Apples to Apples: Using AAUDE Faculty-by-CIP Data to Account for Discipline Differences in Faculty Salaries

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The Challenge

• The University of Minnesota chose to conduct a study of gender equity in faculty salaries

• Important to conduct a rigorous analysis that could isolate and reveal inequities that are separate from other policy issues that may have disparate economic impact

• High-stakes analysis for legal, historical, and ethical reasons
Why do salaries differ?

- Experience and seniority
  - Salaries increase incrementally year to year
- Historical events
  - Special bonus/investment programs
  - Pay freezes or “lean years”
- Qualifications (terminal degree, etc.)
- Meritorious performance and market forces
  - Salary increases are intended to reflect meritorious performance and market
Assessing Merit

- Extraordinarily difficult in practice
  - Definitions of success vary widely by field
  - Eludes easy quantification, particularly at the individual level
- Potentially biased
  - If differences in pay exist, it is likely that perceptions of merit are also influenced by same factors
Variation within and across colleges

Colleges - All Ranks

- TALA
- TCOA
- TCED
- TCLA
- TCBS
- TPHR
- THHH
- TIOT
- TPUH
- TCSM
- TLAW
Variation within and across colleges, single rank
Variation within a single college, single rank

College of Agriculture - Full Professors

[Graph showing variation in salaries across different departments within the College of Agriculture, with departments such as Animal Science, Entomology, Plant Pathology, Soil, Water, & Climate, Fisheries/Wildlife/Consrv Biol, Horticultural Science, Food Science & Nutrition, Agronomy & Plant Genetics, Forest Resources, and Applied Economics.]
Model specification

• Selection of a dependent variable
  – Salaries vs annual increases vs salary at hire
  – Base salary vs increments, augmentations, etc.

• Shaped by research question
  – Base pay?
  – Assessment of merit?
  – Recruiting practices?
  – Advancement opportunities?

• Accounting for other policies with disparate impact
  – E.g., Hiring Faculty at Rank
  – E.g., Tenure Clock Stoppage
  – E.g., Spousal Hire
Model specification

• Selection of independent variables
  – Oversimplification vs “kitchen sink” (overspecification) modeling
  – Variables that are not necessarily gender-related may exhibit differences by gender, confounding analysis

• Controlling for legitimate reasons for differences in pay to isolate differences on dimensions that are not legitimate reasons

• For modeling “market,” need some form of external (appropriate) benchmark or standard
• Simple models
  – Seniority-driven, incremental increases
• Moderately complicated models
  – Add some control variables for fields
• Elaborate/esoteric models
  – Primarily scholarly articles, drawing from external data sources
Basic model

- **Dependent variable**
  - 9-month base salary

- **Independent variables**
  - Gender
  - Degree year
  - Hire year
  - Average AAUDE faculty salary by rank by CIP
Market forces

• Department vs field
  – Departmental names and structures differ across institutions
  – Faculty within the same field might command different salaries in different departments

• Use of “dummy” or indicator variables
  – Question of controlling for influences versus isolating impact of those influences
  – Depending on how “field” defined (college, department, other), sheer number of dummy codes could overspecify model
The Ohio State University
Pennsylvania State University
University of California – Berkeley
University of California – Los Angeles
University of Florida
University of Illinois – Champaign-Urbana
University of Michigan – Ann Arbor
University of Texas – Austin
University of Washington – Seattle
University of Wisconsin – Madison
• Each department has been assigned a primary CIP code by the Office of Institutional Research

• Secondary and tertiary codes are assigned to units with broad or disparate specialties

• CIP codes are used when reporting faculty salaries to AAUDE (also Oklahoma State University Faculty Salary Survey, CUPA, etc.,)
## Example of CIP mapping

<table>
<thead>
<tr>
<th>Deptid</th>
<th>Department Name</th>
<th>CIP Code</th>
<th>CIP Code Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11093</td>
<td>IT Chem Eng &amp; Mat Science Adm</td>
<td>14.0701</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>11093</td>
<td>IT Chem Eng &amp; Mat Science Adm</td>
<td>14.1801</td>
<td>Materials Engineering</td>
</tr>
<tr>
<td>11093</td>
<td>IT Chem Eng &amp; Mat Science Adm</td>
<td>14.3101</td>
<td>Materials Science</td>
</tr>
<tr>
<td>11098</td>
<td>IT Chemistry Administration</td>
<td>40.0501</td>
<td>Chemistry, General</td>
</tr>
<tr>
<td>11098</td>
<td>IT Chemistry Administration</td>
<td>40.0599</td>
<td>Chemistry, Other</td>
</tr>
</tbody>
</table>
## Example of comparison data aggregation (Fictional)

<table>
<thead>
<tr>
<th>CIP Code</th>
<th>Institution Name</th>
<th>Rank</th>
<th>FTE</th>
<th>Average Salary</th>
<th>FTE x Avg Sal</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0701</td>
<td>Comparison Institution 1</td>
<td>Full Professor</td>
<td>20</td>
<td>$122,000</td>
<td>2440000</td>
</tr>
<tr>
<td>14.0701</td>
<td>Comparison Institution 4</td>
<td>Full Professor</td>
<td>15</td>
<td>$115,000</td>
<td>1725000</td>
</tr>
<tr>
<td>14.0701</td>
<td>Comparison Institution 5</td>
<td>Full Professor</td>
<td>7</td>
<td>$128,500</td>
<td>899500</td>
</tr>
<tr>
<td>14.1801</td>
<td>Comparison Institution 1</td>
<td>Full Professor</td>
<td>5</td>
<td>$100,000</td>
<td>500000</td>
</tr>
<tr>
<td>14.1801</td>
<td>Comparison Institution 5</td>
<td>Full Professor</td>
<td>6</td>
<td>$200,000</td>
<td>1200000</td>
</tr>
<tr>
<td>14.3101</td>
<td>Comparison Institution 1</td>
<td>Full Professor</td>
<td>10</td>
<td>$125,000</td>
<td>1250000</td>
</tr>
</tbody>
</table>

| Total:   |                             |                 | 63  |                | 8014500       |

Avg Sal for Full Profs in this Dept: $127,214
Impact on model fit (adjusted $R^2$)

- Assistant Professor: 0.864
- Associate Professor: 0.561
- Full Professor: 0.443

- Gender only: 0.002, 0.012, 0.010
- Add Experience: 0.062, 0.079, 0.051
- Add AAUDE Salary: 0.00, 0.10, 0.20, 0.30, 0.40, 0.50, 0.60, 0.70, 0.80, 0.90, 1.00
Correlation between institutional and “market” average salaries

Assistant Professors

Full Professors
Implications

• Clear, strong market influence
  – Most influence at Assistant Professor Rank
  – Less influence at higher ranks due to greater mobility, seniority, and merit.

• Preserves parsimony of model
  – Addition of single variable (AAUDE salary) accounts for considerable portion of variance explained without overspecifying the model

• Model can be estimated periodically using available internal data plus exchange items
Plans

• Intention is to repeat study on a regular basis
  – Increases importance of a simple, replicable methodology

• Considering approaches to improve matching of CIP codes to units and faculty
  – Faculty governance has expressed interest in having more input on assignment of CIP codes
Additional modeling

• Working with consultant on modeling
  – Building single model combining all ranks
  – Need to adjust calculation of AAUDE average salary variable to combine ranks
• Exploring standardizing of AAUDE faculty salary by CIP variable within and across faculty ranks
• Potential increase in variance explained with individualized departmental comparison groups and/or cost of living index
QUESTIONS?

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