Communicating Uncertainty – An example using the SOC Approach to Reporting IPEDS HR Survey Data

Ronald D. Thompson, Ph.D.
Senior Institutional Research Analyst

Office of Institutional Research & Planning
University of Missouri System
721 Lewis Hall
Columbia, Missouri 65211.

ABSTRACT

Beginning in fiscal year 2013, NCES mandated the use of SOC codes for submitting IPEDS HR Survey data. Consequently, institutions that previously submitted using other than SOC codes might need to apply, retroactively, the mandated FY2013 SOC 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 Bayes-like approach when reporting this metric
- Suggested improvements
- Summary

Motivating Example

*** Refer to SOC handout NOW! ***

Fig 1. UM IPEDS SHR Survey employees.

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

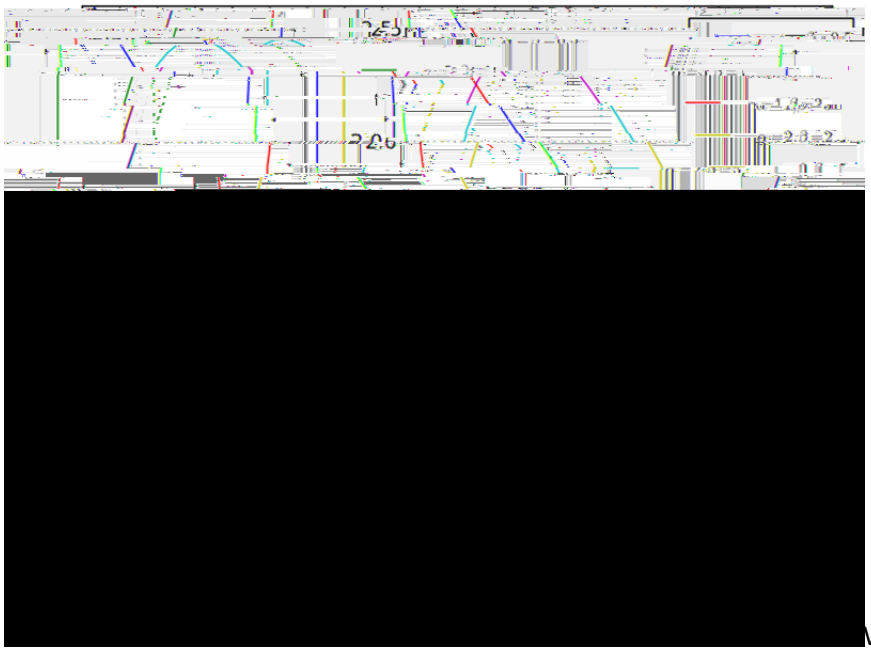
Fig 2. Jobs (business_unit + jobcode) of UM IPEDS SHR Survey employees.

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:

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

$\ > 0$, $\ > 0$, and $B(\ ,\ ) = \int_0^1 u^{t\ -1} e^{-u}\, du$.



Wikipedia

$E(p|\ ,\ ) = \frac{\ }{\ +\ }$, and $Mode(p|\ ,\ ) = \frac{1}{2}$, and

$Var(p|\ ,\ ) = \frac{\ }{(\ +\ )^2(\ +\ +1)}$.

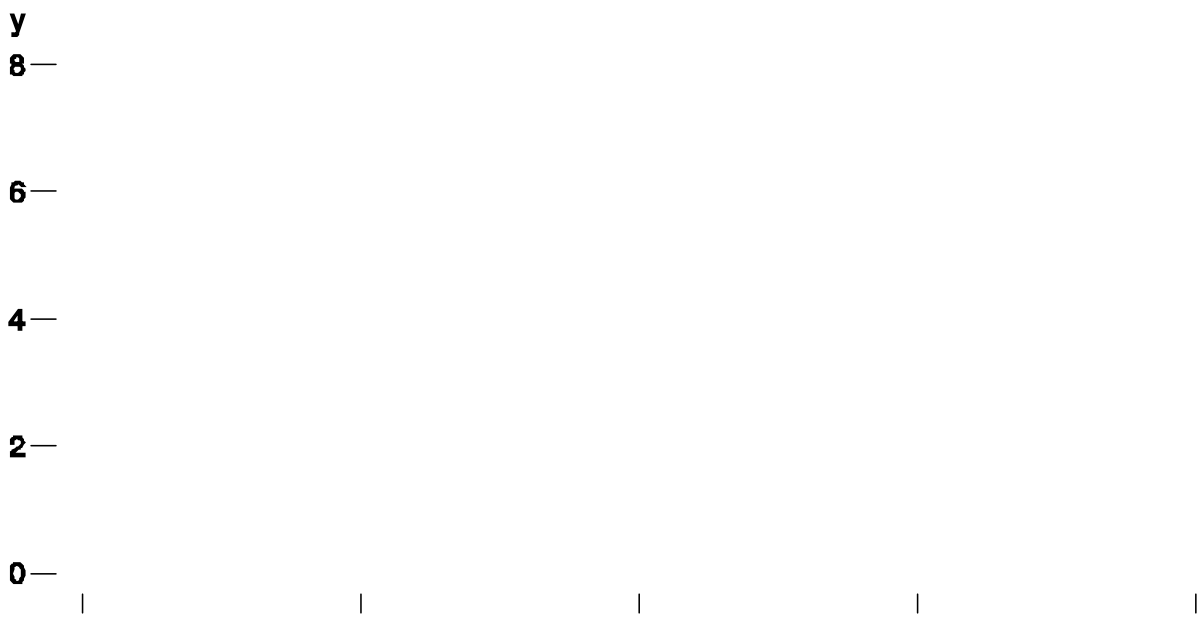
Example:

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 alpha and beta 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



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

Majc Minc Broad Group Detailed Occupation

BUSINESS_UNIT	VCVP	VCVP_DESCR	CSD	CSD_DESCR	DEPT	DEPT_DESCR	DEPTID	DEPTID_DESCR	iAcademic_Depts

~~KCITY~~ ~~KACAF~~ ~~Vc Academic Affairs~~ ~~KA&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	0
								y	1
STLOU	SACAF	Vc For Academic Affairs	SA&S	College Of Arts & Sciences	SA&SACAD				

Alpha =	8.000000	MISSING =	25.000	16.000	1.000
Beta =	24.000000	MGMNT =	38.000	35.000	37.000
		TTTPSTCH =	1068.000	1049.000	1077.000

U(04.4.95999e54.96393.4814.4.9595[V54.967596JK