WHERE HAVE ALL THE
DOCTORAL GRADUATES GONE?

COMPARING SED DATA TO DEPARTMENTAL PLACEMENT
INFORMATION

Julie Carpenter-Hubin - Director
Rich Healy - Assistant Director
Helen Carlon - Strategic Planning Analyst

Office of Institutional Research & Planning
The Ohio State University
GOAL

- Compare National Science Foundation - Survey of Earned Doctorate data to actual placement data collected by Ohio State

  - Prompted by the National Research Council (NRC) decision to use SED data instead of actual placement data collected and submitted by institutions

- Research Question: Is the SED a good proxy for actual placement data?
WHY IS GOOD PLACEMENT DATA IMPORTANT?

- Valuable for use in program reviews
- Valuable to prospective students
- Can be one indicator of program quality
- Informs faculty about training needs
NSF-SED: BACKGROUND

- National Science Foundation - Survey of Earned Doctorate (NSF-SED) - 1957-58
  - [http://www.norc.org/projects/survey+of+earned+doctorates.htm](http://www.norc.org/projects/survey+of+earned+doctorates.htm)

- Response rates traditionally high

- Post-graduation plans gathered
  - Institutions may rely on these data
  - Many institutions do not collect placement data
May be completed by student, institution’s graduate school, or NORC Doctorate Data Project Staff
- Unit record level data for all graduates even if they don’t complete survey

Response rate includes surveys completed by students
- Not by institutions or project staff

OSU Response Rate
- 1996-2004 was 89%
- 2001-2004 was 90%
SED data is available for each institution at the student record level by year and major field of study.

Need to aggregate OSU SED data by year and major field of study.

Replicate NRC’s metric of “Percent PhDs with definite plans for an academic position”.
SED Main Data File Variables

- **PHDFY** - Fiscal year of doctorate
- **PDOCSTAT** - Postdoc status
  - Definite plans vs. no definite plans
- **PDOCPLAN** - Postdoc plans
  - Employed, postdoc, or other
- **PDEMPLOY** - Post graduation employer Type
  - Academic, US Government, Industry, Other
- **PHDFIELD** - Doctoral Field
### NSF - SED 1996-2004 Ohio State Responses

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Responses</th>
<th>Definite Plans</th>
<th>No Definite Plans</th>
<th>Academic Employment</th>
<th>Non-Academic Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>631</td>
<td>438</td>
<td>193</td>
<td>290</td>
<td>148</td>
</tr>
<tr>
<td>1997</td>
<td>597</td>
<td>443</td>
<td>154</td>
<td>292</td>
<td>151</td>
</tr>
<tr>
<td>1998</td>
<td>582</td>
<td>435</td>
<td>147</td>
<td>280</td>
<td>155</td>
</tr>
<tr>
<td>1999</td>
<td>480</td>
<td>355</td>
<td>125</td>
<td>232</td>
<td>123</td>
</tr>
<tr>
<td>2000</td>
<td>545</td>
<td>414</td>
<td>131</td>
<td>295</td>
<td>119</td>
</tr>
<tr>
<td>2001</td>
<td>518</td>
<td>415</td>
<td>103</td>
<td>275</td>
<td>140</td>
</tr>
<tr>
<td>2002</td>
<td>535</td>
<td>431</td>
<td>104</td>
<td>312</td>
<td>119</td>
</tr>
<tr>
<td>2003</td>
<td>527</td>
<td>408</td>
<td>119</td>
<td>297</td>
<td>111</td>
</tr>
<tr>
<td>2004</td>
<td>521</td>
<td>415</td>
<td>106</td>
<td>261</td>
<td>154</td>
</tr>
<tr>
<td>1996-2004</td>
<td>4936</td>
<td>3754</td>
<td>1182</td>
<td>2534</td>
<td>1220</td>
</tr>
</tbody>
</table>
Ohio State University (OSU) participated in the 2006/2007 National Research Council (NRC) assessment of research doctorate programs.

Doctoral placement data collected as part of the NRC assessment.

Successful data collection for 79.5% of OSU doctorates graduating between 1996-2004.
Graduate lists to Departments
- Graduates and corresponding graduation quarters for years 1996-2004

Department Feedback
- Verification of graduate data
- 1st employment position after graduation
- Current employment position
OSU DOCTORAL PLACEMENT: DATA COLLECTION

- **Finding Missing Data**
  - Institutional Research Staff conducted internet searches for graduates with missing placement data

- **Institutional Information Sharing**
  - Newly populated placement information shared back with Departments
OSU DOCTORAL PLACEMENT: DATA SYNTHESIS

- Matching OSU and SED Graduate Program Data
  - Mapping file to connect OSU programs with equivalent program categories in NSF-SED file
  - OSU staff worked closely with NSF-SED project manager to ensure appropriate classification

- Matching Actual Employment to Plans
  - Mapping file to connect OSU graduate employment with equivalent employment plan categories in NSF-SED file

- Aggregate the OSU Data into similar NSF-SED format
HOW WELL DOES SED POST-GRADUATION PLAN DATA REFLECT ACTUAL POST-GRADUATION ACTIVITY?
2 Types of Data Comparison for Analysis

- Calculate NRC Academic Placement Measure
  - Using NSF-SED data
  - Using OSU academic placement data

- Chi-Square Tests
  - Deeper dive into large differences found in measurement results
Calculation of Academic Placement Measure

- **NSF-SED calculation**
  - # of respondents who indicated academic employment plans (either already secured or in negotiations) / # of respondents who answered the plans questions
  - Numerator and denominator match NRC methodology
    - Denominator is based on plans information for approximately 88% of OSU doctorates

- **OSU calculation**
  - # of OSU doctorates for whom academic employment information was found / total number of doctorates
  - The OSU calculation assumes the worst case scenario
    - Doctorates who were not found were assumed to have not received an academic placement
Chi-Square Tests

- Basic statistical tests to determine if differences in the distribution of NSF-SED employment plans data and OSU employment placement data are statistically significant.
- Tests conducted for years/major fields of study where measurement differences were large.
- Focus on differences statistically significant at the .05 level.
  - 95% chance that the difference in the distribution of data is significant.
ANALYSIS METHODOLOGY

- **Measurement Calculation & Chi-Square Tests**
  - Comparisons of NSF-SED data to OSU data
    - Aggregate program data for each, individual year
    - Aggregate program data for 2001-2004
    - Aggregate program data for 1996-2004
    - Major Field of Study data, 2001-2004 combined
    - Major Field of Study data, 1996-2004 combined
**ANALYSIS RESULTS**

**OSU Placement Data vs. SED Placement Data**
1996-2004 All Programs Combined

<table>
<thead>
<tr>
<th>Year</th>
<th>OSU Doctoral Academic Placement Data</th>
<th>NSF-SED Doctoral Academic Placement Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>44%</td>
<td>46%</td>
</tr>
<tr>
<td>1997</td>
<td>50%</td>
<td>49%</td>
</tr>
<tr>
<td>1998</td>
<td>49%</td>
<td>48%</td>
</tr>
<tr>
<td>1999</td>
<td>51%</td>
<td>48%</td>
</tr>
<tr>
<td>2000</td>
<td>55%</td>
<td>54%</td>
</tr>
<tr>
<td>2001</td>
<td>56%</td>
<td>53%</td>
</tr>
<tr>
<td>2002</td>
<td>60%</td>
<td>58%</td>
</tr>
<tr>
<td>2003</td>
<td>62%</td>
<td>56%</td>
</tr>
<tr>
<td>2004*</td>
<td>61%</td>
<td>50%</td>
</tr>
</tbody>
</table>

* Significant at .05 for specific year, across all programs
## Analysis Results

### 1996-2004 & 2001-2004 Academic Placements

**OSU vs. SED**

<table>
<thead>
<tr>
<th></th>
<th>All Programs *^</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1996-2004</td>
</tr>
<tr>
<td><strong>OSU</strong></td>
<td>54%</td>
</tr>
<tr>
<td><strong>SED</strong></td>
<td>51%</td>
</tr>
</tbody>
</table>

* Significant at .05 for 2001-2004
^ Significant at .05 for 1996-2004
ANALYSIS RESULTS

2001-2004 Academic Placements By Major Field of Study - OSU vs. SED

<table>
<thead>
<tr>
<th></th>
<th>Sciences *</th>
<th>Agricultural Sciences *</th>
<th>Social Sci *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSU</td>
<td>63%</td>
<td>62%</td>
<td>71%</td>
</tr>
<tr>
<td>SED</td>
<td>57%</td>
<td>48%</td>
<td>60%</td>
</tr>
</tbody>
</table>

* Significant at .05 for 2001-2004
ANALYSIS RESULTS

1996-2004 Academic Placements By Major Field of Study - OSU vs. SED

<table>
<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>Non S&amp;E</th>
<th>Biological Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSU</td>
<td>59%</td>
<td>58%</td>
<td>61%</td>
</tr>
<tr>
<td>SED</td>
<td>45%</td>
<td>55%</td>
<td>66%</td>
</tr>
</tbody>
</table>

^ Significant at .05 for 1996-2004
# Analysis Results

2001-2004 Academic Placements By Major Field of Study - OSU vs. SED

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>OSU</th>
<th>SED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Sciences</td>
<td>50%</td>
<td>43%</td>
</tr>
<tr>
<td>Earth, Atmospheric, and Ocean Sci</td>
<td>71%</td>
<td>52%</td>
</tr>
<tr>
<td>Physics</td>
<td>60%</td>
<td>49%</td>
</tr>
</tbody>
</table>
FUTURE DIRECTIONS

- Analysis of month to month data to determine if relationship between calendar and reporting definite plans on SED
  - Important for institutions operating under quarter system

- How do the data compare to actual placement data?
The NSF-SED is not an ideal proxy for actual doctoral placements

- Care should be taken when using this data as an alternative for actual placement data
- Less problematic as a measure of program quality if differences exist equally from institution to institution

The NSF-SED data tend to underestimate academic placements

- For OSU within the major field of Sciences
  - Agricultural sciences
  - Social sciences
- For OSU within
  - Mathematics
  - Non-S&E fields
KEY FINDINGS

- Institutions should track, collect and publish doctoral outcomes data in order to give faculty and prospective students a more complete and accurate picture of doctoral outcomes, both academic and non-academic.