Deconstructing Delta: Explaining Educational Costs Through Analysis of the Instructional Portfolio

AIR Forum 2012
New Orleans, LA

Peter M. Radcliffe
Executive Director
Office of Planning and Analysis
University of Minnesota
Objectives

• Critique of the way Delta Cost Project data and analysis is often used by institutional stakeholders and observers

• Considerations for how to evaluate and respond to those uses

• Suggestion for a method to benchmark institutional costs that addresses significant limitations in standard reporting
Presentation plan

1. Why do we care about costs?
2. How do we think about costs?
3. How has the Delta Cost Project thought about costs?
4. What issues are there with the Delta Cost Project approach?
5. How might we try to address those issues?
6. What does that tell us?
7. Where do we go from there?
Our stakeholders are worried
Our input costs are rising

Inflation indexes 1983 to 2009

Source: Commonfund
Our state support is dropping
50 state total higher education expenditures per $1,000 disposable income: FY1961 to FY2012

Source: Postsecondary Education Opportunity
Our prices are increasing
Published and net in-state tuition and fees for public four-year institutions 1996-2012 in constant 2011 dollars

Source: College Board, Trends in College Pricing
Student indebtedness is growing
Public Four Year: Average Total Debt Levels of Bachelor’s Degree Recipients in Constant 2010 Dollars, 1999-2000 to 2009-10
Costs vs Price

Value of required inputs

Amount paid by consumer
Direct vs Indirect Costs
Delta Cost Project

• Funded by Lumina Foundation
• Produces report on costs annually with associated data repository and web tools
• Generates additional papers and presentations
• Attempts to compare across sectors and levels of institutions to look at relative costs, and share paid by students or subsidized
• Our focus will be on their concept of “Education and Related” spending
IPEDS expense categories used by Delta Cost Project

Instruction
Research
Public Service

Student Support
Academic Support
Institutional Support
Operation and Maintenance Of Plant
Delta Cost Project: Education and related spending (E&R)

Instruction

Research

Public Service

Student Support

Academic Support

Institutional Support

Operation and Maintenance Of Plant
Reporting of E&R spending

• State sector-level summaries and individual institution results
  – Raw expenditure totals
  – Per full-time equivalent (FTE) student
  – Per degree awarded
  – Per completion (degree or certificate)
  – Current dollars and inflation-adjusted
Delta state level public research sector cost and subsidy reporting: Top 10 states

Net Tuition | Subsidy
---|---
CT | $10,000 | $26,000
MN | $12,000 | $24,000
AK | $7,000 | $28,000
WA | $10,000 | $25,000
CA | $10,000 | $23,000
VT | $15,000 | $17,000
DE | $15,000 | $17,000
HI | $10,000 | $22,000
NY | $10,000 | $22,000
PA | $15,000 | $20,000
The challenge of state averages

**Minnesota**
- University of Minnesota – Twin Cities

**California**
- UC Berkeley
- UC Davis
- UC Irvine
- UC Los Angeles
- UC Riverside
- UC San Diego
- UC Santa Barbara
- UC Santa Cruz
- San Diego State University
FTEs: How equivalent for comparing costs?

• Undergraduate student FTE is calculated as total annual credit hours divided by 30
• Graduate and professional FTE is calculated as total annual credit hours divided by 20
• If graduate and professional instruction is 50% more expensive than undergraduate, this correction works when examining costs
• Our best evidence is graduate and professional instruction is well more than 50% more expensive
E&R per FTE 2008 vs UG enrollment %

$y = -31678x + 40271$

$R^2 = 0.1834$
Simulated E&R 2009 model coefficients:
Total E&R spending by total degrees awarded

- Associates: $20,558
- Baccalaureate: $39,248
- Masters: $16,671
- Doctoral: $588,288
- Professional: $227,888
The Board of Regents of the University of Evil-Doing

UNIVERSITY OF EVIL-DOING

In recognition of the successful completion of the requisite course of study and nomination of the Faculty of DEPARTMENT OF HORRIBLE STUDIES by virtue of authority granted by charter of the State of California hereby confess upon

PETER RADCLIFFE

the degree of

Ph.D. in Horribleness

With all the right, honors, and privileges pertaining thereto, granted at University of Evil-Doing in the city of Los Angeles in the state of California on this fifteenth day of July, two thousand and eight.
Cost differences by field: SHEEO four-state study

- Statewide reporting of instructional costs in Ohio, Florida, Illinois, and New York (SUNY)

- Compared distribution of student credit hours against the distribution of total costs, and found significant differences

- Health professions and engineering in particular accounted for a higher expenses than credit hours
Modeling costs and the instructional portfolio

• Replicated construction of E&R expenditures from IPEDS
• Added degrees awarded by level and two-digit CIP code
• Focused on public research, doctoral, and masters institutions (Carnegie Basic 2010 codes 15 to 20, N = 423)
• Regressed total E&R on degrees awarded
Level-field regression model variables

$38 \times 5 = 190$

CIP two-digit codes   Degree levels   Independent variables

Eliminating combinations where no degrees were awarded:

100 Variables measuring the number of degrees awarded in 2008-2009 at a particular level in a particular field for each institution
Simulated 2009 E&R model coefficients: Spending per degree by level and field

100 level-field combinations
Predicted vs actual E&R spending: Level-field model

Predicted Total E&R vs Actual Total E&R

Adj $R^2 = .9524$
Selected institutional estimates: Level-field model

<table>
<thead>
<tr>
<th>Institution</th>
<th>Actual E&amp;R</th>
<th>Predicted E&amp;R</th>
<th>Variance</th>
<th>% Var</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania State University</td>
<td>$1,366,000,000</td>
<td>$1,210,000,000</td>
<td>$156,000,000</td>
<td>13%</td>
</tr>
<tr>
<td>University of California Los Angeles</td>
<td>$1,537,000,000</td>
<td>$1,380,000,000</td>
<td>$157,000,000</td>
<td>11%</td>
</tr>
<tr>
<td>University of Washington Seattle</td>
<td>$1,284,000,000</td>
<td>$1,180,000,000</td>
<td>$104,000,000</td>
<td>9%</td>
</tr>
<tr>
<td>The Ohio State University</td>
<td>$1,172,000,000</td>
<td>$1,090,000,000</td>
<td>$82,000,000</td>
<td>8%</td>
</tr>
<tr>
<td>University of Minnesota Twin Cities</td>
<td>$1,085,000,000</td>
<td>$1,040,000,000</td>
<td>$45,000,000</td>
<td>4%</td>
</tr>
<tr>
<td>University of Michigan Ann Arbor</td>
<td>$1,230,000,000</td>
<td>$1,210,000,000</td>
<td>$20,000,000</td>
<td>2%</td>
</tr>
<tr>
<td>University of Texas Austin</td>
<td>$851,300,000</td>
<td>$864,000,000</td>
<td>$(12,700,000)</td>
<td>-1%</td>
</tr>
<tr>
<td>University of California Berkeley</td>
<td>$841,000,000</td>
<td>$926,000,000</td>
<td>$(85,000,000)</td>
<td>-9%</td>
</tr>
<tr>
<td>University of Florida</td>
<td>$728,500,000</td>
<td>$826,000,000</td>
<td>$(97,500,000)</td>
<td>-12%</td>
</tr>
<tr>
<td>University of Illinois Urbana-Champaign</td>
<td>$712,200,000</td>
<td>$834,000,000</td>
<td>$(121,800,000)</td>
<td>-15%</td>
</tr>
<tr>
<td>University of Wisconsin Madison</td>
<td>$675,100,000</td>
<td>$885,000,000</td>
<td>$(209,900,000)</td>
<td>-24%</td>
</tr>
</tbody>
</table>
## Selected institutional estimates: Level-field model

<table>
<thead>
<tr>
<th>Institution</th>
<th>Actual E&amp;R</th>
<th>Predicted E&amp;R</th>
<th>Variance</th>
<th>% Var</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland State University</td>
<td>$190,200,000</td>
<td>$148,000,000</td>
<td>$42,200,000</td>
<td>29%</td>
</tr>
<tr>
<td>University of Massachusetts-Dartmouth</td>
<td>$113,100,000</td>
<td>$89,000,000</td>
<td>$24,100,000</td>
<td>27%</td>
</tr>
<tr>
<td>Wright State University – Main Campus</td>
<td>$236,300,000</td>
<td>$196,000,000</td>
<td>$40,300,000</td>
<td>21%</td>
</tr>
<tr>
<td>University of Nevada – Las Vegas</td>
<td>$314,800,000</td>
<td>$272,000,000</td>
<td>$42,800,000</td>
<td>16%</td>
</tr>
<tr>
<td>University of Colorado Denver</td>
<td>$393,500,000</td>
<td>$345,000,000</td>
<td>$48,500,000</td>
<td>14%</td>
</tr>
<tr>
<td>University of Wisconsin – Milwaukee</td>
<td>$289,400,000</td>
<td>$270,000,000</td>
<td>$19,400,000</td>
<td>7%</td>
</tr>
<tr>
<td>Oakland University</td>
<td>$173,800,000</td>
<td>$181,000,000</td>
<td>$(7,200,000)</td>
<td>-4%</td>
</tr>
<tr>
<td>University of North Carolina – Charlotte</td>
<td>$258,800,000</td>
<td>$270,000,000</td>
<td>$(11,200,000)</td>
<td>-4%</td>
</tr>
<tr>
<td>University of Central Florida</td>
<td>$365,900,000</td>
<td>$389,000,000</td>
<td>$(23,100,000)</td>
<td>-6%</td>
</tr>
<tr>
<td>Old Dominion University</td>
<td>$206,700,000</td>
<td>$227,000,000</td>
<td>$(20,300,000)</td>
<td>-9%</td>
</tr>
<tr>
<td><strong>University of Minnesota – Duluth</strong></td>
<td>$105,300,000</td>
<td>$118,000,000</td>
<td>$(12,700,000)</td>
<td>-11%</td>
</tr>
<tr>
<td>Florida Atlantic University</td>
<td>$241,800,000</td>
<td>$298,000,000</td>
<td>$(56,200,000)</td>
<td>-19%</td>
</tr>
<tr>
<td>University of Michigan - Dearborn</td>
<td>$92,025,690</td>
<td>$118,000,000</td>
<td>$(25,974,310)</td>
<td>-22%</td>
</tr>
</tbody>
</table>
Where to next?

• Undergraduate institutions
  – Model separately
  – Include in comprehensive model
• Re-examine and group CIP categories
• Examine stability over time
• Bring private institutions back into modeling
• Look at additional potential cost drivers, e.g. spill-over impacts of research, service, athletics
Thank you!

Peter M. Radcliffe  
Executive Director  
Office of Planning and Analysis  
University of Minnesota  
radcl002@umn.edu  
http://www.planning.umn.edu
References and resources

• College Tuition and Fees and Student Debt
  – http://trends.collegeboard.org/college_pricing
  – http://trends.collegeboard.org/student_aid

• Delta Cost Project
  – http://www.deltacostproject.org/ (home page)
  – http://www.tcs-online.org/Home.aspx (online data and reports)
More References and Resources

• State spending on higher education
  – http://www.postsecondary.org/

• Inflation Indexes
  – http://www.bls.gov/cpi/ (Consumer Price Index)
  – http://www.commonfund.org/CommonfundInstitute/HEPI/Pages/default.aspx (Higher Education Price Index)
Classification of instructional program (CIP)

1 Agriculture, agriculture operations, and related sciences.
3 Natural resources and conservation.
4 Architecture and related services.
5 Area, ethnic, cultural, and gender studies.
9 Communication, journalism, and related programs.
10 Communications technologies/technicians and support services.
11 Computer and information sciences and support services.
12 Personal and culinary services.
13 Education.
14 Engineering.
15 Engineering technologies/technicians.
16 Foreign languages, literatures, and linguistics.
19 Family and consumer sciences/human sciences.
22 Legal professions and studies.
23 English language and literature/letters.
24 Liberal arts and sciences, general studies and humanities.
25 Library science.
26 Biological and biomedical sciences.
27 Mathematics and statistics.
29 Military technologies.
30 Multi/interdisciplinary studies.
31 Parks, recreation, leisure, and fitness studies.
38 Philosophy and religious studies.
39 Theology and religious vocations.
40 Physical sciences.
41 Science technologies/technicians.
42 Psychology.
43 Security and protective services.
44 Public administration and social service professions.
45 Social sciences.
46 Construction trades.
47 Mechanic and repair technologies/technicians.
48 Precision production.
49 Transportation and materials moving.
50 Visual and performing arts.
51 Health professions and related clinical sciences.
52 Business, management, marketing, and related support services.
54 History