TO: Fort Wayne Senate

FROM: Faculty Affairs Committee
             David Oberstar, Chair

DATE: February 25, 2000

SUBJ: Gender Equity Study - for information only

During the 1998-99 academic year the Faculty Affairs Committee requested that the Vice Chancellor for Academic Affairs carry out a gender equity study on the salaries of IPFW's resident faculty to determine if gender bias is a significant factor in salary disparities. This task was carried out by Professor David Legg and the results are attached for your perusal. The study found gender not to be a statistically significant factor (see bottom of second page). Questions should be directed to David Legg.

A STUDY OF GENDER SALARY EQUITY AT IPFW

The first phase of a gender salary equity study for professional staff on the Indiana University Bloomington and IUPUI campuses has been completed and the results have been forwarded to schools and departments to identify inequities. It was decided to do a similar study at IPFW. Our study uses the same statistical method as those employed at IUPUI. We use as a database the voting faculty for the academic year 1998-99. The idea is to try to construct a mathematical formula which will produce a faculty member's monthly salary based on a number of variables. This is identical in concept to the familiar least- squares method of trying to fit a straight line to a set of data points, except that we have many more independent variables.

The method begins by using rank, discipline salary, years at IPFW, years from degree, years in rank, possession of a doctorate, previous or current administrative duties, school affiliation, and interactive terms as independent variables, and monthly salary as the dependent variable. The data can be entered into a statistical software package such as Minitab, and a formula is produced which fits the data as closely as possible. A measure of how well the formula fits the data is called the R-sq (adj) value. It may be possible to improve the R-sq (adj) value by deleting various combinations of the independent variables, producing new formulas which fit the data better and better. (Minitab does this automatically). In the end we have a formula which fits the data as well as possible using some combination of the original independent variables. In the IUPUI study, an R-sq (adj) value of 80.5% was obtained. As you see in the table below, our study obtained an R-sq (adj) value of 79.9%, which is essentially as good. What this means intuitively is that about 80% of the variation in monthly salary can be explained by these formulas.

At this point we can test for gender bias. We add a new independent variable, which simply indicates whether the faculty member is male or female. The resulting formula will have a term corresponding to this variable, and the coefficient of this term may be interpreted as the portion of your salary which is based solely on being male. However, we must be careful here. A measure of statistical significance is called the P value. Different levels of significance can be assigned, but the most common is P < .05. Hence we consider bias factor statistically significant only if its P value is less than .05. As you can see in the table below, this factor is not even close to significant. Hence we conclude that there is no gender bias in the salary structure for voting faculty at IPFW.

DETAILS OF THE STUDY

The data used for this study consists of the faculty listed as voting faculty for the academic year 1998-99, totaling 294 persons. The salary is the 1998-99 academic year salary, with 12-month employees adjusted down so that all salary data is on a 10-month academic year basis. The discipline salary comes from CUPA data, 1998-99, and similar sources. Specifically, the following is a list of the variables used in the model.

C1 Monthly Salary	C8 Years in Rank	C15 FPA
C2 Professor	C9 Doctorate	C16 HS
C3 Associate Professor	C10 Previous Administrative Appointment	C17 ETCS
C4 Assistant Professor	C11 Special Professor	C18 OLS
C5 Discipline Salary	C12 Chair, Associate Chair, Associate Dean	C19 PEA
C6 Years at IPFW	C13 BMS	C20 LIB
C7 Years From Degree	C14 EDUC	

Also included in the model are the following interactive terms. These are products of the variables mentioned above, and hence occur the model as nonlinear terms.

C21 C6*C6	C25 C8*C5	C29 C5*C16	C33 C5*C20
C22 C8*C8	C26 C5*C13	C30 C5*C17	C34 C6*C2
C23 C6*C5	C27 C5*C14	C31 C5*C18	C35 C6*C11
C24 C6*C8	C28 C5*C15	C32 C5*C19	

Finally, the last variable added to the model is

C36 Male

The following table gives data relative to the initial model using all the variables, and to the final model which fits the data best among all models using our variables. The R-sq. and R-sq. (adj) numbers are interpreted as the percentage of the variability in monthly salary that can be explained by the variables used in the model. The R-sq. (adj) numbers are the best to use since they take into account the number of variables used in the model (in general, you pay a penalty for introducing more variables into the model). Hence we see that both models explain very nearly 80% of the variability in monthly salary. The final (benchmark) model used at IUPUI has R-sq. value of 81.6% and R-sq. (adj) value of 80.5%. Hence our models presented here have the same predictive power as the benchmark model used at IUPUI.

Variables Use	R-sq	R-sq (adj)	Coefficient of C36	P value
all C2-C36	81.9%	79.5%	$ 40.13	.629
all except C2,C3,C7,C13,C19, C22,C29,C31	81.7%	79.9%	$ 46.34	.568

Hence variables remaining in the benchmark model (the ones not deleted) are: Assistant Professor, Discipline Salary, Years at IPFW, Years in Rank, Doctorate, Previous Administrative Appointment, Special Professor, Chair, EDUC, FPA, HS, ETCS, OLS, LIB, and most interactive terms. It is clearly demonstrated in this table that the gender bias term, C36, is not close to statistically significant, which would require $P < .05$.

The variables in the last model which are statistically significant ($P<.05$) are:

Assistant Professor

Discipline Salary

Years at IPFW

Years in Rank

Doctorate

Previous Administrative Appointment

Special Professor

Chair, Associate Chair, Associate Dean

HS

ETCS

OLS