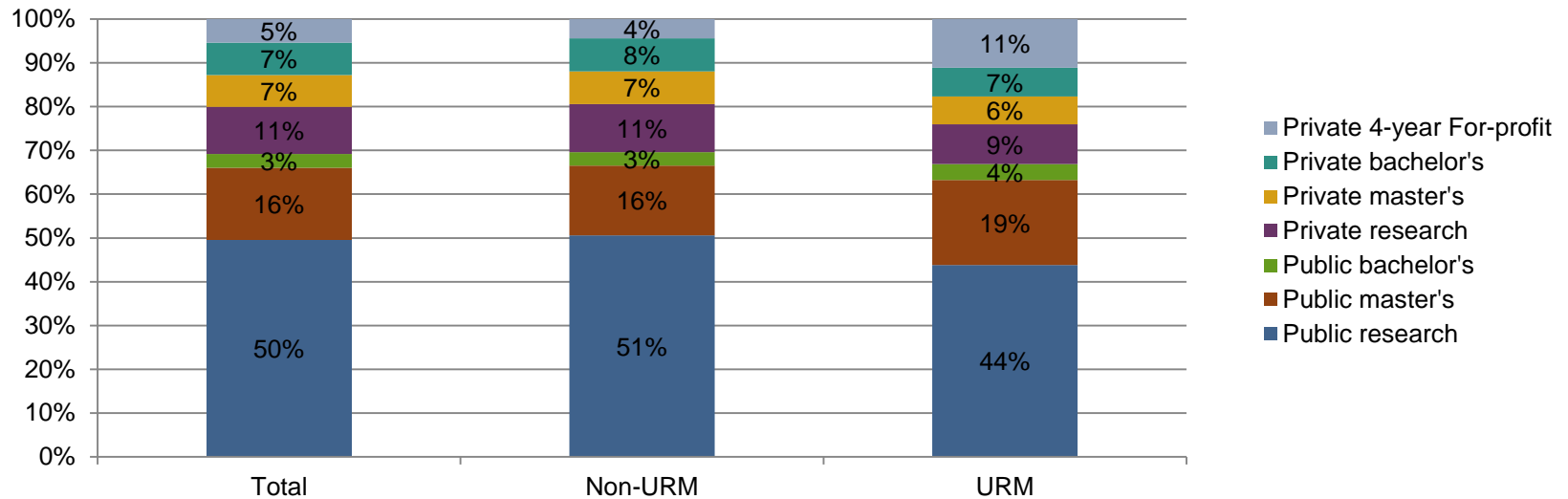
- Discussions of college affordability often ignore how colleges & universities spend money.
- College affordability can't be solved by looking at revenue alone – e.g., tuitions, state appropriations, endowments.
- Delta Cost Project focuses on college spending.

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

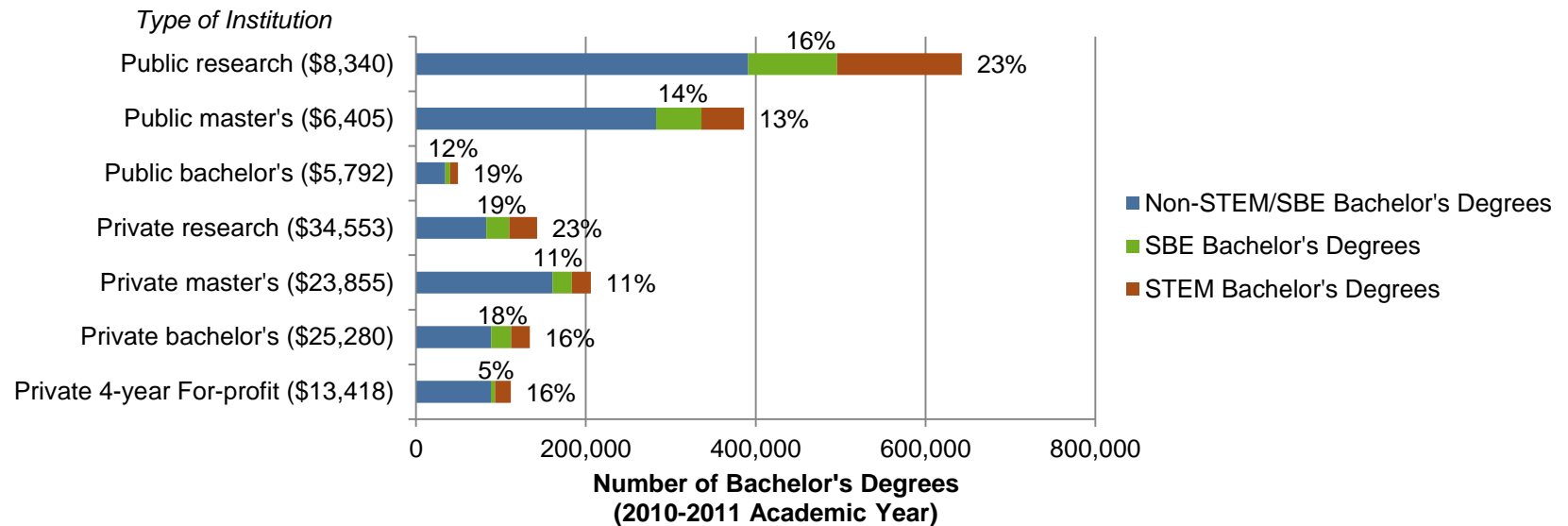
The Price of Science

Where Do STEM Students Get Undergraduate Degrees?

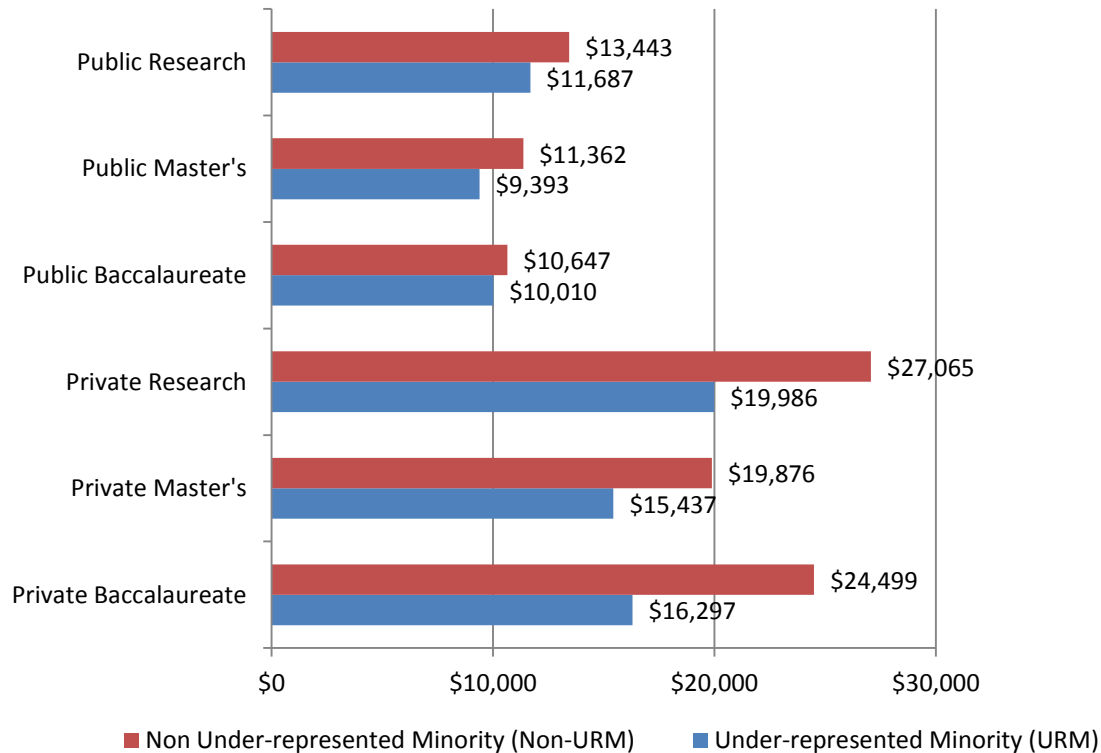


Source: Integrated Postsecondary Education Data System (IPEDS), 2010-2011 academic year.

Where Students Get STEM & SBE Degrees & What They Pay



Undergraduate Net Price for STEM Majors



Source: National Postsecondary Student Aid Study (NPSAS), 2007.

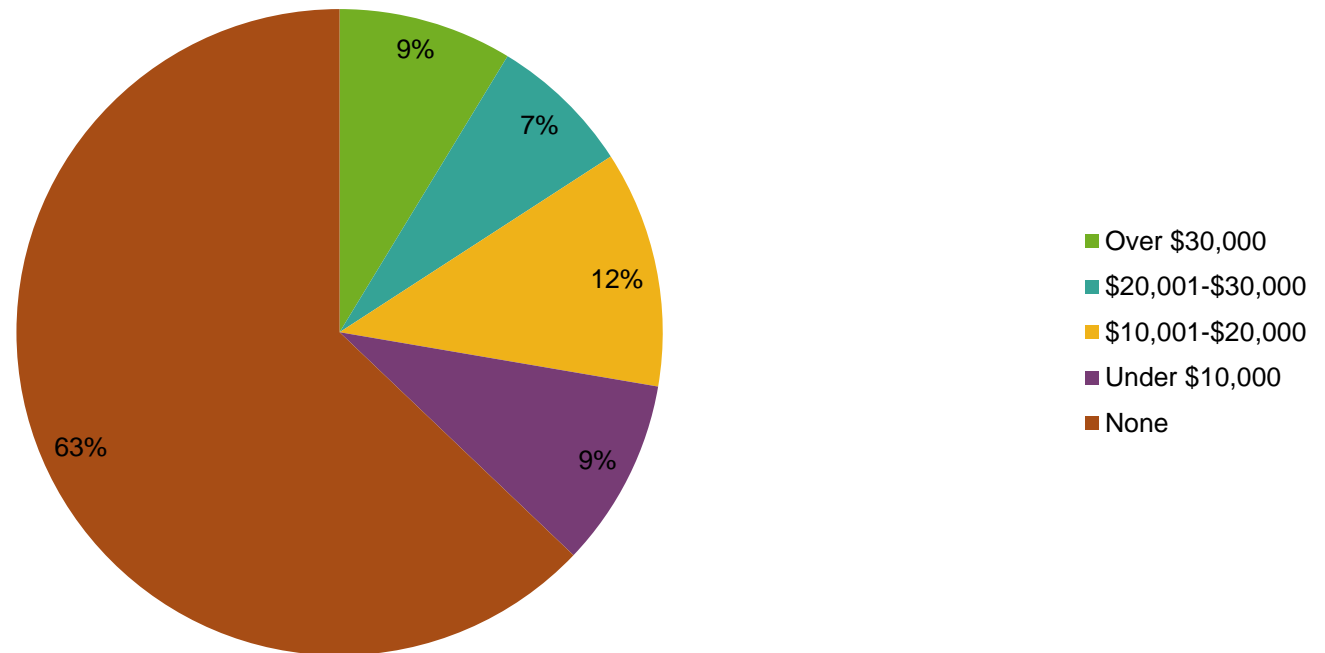
Undergraduate Debt – STEM Majors

Type of Institution	% with Debt > \$30,000	
	URMs	Non-URMs
Public research	14	8
Public master's	18	9
Private research	42	17
Private master's	33	22
Private bachelor's	20	18
For-profit private	87	50

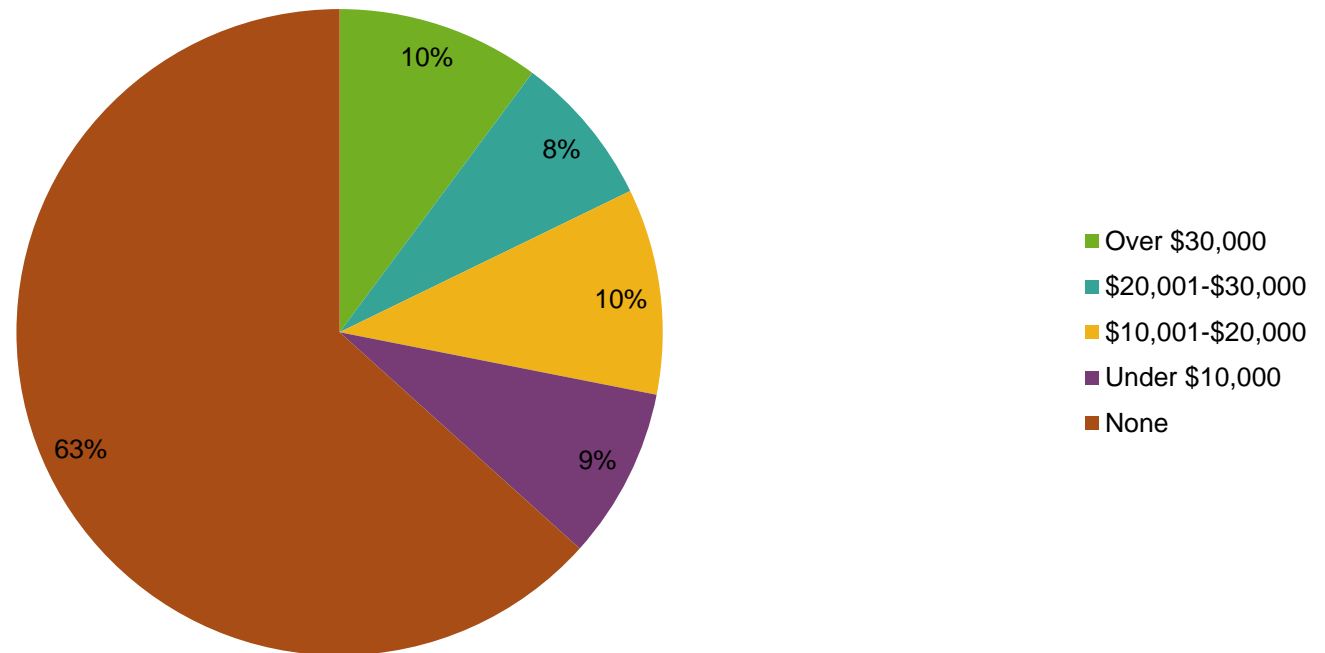
Undergraduate Debt – SBE Majors

Type of Institution	% with Debt > \$30,000	
	URMs	Non-URMs
Public research	19	14
Public master's	15	16
Private research	26	21
Private master's	32	23
Private bachelor's	20	16

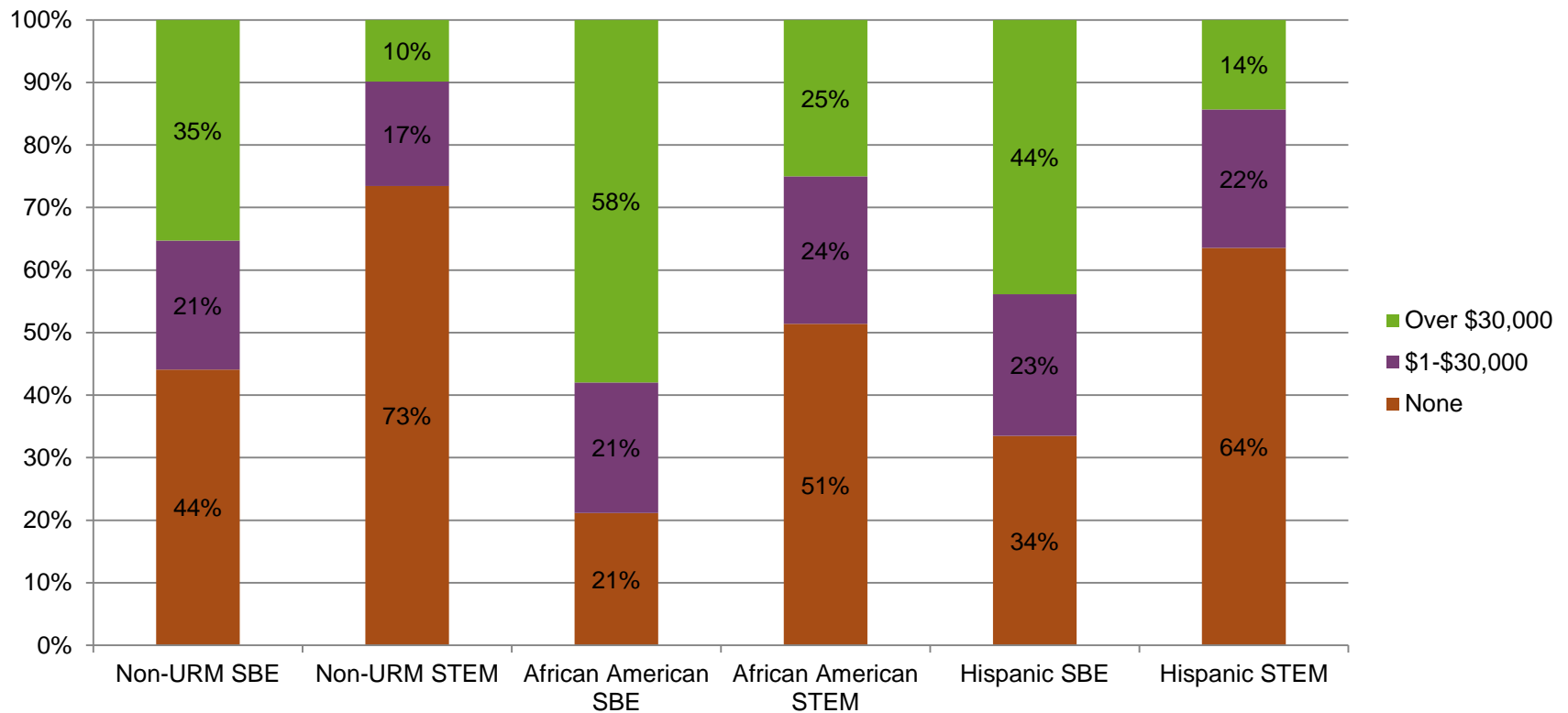
Undergraduate Debt – STEM Ph.D.s



Undergraduate Debt – SBE Ph.D.s



Graduate Debt: STEM & SBE by Race

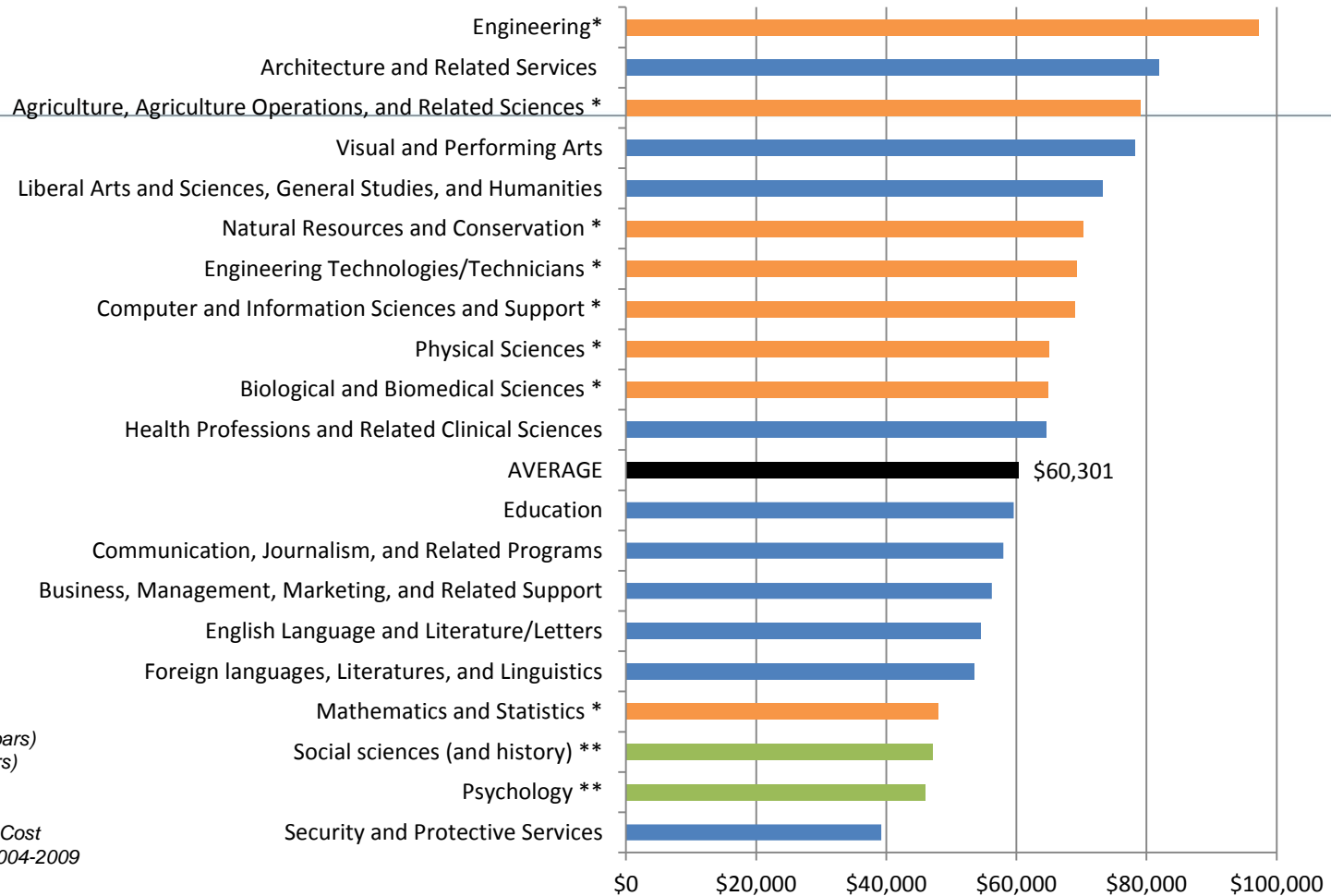


The Cost of Science

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

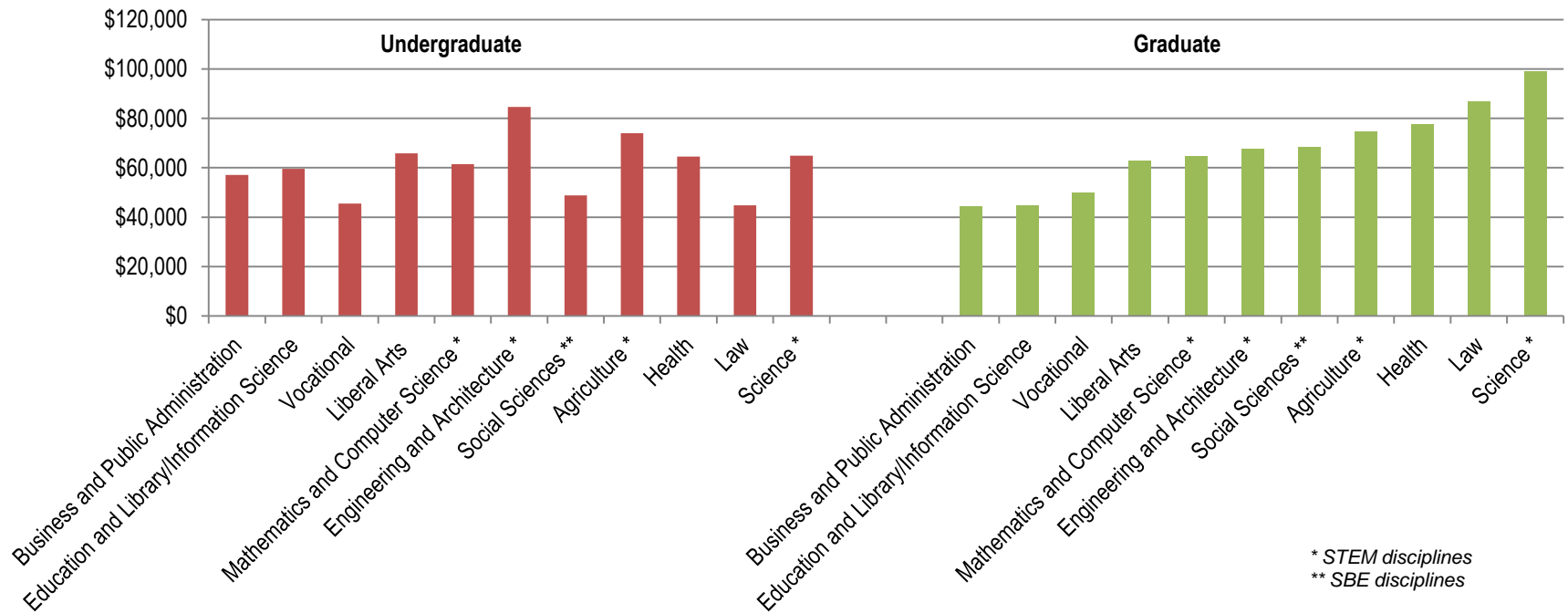


* STEM discipline (orange bars)

** SBE discipline (green bars)

Source: Desrochers, 2011.
Special Tabulation of Delta Cost
Project IPEDS Database, 2004-2009
(ungrouped).

E& R Spending per Degree by Level & Major



Source: Desrochers, 2011.
Special Tabulation of Delta Cost Project IPEDS Database, 2004-2009 (ungrouped).

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 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 their costs to produce STEM degrees?
- What is the cost of attracting and 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?

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

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