

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



UNIVERSITY OF MINNESOTA

**Driven to Discover**<sup>SM</sup>

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

**Leonard S. Goldfine**  
**Assistant Director**  
**Office of Institutional Research**  
**University of Minnesota**

AIR Annual Forum  
May 25, 2011  
Toronto, Canada

- 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

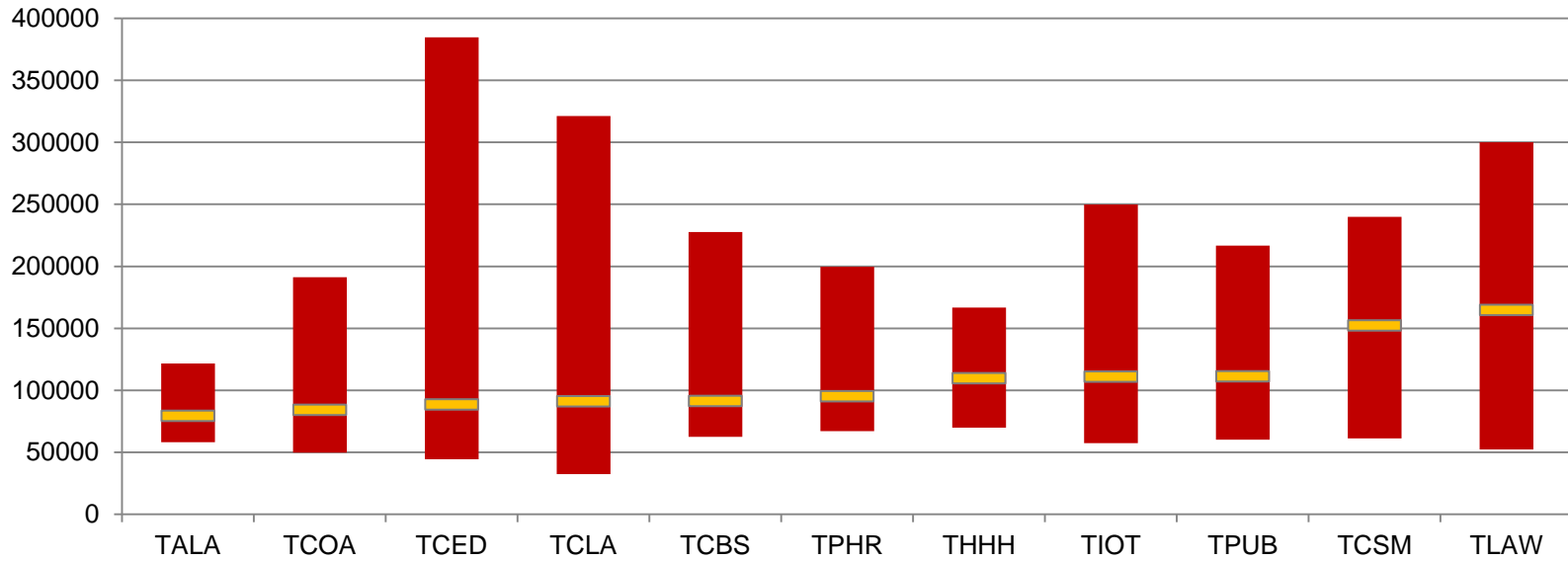
# Why do salaries differ?

- 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

- 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

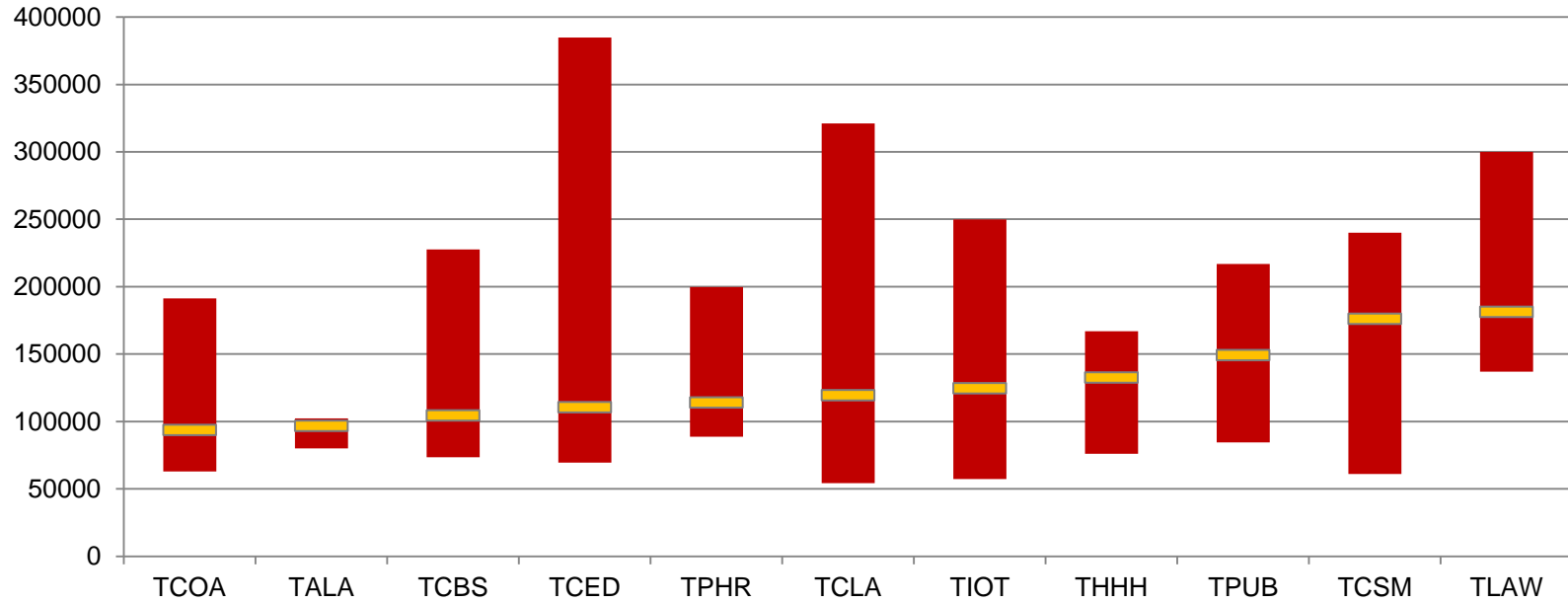
# Variation within and across colleges

## Colleges - All Ranks



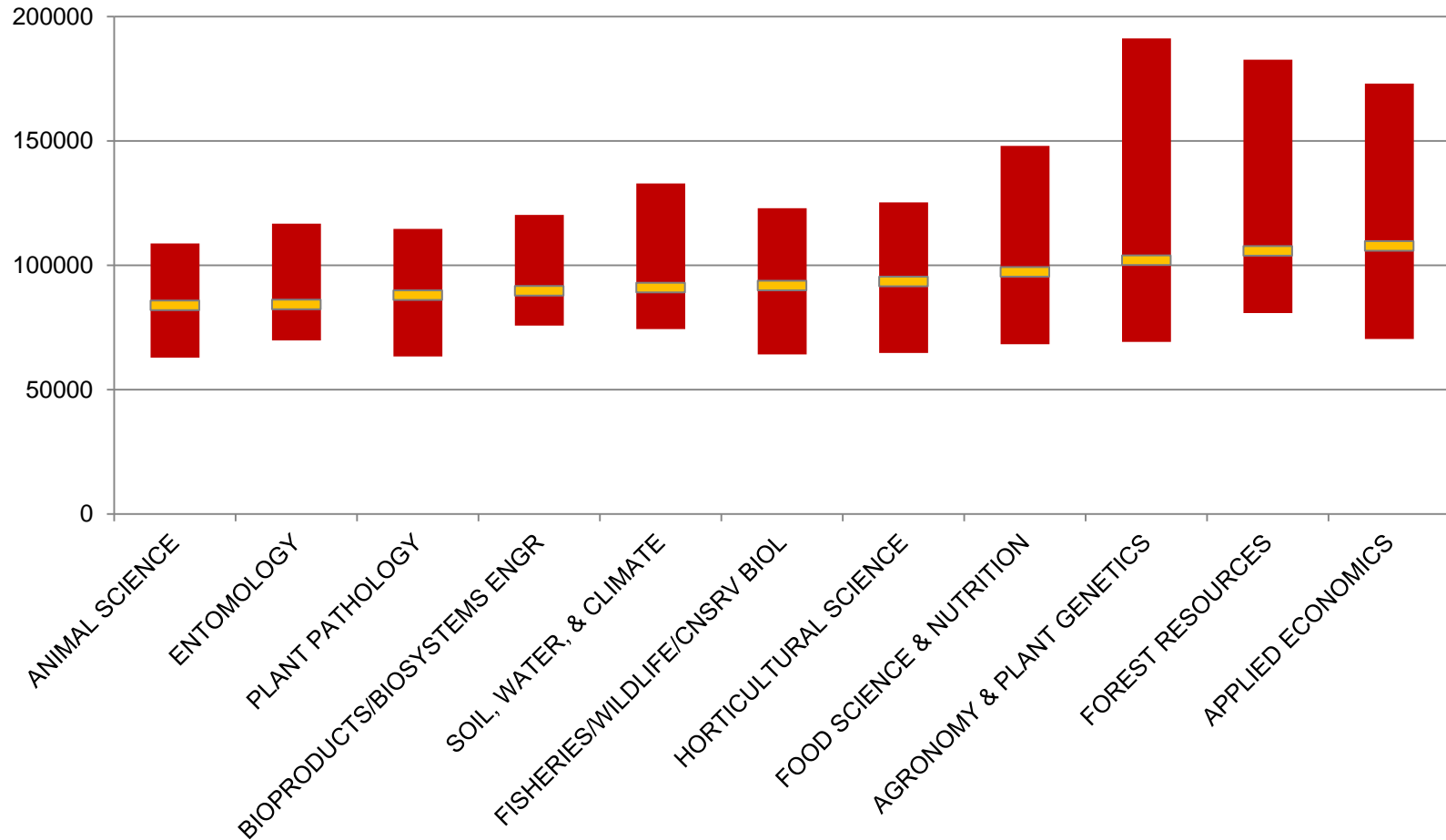
# Variation within and across colleges, single rank

## Colleges - Full Professors



# Variation within a single college, single rank

## College of Agriculture - Full Professors



- 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



- 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

- Dependent variable
  - 9-month base salary
- Independent variables
  - Gender
  - Degree year
  - Hire year
  - Average AAUDE faculty salary by rank by CIP

- 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

<b>Deptid</b>	<b>Department Name</b>	<b>CIP Code</b>	<b>CIP Code Description</b>
11093	IT Chem Eng & Mat Science Adm	14.0701	Chemical Engineering
11093	IT Chem Eng & Mat Science Adm	14.1801	Materials Engineering
11093	IT Chem Eng & Mat Science Adm	14.3101	Materials Science
11098	IT Chemistry Administration	40.0501	Chemistry, General
11098	IT Chemistry Administration	40.0599	Chemistry, Other

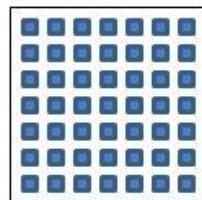
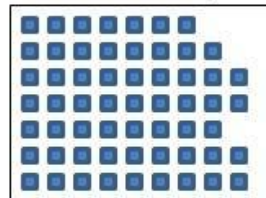
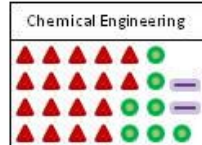
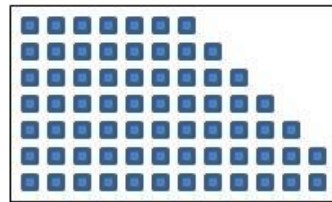
# Example of comparison data aggregation (Fictional)

CIP Code	Institution Name	Rank	FTE	Average Salary	FTE x Avg Sal
14.0701	Comparison Institution 1	Full Professor	20	\$122,000	2440000
14.0701	Comparison Institution 4	Full Professor	15	\$115,000	1725000
14.0701	Comparison Institution 5	Full Professor	7	\$128,500	899500
14.1801	Comparison Institution 1	Full Professor	5	\$100,000	500000
14.1801	Comparison Institution 5	Full Professor	6	\$200,000	1200000
14.3101	Comparison Institution 1	Full Professor	10	\$125,000	1250000
		Total:	63		8014500
		Avg Sal for Full Profs in this Dept:			\$127,214



# Matching by CIP Code

University of Minnesota  
Academic Departments



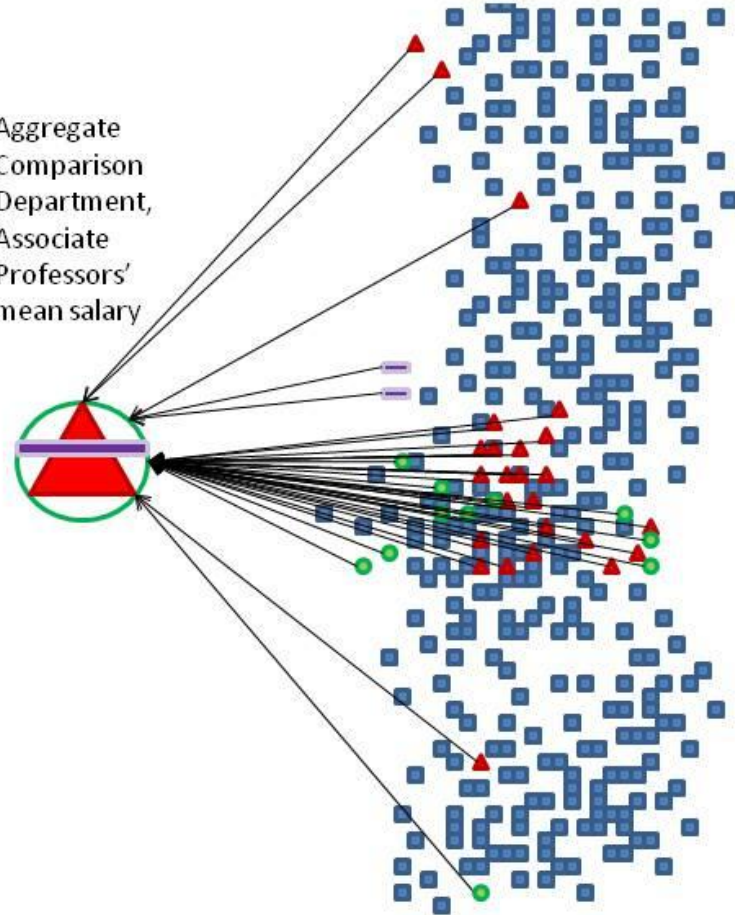
U of M  
Chemical  
Engineering  
& Material  
Science,  
Associate  
Professors'  
mean salary



Aggregate  
Comparison  
Department,  
Associate  
Professors'  
mean salary



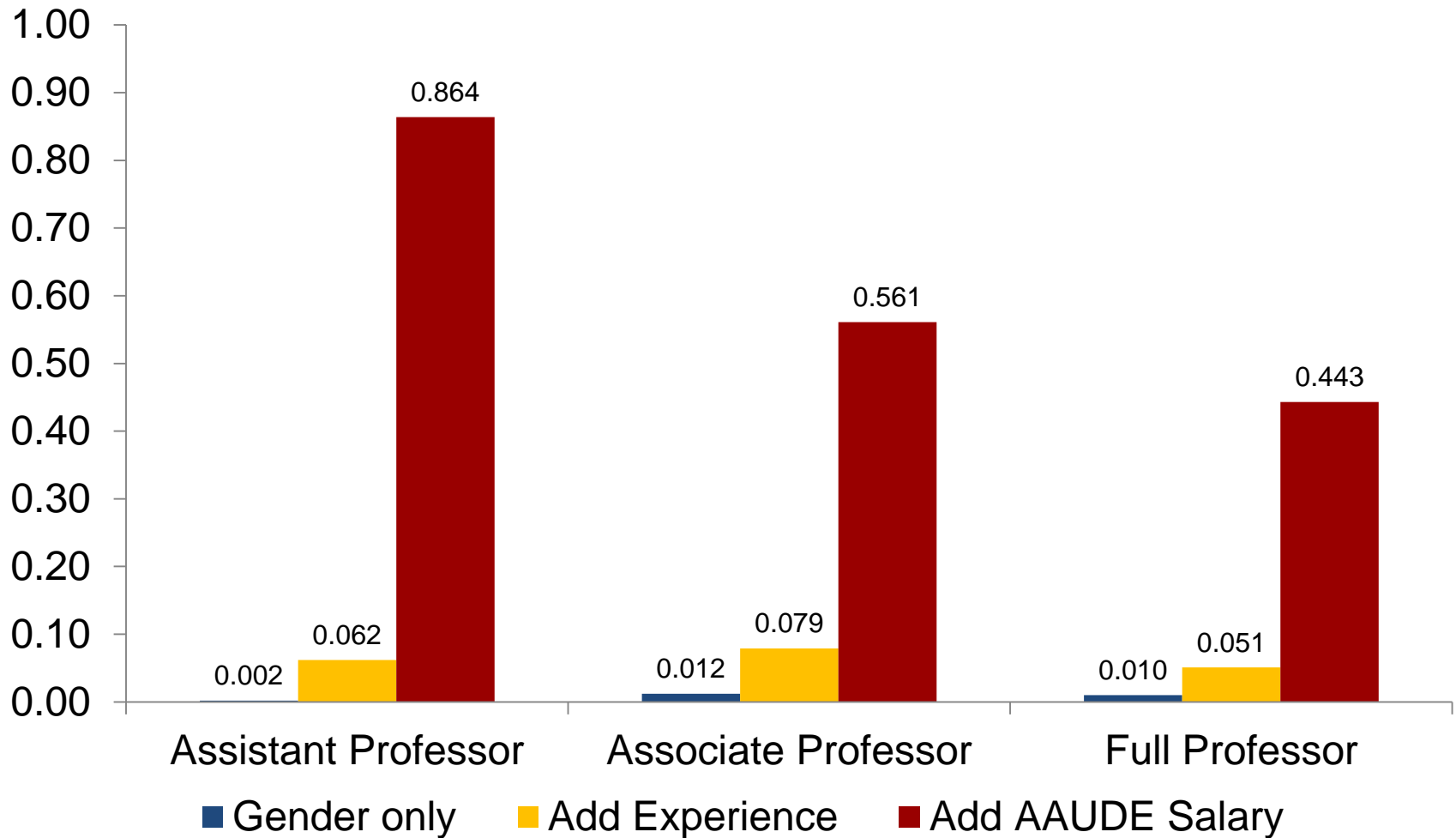
Aggregate of all AAUDE  
Comparison Faculty



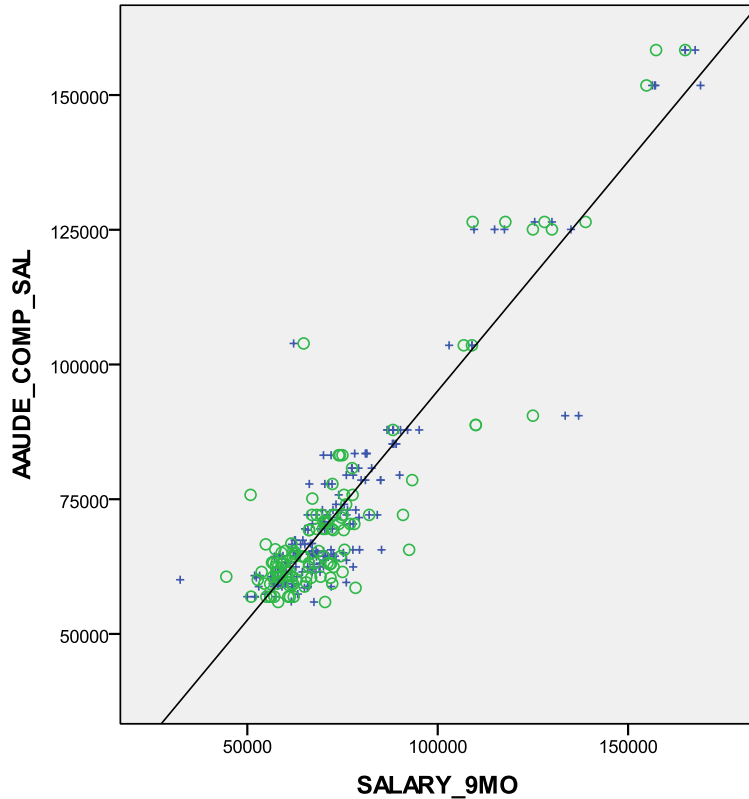
CIP Codes

- 14.0710
- ▲ 14.1801
- 14.3101
- Other CIPs

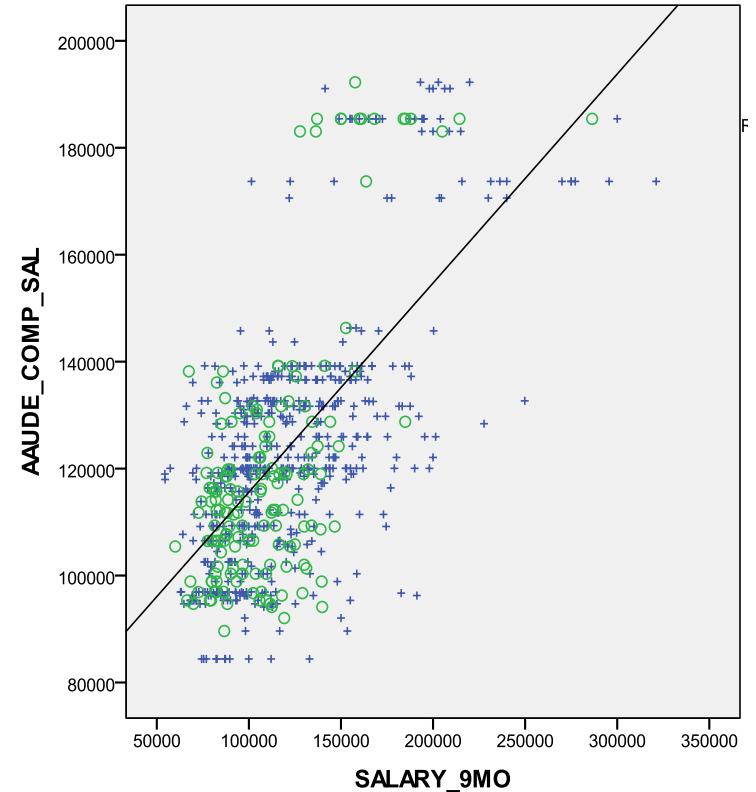
# Impact on model fit (adjusted R<sup>2</sup>)



# Correlation between institutional and “market” average salaries



Assistant Professors



Full Professors

- 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

- 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

- 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?

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

**Leonard S. Goldfine**  
**Assistant Director**  
**Office of Institutional Research**  
**University of Minnesota**