



Communicating Uncertainty – An example using the SOCApproach to Reporting IPEDSHR Survey Data

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ABSTRACT

Beginning in fiscal year 2013, NCEs mandated the use of SOCA codes for submitting IPEDSHR survey data. Consequently, institutions that previously submitted using other than SOCA codes might need to apply, retroactively, the mandated FY2013 SOCA approach to pre FY2013 HR data in order to generate associated historical trends. This presentation discusses some ways in which the uncertainty introduced by this retroactive application might best be communicated to the university officers who routinely utilize these historical trends.



OUTLINE

Motivating example using a specific metric (Ratio of Managers to Faculty)

SOC's at UM

Implications of ignoring uncertainty when reporting this metric

Incorporating uncertainty using a Bayesian approach when reporting this metric

Suggested improvements

Summary

Motivating Example

*** Referto SOChandoutNOW!***

Fig1. UM IPED\$HRSurveyemployees.

| FY | Total | No. Missing SOC | % Missing SOC |
|------|--------|-----------------|---------------|
| 2010 | 28,108 | 1,126 | 4.01 |
| 2011 | 28,612 | 773 | 2.70 |
| 2012 | 28,852 | 208 | 0.72 |
| 2013 | 28,355 | 0 | 0.00 |

Fig2. Jobs(business_unit+ jobcode)of UM IPED\$HRSurveyemployees.

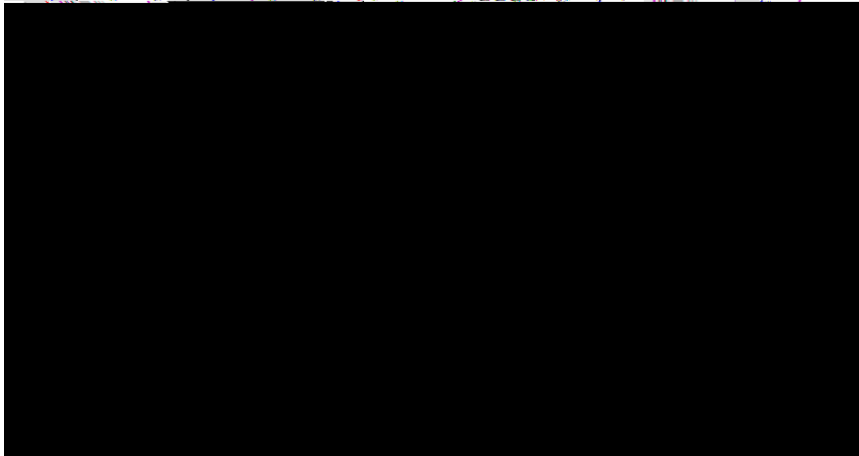
| FY | Total | No. Missing SOC | %Missing SOC |
|------|-------|-----------------|--------------|
| 2010 | 3,435 | 415 | 12.08 |
| 2011 | 3,440 | 296 | 8.60 |
| 2012 | 3,446 | 159 | 4.61 |
| 2013 | 3,354 | | |



Beta Distribution:

$f(p) = \frac{1}{B(\alpha, \beta)} p^{\alpha-1} (1-p)^{\beta-1} I_{0,1}(p)$, where

$$0 < \alpha < \infty, \quad 0 < \beta < \infty, \quad \text{and} \quad t = \int_0^t u^{\alpha-1} e^{-u} du.$$



Wikipedia

$E(p) = \frac{\alpha}{\alpha + \beta}$, $Exp(p) = \frac{1}{\alpha + \beta}$, and $Mode(p) = \frac{\alpha - 1}{\alpha + \beta - 2}$, and

$$Var(p) = \frac{\alpha\beta}{(\alpha + \beta)^2 + 1}.$$

Example:

Suppose you “believe” (for whatever reason) that, for a given FY:

Each of these employees who have a missing SOC either has a management occupation, or is a postsecondary teacher.

Each is three times more likely to be a teacher than a manager.

Then, for each FY you want parameters α and β to satisfy:



| alpha | beta | Exp(p) | StdDev(p) | Var(p) |
|-------|------|--------|-----------|--------|
| 0.5 | 1.5 | 0.25 | 0.2500 | 0.0625 |
| 1.0 | 3.0 | 0.25 | 0.1936 | 0.0375 |
| 2.0 | 6.0 | 0.25 | 0.1443 | 0.0208 |
| 4.0 | 12.0 | 0.25 | 0.1050 | 0.0110 |
| 8.0 | 24.0 | 0.25 | 0.0754 | 0.0057 |
| 16.0 | 48.0 | 0.25 | 0.0537 | 0.0029 |

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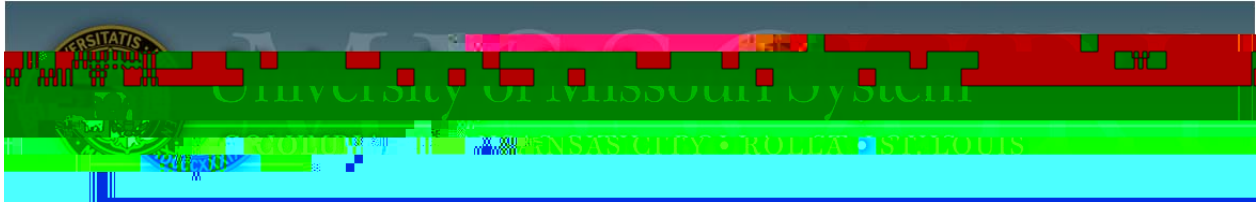
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Remarks:



Appendix(Handouts)

Bureau of Labor Statistics (<http://www.bls.gov/soc/>)
On behalf of the Standard Occupational Classification Policy Committee (SOCPC)

Last Modified Date: March 11, 2010

2010 Standard Occupational Classification

Major Minor Broad Group Detailed Occupation



| | | | | | | | | | |
|---------------|------|------------|-----|-----------|------|------------|--------|--------------|-----------------|
| BUSINESS_UNIT | VCVP | VCVP_DESCR | CSD | CSD_DESCR | DEPT | DEPT_DESCR | DEPTID | DEPTID_DESCR | iAcademic_Depts |
|---------------|------|------------|-----|-----------|------|------------|--------|--------------|-----------------|

KCITY

KACAF Ve Academic Affairs

K&S

College

| | | | | | | | | | |
|-------|-------|-------------------------|------|----------------------------|----------|--------------------------------|---------|---------------------------------|--------|
| STLOU | SACAF | VC for Academic Affairs | SA&S | College of Arts & Sciences | SIWGSTU | Institute for Women & Gender S | SIWGSTU | Institute for Women & Gender S | 0 |
| STLOU | SACAF | VC for Academic Affairs | SA&S | College of Arts & Sciences | SPSYCTR | Center for Trauma Recovery | SPSYCTR | Center for Trauma Recovery y | 0 1 |
| STLOU | SACAF | Ve For Academic Affairs | SA&S | College OF Arts & Sciences | SA&SAGAD | | | | |

