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ABSTRACT

A study was conducted using the parity-equity model to investigate variances in faculty salaries at North Dakota State School for Science. The parity-equity model specifies three constructs as determinants of faculty salaries: (1) rational equity factors, including years of professional experience, rank, degree, graduate faculty status, tenure status, years in current rank, and administrative responsibilities; (2) nonrational equity factors, including sex, age, years at university, a 9-month versus a 12-month appointment, and former administrative duties; and (3) marketplace influences, as determined by average faculty salaries by college and by department in eight land grant institutions. The study focused on determining the amount of salary variance attributable to these factors; developing a parsimonious regression model of salary; examining the efforts of the independent variable on salary; developing a recursive path model of salary, a block model of salary, and a nonrecursive model of salary; and analyzing the decomposition of salary differentials. The study found that over 80% of the salary variance could be explained by the rational equity variables, with years of experience having the greatest impact on faculty salaries; and that nearly two-thirds of the $224 salary differential between men and women arose from labor market discrimination. The study report includes background information on the parity-equity model, details the statistical methodologies employed, and provides diagrams depicting the statistic models. (HB)

FACULTY SALARY DETERMINANTS IN A TWO-YEAR POST-SECONDARY INSTITUTION

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FACULTY SALARY DETERMINANTS

IN A TWO-YEAR POST-SECONDARY

INSTITUTION

This study is an investigation of faculty salaries at a two-year postsecondary institution. It examines, analyzes and ascertains the degree to which measurable differences in the characteristics of faculty in a two-year comprehensive college lead to measurable differences in faculty salaries. External marketplace influences and structural determinants of faculty salaries are also incorporated into the research design to capture their influence and to provide for a more complete specification of the model. The variance in faculty salaries is assessed by variables consistent with a "parity-equity" model.

INTRODUCTION

The parity-equity model specifies three constructs as determinants of faculty salaries: rational equity factors, nonrational equity factors and marketplace influences. Rational equity represents the influence of legitimate, achieved characteristics, while nonrational equity represents the influence of illegitimate, ascribed characteristics. Marketplace influences are captured by supply and demand dynamics-which adjust faculty salaries accordingly.

As the assumption of multiple causation of salary differences is made, statistical procedures permitting the simultaneous examination of many predictor variables are needed. Multiple regression and path analysis offer such an examination. Seven major aims of the research are accomplished by the utilization of multiple regression and path analysis. They are:

1. Assess how much of the variance in salary is uniquely and collectively explained by the three constructs;

2. Develop a parsimonious model of faculty salaries characterized by its economy of description;

3. Examine each independent variable in the parsimonious model to determine its influence on salary;

4. Develop a recursive path model of salary facilitating an examination of the total, direct, and indirect effects of the variables representing the three major constructs of the analysis;

5. Assess the overall influence of each construct on salary through a block variable model;

6. Test a possible feedback relationship between salary and performance evaluation by means of a nonrecursive model of salary; and

7. Decompose observed salary differentials between male and female faculty and between faculty in four instructional divisions of the study population, into factors which capture the influence of a) different returns to faculty characteristics, b) different faculty endowments, c) different starting salaries, and d) an interaction component.

Summarizing, the study aims to identify, isolate, examine and control for a multiple number of predictors of faculty salary. As prediction and efficient control are concerned with cause and effect relationships, statistical techniques that allow for inferences of causality among variables in a theoretical framework are needed. Multiple regression and path analysis provide for such inferences. While these tools do not prove theory, they do provide a means to more exactly state theory, to more precisely test theory, and, if needed, to more intelligently modify theory.

HUMAN CAPITAL APPROACH

The human capital approach attributes income differentials to differences in individual investment behavior. The heterogeneity of incomes is attributed to investments individuals have made in their stock of "human capital", such as schooling, on-the-job training, medical care and acquiring information about the economic system (Becker, 1962:9). According to Becker, these investments improve physical and mental ability, increase employee resources, and raise their income prospects.

The work of Becker and further elaborations of the theory by Mincer (1958, 1962) provide a novel view of the life cycle of earnings by linking it to the time profile of investment in human capital: people make most of their investments in themselves when they are young, and to a large extent, by foregoing current earnings. Earnings are, therefore, relatively low at early years, and they rise as investment declines and returns on past investments are realized. Thus, the major source of income inequality is found in lifetime differences in the amount of human capital investment among individuals and differences in rates of return on these investments.

There are actually three distinct models of human capital theory: 1) the schooling model, 2) the general earnings model, and 3) the post-schooling investment model. The schooling model (Mincer, 1958) views earnings as a function of years of schooling completed. The model is formulated in terms of training periods which are completed before earnings begin. It, therefore, applies strictly to schooling rather than to all occupational training. As such, the model has relatively low explanatory power in accounting for the variance of earnings because it omits other human capital investments, such as on-the-job training which occurs with work experience.

Becker's (1964) general earnings model is an advancement over Mincer's schooling model because it views earnings as a function of both schooling and post-schooling investment. However, Becker's specification of the model requires data on the average rate of return on investments and net investment costs. This data is generally not available for individuals so empirical estimates derived from the model cannot be obtained. To overcome this problem, Mincer (1974) developed the post-schooling investment model, which is based on the general earnings model but is in an empirically testable form.

Johnson and Stafford (1974b) have an article which examines female faculty earnings. Utilizing data from the National Science Foundation, they hypothesize that the male-female salary differential may be due to women voluntarily choosing less labor force participation and less on-the-job training. They conclude that over half of the salary differential can be explained by the market's reaction to voluntary choices by females regarding on-the-job training. They estimate that over a thirty-five year work life, nearly two-fifths of the wage disadvantage is attributable to discrimination, three-fifths to human capital differences. In addition, they find that the salary differential widens as years of experience increase.

Hoffman (1975) employed the human capital approach in an econometric study of salary differentials at the University of Massachusetts/Amherst. She found that the post-schooling investment model fits the data well, in a statistical sense ($R^2 = .575$). Years of experience and its quadratic, along with years of schooling and sex, were found to be significant predictors of faculty salary. Increased explanatory power was obtained by adding productivity variables to the model.

Hoffman also found that the salary structure was significantly different for males and females. With years of schooling and experience held constant, female faculty earned 15 percent less than males with equal characteristics. Sex was also found to be a significant predictor of rank. As such, rank should not enter a salary regression as it could mask the effects of discrimination.

INSTITUTIONAL AND STRUCTURAL DETERMINANTS

The characteristics and properties of the marketplace, the occupation, and the labor force are the focal points of interest for this perspective of wage determination. Salary differences are seen to result from the context of employment.

One structural property of employment that has received a substantial amount of attention is the relationship between income and the size of the organization. Direct relationships between size of firm and level of income are consistently reported (Rees and Schultz, 1970; Shepard and Levin, 1973; Lester, 1967). Interpretations of this relationship are often attributed to the covariance of large firms existing in large urban communities, with higher income levels; to be organized, with union pay scales; to have management policies expecting wage leadership, and economies of scale making this leadership possible; and to have impersonal disadvantages for which higher wages compensate.

Another structural property of employment and its relationship to income to receive research attention is the percentage of a socially identifiable minority (females as well as Negroes). Hodge and Hodge (1965) hypothesize that the presence of a socially identifiable minority acts as a depressant upon the income of the majority. They found an inverse relationship between the percentage of the occupation that was female (as well as Negro) and the proportion of white males in the occupation with incomes over 3500 dollars. They interpreted this finding to mean that the minority group offers to supply labor at less than the going price, which sets off a competitive process that lowers the wage of the majority group. In a similar study, Fuchs (1971) reports that the income of both men and women is depressed in industrial classifications with higher proportions of women.

Fox (1978) incorporates characteristics of the department in her sex-wage study of faculty at the University of Michigan. Three departmental characteristics were incorporated into her research design: unit type, unit size, and percentage unit female. Hoffman's analysis demonstrates that it pays not to be in departments where a high percentage of the employees are female; and this negative effect is much greater for men than for women.

INTERNAL LABOR MARKET ANALYSIS

Reagan and Maynard (1974) interpret faculty salaries within an "internal labor market" framework. In this study, salary was regarded as a function of a set of administrative rules and procedures for promotion within an organization, and only indirectly by external economic variables. The connection between the internal labor market and the external labor market is regarded as an impingement upon the internal, academic market in terms of supply of faculty available.

The application of this framework at Southern Methodist University demonstrated that three fourths of the women faculty had salaries that were markedly below those of men with corresponding credentials and productivity. Reagan and Maynard attribute the discrepancies between salaries for men and women to the unconsciously narrow perceptions of women's roles and to the peculiar relationship of many women to the external labor market.

IDEOLOGY OF ACHIEVEMENT

Fox's (1978) analysis of faculty salaries at the University of Michigan is directed by an "ideology of achievement" framework. She demonstrates that achievement is one of the strongest values in American society. Income differentials are attributed to the significance of the tasks that people perform and to their ability and achievement in performance of these tasks. Further, Fox pairs achievement with the value of universalism and science. The value of universalism directs people to treat objects according to generalized standards covering all objects in that classification. Accordingly, the allocation of rewards (income) on the basis of performance tends to demand that the same standards of achievement be applied to all persons. In addition, science is thought to approximate the ideal of universalism-achievement. With the university as the primary locus of scientific investigation, Fox examines equity in female faculty salaries within this contextual framework.

Some of the important findings are:

1. Achieved characteristics are the most important determining variables of salary. They account for 61 percent of the variation in women's income and 64 percent of the variation in men's income. However, the rate of return on these characteristics is not the same for men and women. Notable sex-wage disparities exist in payment for age/experience, title and education.

2. Majority status (native citizenship and white race) is economically advantageous for both sexes, but it is worth more to men than women. The most important ascriptive salary determinant is sex.

3. In terms of explaining salary differentials, unit location characteristics are more important than ascribed, but less important than, achieved characteristics - for both sexes.

4. For each set of characteristics, women's income payments are lower, leading Hoffman to conclude that while achievements are the income dominator, sex is the great divider of reward. A dual reward structure exists, dominated by ideologically legitimate factors, but divided by an illegitimate, ascribed factor.

PARITY-EQUITY MODEL

Braskamp and Johnson (1978) developed a "parity-equity" model to evaluate faculty salaries. This model not only takes into consideration internal promotion and salary policies aimed to reward professional and academic productivity, but also external influences on salary that result from the behavior of the marketplace. More specifically, three sets of independent variables were developed to account for the variance in salary: rational equity factors, nonrational equity factors and marketplace factors.

Variables included in the rational equity set were: years of professional experience, rank, degree, graduate faculty status, tenure status, years in current rank, and administrative responsibilities. Certain factors were not considered rational or equitable bases for salary differentials and were grouped as a set representing nonrational equity factors.

Variables included in this set were: sex, age, years at university, a 9-month versus a 12-month appointment, and former administrative duties. Finally, average faculty salaries by college and by department in eight land grant institutions were used to measure marketplace influences.

The parity-equity model accounted for 86 percent of the variance in salaries, as indicated by a multiple regression analysis. Hierarchical multiple regression demonstrated that the rational equity factors were the most powerful determinants of salary, accounting for 78 percent of the variance in salaries. Professional rank accounted for over 61 percent of the variance in 1975-76 and 64 percent in 1976-77. On the other hand, parity and nonrational equity factors explained only 8.3 percent of the variance in the first year and 6.2 percent in the second year. Braskamp and Johnson found that departmental salaries do reflect external marketplace demands, but the relationship is not as strong when compared to the importance of rational equity factors.

Although Braskamp and Johnson fail to integrate their model of faculty salaries with the broader perspective of "equity theory", it appears that a review of the major propositions and findings associated with equity theory is in order. A number of theorists (Adams, 1963, 1965; Homans, 1961; Patchen, 1961) have advanced models for determining equitable payment for work. The theories share three primary points. First, each assumes that employees perceive a fair, just, or equitable return for what they contribute to their jobs. Second, each theory includes the concept of social comparison whereby employees determine what their equitable return should be after comparing their inputs (skills, education, effort, etc.) and outcomes (pay, promotion, job status, etc.) with those of co-workers. Finally, each theory assumes that employees who perceive themselves as being in an inequitable situation will seek to reduce the inequity - by cognitive distortion of inputs and/or outcomes, by directly altering inputs and/or outcomes, or by leaving the organization.

While the focus of this research is not on the consequences of salary inequities, the possible consequences derived from such perceptions are, nonetheless, important to keep in mind and, indeed, may affect the effectiveness of institutions in achieving their respective missions.

A STUDY OF SALARY VARIATION: FOCUS, OBJECTIVES, AND CONTRIBUTIONS

This research is a study of salary determination in a particular organizational setting and conceptual framework. The heterogeneity of faculty salaries is investigated in the setting of a two-year post-secondary institution. The variance in faculty salaries is assessed by variables consistent with a "parity-equity" model. As such, three sets of variables are viewed as governing faculty salaries. These constructs are: rational equity factors, nonrational equity factors and marketplace influences. The aim of the study is to assess the influence of each of these constructs on faculty salaries, and to uncover and elucidate the determinants of faculty salaries with multi-stage analyses. The analytic procedures include multiple regression and path analysis. Two types of causal models are postulated as representing salary outcomes - a recursive and a nonrecursive model. Also, a block variable model is employed to assess the relative importance of each of the three constructs on salary.

Basically, the initial orientation of this research is guided by the schematic diagram of Figure 1. This model depicts a linear relationship between the variables in each set and salary. Clearly, the initial orientation of the research is guided by the work of Braskamp and Johnson (1978).

To further explore the relationships in the data, a recursive path model of salary was developed. This model is shown in Figure 2. In this path diagram, it is observed that the faculty member's evaluation (performance appraisal) is dependent on the same three constructs as salary. In addition, evaluation is taken to be a determinant of salary. The rationale for viewing evaluation as a consequence of the three constructs comes from the research by Hoffman (1975), Fox (1978), Loeb and Ferber (1971, 1973), and Bayer and Astin (1975). Each study found that rank (a proxy for evaluation) was significantly dependent on many of the same variables included in these sets of constructs. Also, the rationale for viewing salary as dependent on evaluation comes from the institution's State Board of Higher Education policy manual which directs the college to set salaries based on merit considerations. Performance appraisals in the form of evaluation scores are used to determine merit pay. The position of evaluation in the model provides an opportunity to assess how much of the influence of the exogenous variables is mediated or transmitted by evaluation.

Not only do evaluation scores influence salary, but, according to Birnbaum (1979) and Ramsay (1979), salary may have a feedback effect on evaluation. Such a relationship in the context of the exogenous variables is represented by Figure 3. The nonrecursive relationship between salary and evaluation not only represents a different structural relationship between the variables, but also implies the use of a more sophisticated statistical technique to estimate the parameters of the model.

This study examines, analyzes and ascertains the degree to which measurable differences in the characteristics of faculty in a two-year comprehensive college lead to measurable differences in faculty salaries. External marketplace influences and structural determinants of faculty salaries are also incorporated into the research design to capture their influence. More specifically, the focus of the study is on salary variation as it is influenced by rational equity and nonrational equity factors along with marketplace influences. As such, a major contribution of this study is the explicit manner in which the parity-equity model is utilized. This places the study in the forefront of an emergent body of research tradition.

No other known study has solely examined faculty salaries at a two-year comprehensive college. This oversight is especially unwelcome as one out of every five faculty in higher education are now associated with two-year institutions (Carnegie Council, 1980). This study advances the literature on faculty salaries by correcting this oversight and filling gaps in methods of analysis. Earlier income analyses suffer from either non-simultaneous control of important variables affecting salary (Bayer and Astin, 1968), or simultaneous control for a limited number of variables (Converse and Converse, 1971; LaSorte, 1971; Simon, Clark and Galway, 1967; Loeb and Ferber, 1973). This research has the potential to identify the importance of a range of factors affecting faculty salaries. Such an analysis can further be used to identify discrepancies between espoused salary policies and operational policies. It also possesses the potential to reveal policy recommendations for correcting any observed salary inequities.

This study of salary variation within one two-year institution severely limits the generalizability of the findings to other populations. This limitation in external validity is a liability, but the restriction is also an advantage. Complete information on many more pertinent variables of the analysis was possible with this restriction.

METHODS OF STUDY

This section is primarily concerned with "the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance" (Kerlinger, 1973:300). In addition, a description of the population studied is presented along with a discussion of the variables included in the analysis. Finally, the statistical techniques employed to answer research questions and control variance are examined.

POPULATION AND VARIABLES OF THE ANALYSIS

Study Population

The data for this research represents a complete census of all full-time faculty at the North Dakota State School of Science for whom specific information appears on the college personnel tape, June, 1980. The college is a two-year comprehensive college with state-wide responsibilities for transfer and vocational education programs. For purposes of instruction, the faculty is organized into four instructional divisions. Complete information was obtained for 43 faculty in the Technical Division, 55 faculty in the Trades Division, 45 faculty in the Arts, Science and Pre-professional Division, and 23 faculty in the Business Division. A great majority of these faculty are male (140). As the college does not use professional ranking, all teaching faculty are designated instructors.

Variables of Analysis

The independent variables of this research are organized in three sets - rational equity, nonrational equity and marketplace influences. These variables are presented along with variable labels and units of measurement in Table 1. As some of these variables are categorical variables and are, therefore, treated as dummy variables, Table 2 summarizes the dummy variable coding.

Nearly all of the measurements necessary to complete the data matrix were obtained from the college personnel tape. A few exceptions existed. Both present and past evaluation scores were obtained from files in the office of the Vice President for Academic Affairs. Current evaluation score (EVAL) is defined as the most recent evaluation score obtained from the Division Dean's performance appraisal of the faculty member. Past evaluation scores (PEVAL) are the scores obtained from previous evaluations nearest to the years 1973-74. The original scores were coded on a scale from 1 to 6, with 1 representing a very positive evaluation and 6 representing unacceptable performance. These scores were recoded so that a 6 represents superior performance and a 1 represents inferior performance.

The two productivity scores, individual productivity (PROD) and departmental productivity (DFTE), were obtained from the college faculty load tapes for fall, winter and spring quarters of the 1979-80 college year. Average productivity scores were calculated for each faculty member and department. More specifically, PROD was calculated in the following manner. First, for each course for which a faculty member had responsibility, the number of students in the course was multiplied times the course number of credits. These values were then summed to give a quarterly measure of productivity. Quarterly measures of productivity were obtained for each of the three quarters in the academic year. Finally, an average measure of productivity was obtained by calculating the arithmetic mean of the three quarterly values. Departmental productivity (DFTE) was calculated by first adding the faculty productivity scores of departmental faculty for each quarter. A quarterly department average was obtained for each quarter. Then, finally, a yearly productivity average for the department was calculated.

Dummy coding for the marketplace variables (MMKT and SMKT) was based on the response of the Division Deans to the following request:

> "For every faculty member in your Division, please reflect back to the time that he/she was hired. Please check if supply and demand factors (or other marketplace conditions) influenced the starting salary of the faculty in the following way. If the marketplace factors raised the starting salary of faculty considerably, mark the column indicating strong marketplace influences. If marketplace conditions had a moderate influence, check the column indicating moderate influences. If the marketplace had a weak influence on the individual's starting salary, check that column."

Of course, measurement errors may be attached to the variables reflecting the influence of the marketplace (or for that matter any other variable). If these errors are random, they will produce attenuating biases in the

TABLE 1

Independent Variables of the Analysis

Variable Label	Variable Name	Unit of Measurement
I. Rational Equity		
YRSEX2	Years of Experience	Years
YRSEX	Quadratic of YRSEX	Years (squared)
YRSR	Years related experience	Years
YRSCH	Years of schooling	Years
EVAL	Evaluation	Evaluation score (1-6)
ABSNT	Absenteeism	Number times absent
ADMD	Administrative duties	Dummy coded
TEN	Tenure status	Dummy coded
PROD	Productivity	FTE Productivity
II. Marketplace		
MMKT	Moderate marketplace influence	Dummy coded
SMKT	Strong marketplace influence	Dummy coded
III. Nonrational Equity		
SEX	Sex	Dummy coded
AGE	Age	Years
Location Characteristics		
PWO	Percent women in dept.	Percent
DEPTS	Department size	No. of faculty
Division		
ASP	Arts and Science faculty	Dummy coded
BUS	Business faculty	Dummy coded
TECH	Technical faculty	Dummy coded
DFTE	Department Productivity	FTE dept. Productivity
PEVAL	Past evaluation	Past evaluation score (1-6)

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TABLE 2

Dummy Variable Coding

Dummy Variable	Description of Coding
ADMD (Administrative duties)	Coded 1 if faculty has department chairman status, all others coded 0
TEN (Tenure status)	Coded 1 if faculty has tenure status, all others coded 0
MMKT (Moderate marketplace)	Coded 1 if faculty hired under moderate marketplace influences, all others coded 0[a]
SMKT (Strong marketplace)	Coded 1 if faculty hired under strong marketplace influences, all others coded 0[a]
SEX (Sex)	Coded 1 if faculty male, females coded 0
ASP (Arts and Science faculty)	Coded 1 if faculty in Arts and Science Division, all others coded 0[b]
BUS (Business faculty)	Coded 1 if faculty in Business Division, all others coded 0[b]
TECH (Technical faculty)	Coded 1 if faculty in Technical Division, all others coded 0[b]

[a]The implicit category of marketplace influences is faculty hired under weak marketplace conditions.

[b]The implicit category of divisional status is faculty in the Trades Division.

ordinary least-squares parameters, the degree of bias being dependent on the relative magnitudes of the measurement error variance as compared with the variance in the independent variable concerned (Blalock, Wells and Carter, 1970:78).

The three sets of independent variables in this analysis are at one point treated as block variables (Heise, 1972); that is, a single index summarizing the influence of each abstract construct on salary is calculated. In addition, divisional affiliation is treated as a block and is labeled DIVN. (The effects of these block variables are indicated by sheaf coefficients which are explained in the section on "techniques of analysis".)

The dependent variable is, of course, monthly salary (MSAL). It was obtained by dividing the faculty member's 1980-81 contractual salary by 9 months. It thus represents a monthly, full-time income rate. It also implicitly standardizes, or controls, for proportion of the academic year worked.

RESEARCH QUESTIONS

Twelve research questions are organized under seven major sets. These sets and the specific research questions are presented in the order in which they are addressed in the following chapter on "findings and interpretations".

Accounting for the variance in salary

1. How much of the variance in the dependent variable, monthly salary, can be explained by the rational equity variables?

2. After the influence of the rational equity variables has been taken into account, how much of the variance in monthly salary can be additionally accounted for by marketplace variables?

3. After the influence of the rational equity and marketplace variables has been taken into account, how much of the variance in monthly salary can be additionally accounted for by the nonrational equity variables?

4. Do selected independent variables interact to more fully explain the variance in salary?

A parsimonious regression model of salary

5. Can a parsimonious model be obtained from the full model?

An examination of the effects of the independent variables on salary

6. In terms of dollars, how much does each independent variable contribute to salary, controlling for the influence of all other independent variables?

7. As the independent variables are measured in different metrics, which ones are relatively more important in influencing salary?

A recursive path model of salary

8. Given the causal model depicted in Figure 4:

   a. What are the total, direct and indirect effects of the exogenous variables on salary?
   b. Does the path model alter the relative rankings of the importance of the exogenous variables when compared to the rankings provided in the parsimonious regression model of salary?
   c. How much of a direct effect does the endogenous variable, evaluation, have on salary?
   d. How much of the variance in salary and evaluation is accounted for by the model?
   e. How much of a direct effect do the exogenous variables have on evaluation?
   f. Is the recursive path model consistent with the relations in the data?

A block model of salary

9. Given the block variable model of Figure 5, what are the overall effects of each of the three abstract constructs - rational equity, nonrational equity and the marketplace - on salary?

A nonrecursive model of salary

10. Given the nonrecursive model illustrated in Figure 6, is the nonrecursive relationship between salary and evaluation meaningful, and if meaningful, is the nonrecursive model consistent with the data?

Decomposition of salary differentials

11. How much of the salary differential between male and female faculty is attributable to:

    a. Different returns to their characteristics;
    b. Different endowments;
    c. Different intercept constants, i.e., different starting salaries; and
    d. Differences that result from interaction effects?

12. How much of the salary differential between faculty in the four instructional divisions in the college is attributable to:

    a. Different returns to their characteristics;
    b. Different endowments;
    c. Different intercept constants (starting salaries); and
    d. Differences that result from interaction effects?

TECHNIQUES OF ANALYSIS

Two techniques of analysis are employed in this study: multiple regression and path analysis. Further, three distinct models of path analysis are adopted: a recursive path model, a nonrecursive path model and a block variable model. Each of these techniques of analysis are examined beginning with multiple regression.

Multiple Regression

Multiple regression is a powerful method to study the relationship of a single dependent variable with several coefficient is zero.

Thus, multiple regression provides a rich yield of various statistics (or parameters) to be used in the interpretation of data. Perhaps the most important utility of multiple regression is that it is closely related to the basic purpose of science, the explanation of natural phenomena (Kerlinger and Pedhazur, 1973:444). Further, its ability to control for variance provides a powerful analytic tool to examine the unique and collective influence of independent variables on a criterion variable.

Path Analysis

Path analysis was developed by the geneticist Sewall Wright in a series of general essays (1921,1934,1954,1960a, b). It is a method of decomposing observed correlations into direct and indirect effects between a theoretically specified set of variables in order to test the adequacy of the theory in question. It is important to understand that path analysis is not a method for discovering causes, but a method applied to a causal model formulated from theoretical considerations. It tests theory, it does not generate theory.

The first step in path analysis is the formulation of a theory to account for the relations among variables. It can readily be used regardless of the complexity of the causal model. Their contribution is that they present a method for decomposing total associations by applying multiple regression procedures systematically. Alwin and Hauser's procedure is utilized in this research to decompose total associations into their constituent parts. The importance of decomposition is that total effect coefficients can alter the relative ranking of the importance of the variables when contrasted with the assessment of the variables with one based on the beta coefficients in a multiple regression equation (Lewis-Beck, 1974).

The Employment of Nominal and Block Variables in Path Analysis

The employment of nominal and block variables in this research, especially in path analysis, has necessitated the adoption of a methodology to summarize the effects of the nominal and block variables. Such a summary coefficient is found in the sheaf coefficient (Heise, 1972). It is well suited to the purposes of this research as it uses observations on the indicators of an abstract construct to assess the relations beween the construct and other variables. An example should clarify the use of sheaf coefficients.

In simplified form, assume that one is interested in only the effects of divisional affiliation (DIVN) and years of experience (YRSEX) on salary (MSAL). Divisional affiliation is a nominal variable and is decomposed into a set of dummy variables which are conceived to be determinants of salary. The dummy variables which are taken to be indicators of divisional affiliation are status in the Arts, Science and Pre-professional (ASP) Division, status in the Business (BUS) Division, and status in the Technical (TECH) Division (with status in the Trade Division being implicit). A path diagram indicating the relationships between the variables is illustrated in Figure 7.

The sheaf coefficient is noted as p in Figure 7. It conveys the idea that it is a single measure of multiple effects. The parameters in Figure 7 are identifiable if it is assumed that the set of indicators (the dummy variables) perfectly define the unmeasured construct (DIVN). Ultimate effects are obtained by postmultiplying the matrix of endogenous indirect effects, $(I-B)^{-1}$ by the matrix of exogenous coefficients (C), some of which are zero for those exogenous variables left out of certain equations. (Ng does not make it explicit, but the only way this author could reproduce his results was to include the intercept constants in matrix C.)

A Note on Decision Rules

As the data in this study represent a census and, therefore, not a sampling of the institution's faculty, traditional statistical tests of significance are viewed as not having any meaning. Therefore, F and t tests and their associated probabilities are not utilized in the research as they have meaning only in a sampling framework. Only when data analysts are estimating the values of structural coefficients from sample data do probablistic inferences about the population make sense. In short, the coefficients in this study represent parameters, not statistics, for the faculty at the North Dakota State School of Science.

However, this does not mean that all parameters will be accepted without critical examination. Taking a lead from Heise (1969), Land (1969) and Duncan (1966), specific criteria of meaningfulness were established on an a priori basis to guide research decisions. Specifically, for any standardized partial regression coefficient to be regarded as 'meaningful' its magnitude must be equal to or greater than +.05. Also, as the vast majority of studies in this subject area report R^2 above 40 percent, an R^2 equal to or greater than 40 percent must be obtained to be regarded as meaningful. In a similar manner, increments in R^2 obtained from adding variables or sets of variables to a regression equation must be equal to or greater than 3 percent to be regarded as meaningful. In addition to these criteria being helpful in guiding research decisions, these decision rules are useful for purposes of "theory trimming" (Heise, 1969) and the economy of description obtained from parsimonious models.

FINDINGS AND INTERPRETATIONS

This part is organized in eight sections. First, some basic characteristics of the population are presented through descriptive parameters and scatter diagrams. Second, research findings associated with the accounting of variance in salary are examined. A parsimonious regression model of faculty salaries is developed in the third section. In the fourth section, the effects of each independent variable on salary are examined. To more completely examine the relationships between the variables, a recursive path model of salary is presented in section five. Section six summarizes the effect of each of the three constructs - rational equity, nonrational equity and the marketplace - on salary through a block variable model of salary. The nonrecursive model of salary is interpreted in section seven. Finally, in section eight, findings related to the decomposition of salary differentials are presented.

All of the sections, excluding the first section, are organized by a similar format. First, the research question is posed. Second, a brief description of the methodology employed to answer the research question is presented. Finally, findings and interpretations are presented to answer the research question.

I. SOME CHARACTERISTICS OF THE POPULATION

Before presenting results associated with models of salary determination, an examination of various features of the data is presented by way of means and scatter diagrams. Tables below show selected characteristics of faculty by numbers, sex and instructional unit. Experience-salary profiles are presented by scatter diagrams.

Table 3 presents a comparison of male and female faculty. A large proportion of the faculty is male (84 percent). On the average, these faculty have more years of experience at the college than their female colleagues. They also possess a slight margin in the number of years of related experience that they bring to the college. On the other hand, female faculty have over a one year advantage in the number of years of formal education beyond high school. This fact is largely due to the concentration of female faculty in the Business and Arts, Science and Pre-professional Divisions where a Masters Degree is usually required as a condition of employment. Female faculty are also, on the average, evaluated higher than their male counterparts. Yet, proportionately, female faculty have only 12 percent of their numbers as department chairman, whereas 19 percent of the male faculty possess department chairman status. Similar advantages for male faculty are observed in tenure status. As measured by the productivity variable, male faculty are over 25 percent

TABLE 3

Selected Characteristics of Faculty by Sex and Division[b] at the North Dakota State School of Science, Fall, 1980

VAR.[a]	GENDER		DIVISION				
	Male	Female	Trade	Tech	Bus	ASP	Total
YRSEX	11.86	8.12	11.22	12.53	9.13	11.22	11.27
YRSR	8.69	7.04	9.71	9.53	6.52	6.78	8.43
YRSCH	2.86	4.12	1.07	2.51	4.87	5.07	3.05
EVAL	3.70	3.88	3.70	3.62	3.82	3.84	3.73
ABSNT	1.36	2.27	.96	1.86	.65	2.24	1.50
ADMD	.19	.12	.18	.16	.22	.18	.18
TEN	.71	.58	.64	.77	.74	.64	.69
PROD	64.34	442.04	22.00	539.86	523.96	467.24	545.19
MMKT	.14	.15	.11	.21	.04	.13	.14
SMKT	.03	.04	.07	.02	.04	.02	.03
MSAL	88.42	1864.17	21.32	2097.28	2036.31	2059.04	2054.07
N	140	26	55	43	23	45	166

[a]The averages associated with dummy coded variables are interpreted as percentages.

[b]Trade represents faculty in the Trades Division, Tech represents faculty in the Technical Division, Bus represents faculty in the Business Division, and ASP represents faculty in the Arts, Science and Pre-Professional Division.

more productive than female faculty. Similar averages are observed for the proportion of male and female faculty hired under conditions of moderate and strong marketplace influences. However, the female faculty average salary is 89 percent of the average salary of male faculty.

Table 3 also reports a comparison of the faculty according to divisional affiliation. Business faculty have the fewest years of experience at the college, whereas faculty in the Technical Division have the highest average years of experience. The Business and Arts, Science and Pre-professional faculty have more years of formal education than their colleagues in the other two divisions, but at the expense of the number of years of related experience. This is consistent with appointment policies which emphasize formal educational backgrounds for faculty in the Business and Arts, Science and Pre-professional Divisions and on the job experience for faculty in the Trades and Technical Divisions. Faculty in the Technical Division have the highest average productivity and the highest proportion of faculty hired under moderate marketplace influences. On the other hand, there are proportionately more faculty in the Trades Division hired under strong market conditions.

II. ACCOUNTING FOR THE VARIANCE IN SALARY

With a number of independent variables in this analysis, a natural question arises as to the overall relation between these independent variables and monthly salary (MSAL). In short, one wants to know how well the independent variables explain MSAL. Along these same lines, as the independent variables have been grouped under three constructs - rational equity, nonrational equity and marketplace influences - a question arises as to how well the sets of variables uniquely contribute to the explanation of MSAL, given a temporal order of the sets of variables. (It is assumed that salary considerations are based first on rational factors, followed by the influence of the marketplace and, finally, by nonrational factors.) In addition to these questions, it is also possible that the independent variables interact to more fully explain MSAL. All of these questions are examined in this section. Beginning with questions concerning the unique contribution of each set of variables to the explanation of MSAL, the analysis moves to questions concerning how well all the predictor variables explain MSAL to a question of whether or not the independent variables interact to more fully explain MSAL.

Research Question: How much of the variance in the dependent variable, monthly salary, can be explained by the rational equity variables?

Methodology: Since the assumption of multiple causation of salary differences has been made, a statistical procedure permitting the simultaneous influence of the predictors on MSAL is needed. A regression framework offers such a procedure. As such, MSAL was regressed on the rational equity variables to obtain R^2, the coefficient of determination. More specifically, the following multiple regression equation was specified:

$$(4.1)\quad MSAL = a_0 + b_1YRSEX + b_2YRSEX^2 + b_3YRSR + b_4YRSCH + b_5EVAL + b_6ABSNT + b_7ADMD + b_8TEN + b_9PROD + e$$

where the b_i equals unstandardized partial regression coefficients, a_0 equals the intercept constant and e represents the residual error term. The independent variables are represented by their notational symbols. The following notation will symbolize model (4.1): $R^2_{Y.R}$, the squared multiple correlation of MSAL (Y) with the set of independent variables associated with the rational equity variables (R).

Findings and Interpretations: The empirical results of model (4.1) are presented in Table 4. While the metric and standardized partial regression coefficients are of interest in another context, the present focus of interest is on the coefficient of determination, $R^2_{Y.R}$. The rational equity variables account for 80 percent of the variance in MSAL, i.e., $R^2_{Y.R} = .8042$. Thus, a very substantial portion of the variance in MSAL is explained by the rational equity variables.

Research Question: After the influence of the rational equity variables (R) has been taken into account, how much of the variance in MSAL can be additionally accounted for by marketplace variables (M)?

TABLE 4

Multiple Regression of MSAL on Rational Equity Variables

Variable	Unstandardized Coefficient	Standardized Coefficient
Constant	1333.25	
$YRSEX^2$	33.68	1.007
YRSEX	- 0.44	-.431
YRSR	7.73	.166
YRSCH	15.14	.135
EVAL	43.67	.064
ABSNT	0.10	.001
ADMD	120.73	.180
TEN	97.85	.176
PROD	.11	.085
R^2	.8042	
$S.E._{est}$	117.49	
N	166	

Methodology: Model (4.1) was expanded to include the marketplace variables:

$$(4.2)\ MSAL = a_0 + b_1 YRSEX + b_2 YRSEA + b_3 YRSR + b_4 YRSCH + b_5 EVAL + b_6 ABSNT + b_7 ADMD + b_8 TEN + b_9 PROD + b_{10} MMKT + b_{11} SMKT + e$$

Model (4.2) is symbolized by $R^2_{Y.RM}$. The additional amount of variance accounted for by the marketplace variables (M), over and above that explained by the rational equity variables (R), is determined by subtracting $R^2_{Y.R}$ from $R^2_{Y.RM}$.

Findings and Interpretations: The coefficients of model (4.2) are reported in Table 5. Model (4.2) accounts for 84 percent of the variance in MSAL. The additional amount of variance accounted for by the marketplace variables, above and beyond that already explained by the rational equity variables, is given by $R^2_{Y.RM} - R^2_{Y.R}$, or .8411 - .8042 = .0369. Thus an additional 3.69 percent of MSAL variance is accounted for by marketplace variables. If a sampling methodology had been employed

TABLE 5

Multiple Regression of MSAL on Rational Equity and Marketplace Variables

Variable	Unstandardized Coefficient	Standardized Coefficient
Constant	1290.90	
YRSEX	39.17	1.172
$YRSEX^2$	- 0.54	- .523
YRSR	7.47	.161
YRSCH	15.03	.134
EVAL	40.20	.059
ABSNT	0.02	.000
ADMD	86.75	.130
TEN	103.21	.186
PROD	0.09	.072
MMKT	131.97	.180
SMKT	192.88	.128
R^2	.8411	
$S.E._{est}$	106.55	
N	166	

instead of taking a full census, this increment would be subjected to a hierarchical F ratio (Cohen and Cohen, 1975:135-137); Kerlinger and Pedhazur, 1973:70-72) to test the null hypothesis that in the population there is literally no increment in MSAL variance when marketplace influences are added to the rational equity set of variables; that is, that $R^2_{Y.RM} - R^2_{Y.R} = 0$. Due to the population mode of analysis, this procedure is inappropriate. Hence, the decision rule discussed earlier is applied; that is, a set of variables must add at least an additional 3 percent to the variance already accounted for to be regarded as meaningful. As such, the increment of 3.69 percent satisfies the decision rule. The marketplace variables are regarded as contributing meaningfully to the explanation of MSAL variance, beyond that already accounted for by the rational equity variables.

Research Question: After the influence of the rational equity and marketplace variables have been taken into account, how much of the variance in MSAL can additionally be accounted for by the nonrational equity variables?

Methodology: The nonrational equity variables (N) were added to model (4.2) to produce the following equation:

$$(4.3)\ MSAL = a_0 + b_1YRSEX + b_2YRSEX^2 + b_3YRSR + b_4YRSCH + b_5EVAL + b_6ABSNT + b_7ADMD + b_8TEN + b_9PROD + b_{10}MMKT + b_{11}SMKT + b_{12}SEX + b_{13}AGE + b_{14}PWO + b_{15}DEPTS + b_{16}ASP + b_{17}BUS + b_{18}TECH + b_{19}DFTE + b_{20}MSTAT + b_{21}PEVAL + e$$

TABLE 6

Multiple Regression of MSAL on Rational Equity, Marketplace and Nonrational Equity Variables

Variable	Unstandardized Coefficient	Standardized Coefficient
Constant	1033.61	
YRSEX	34.72	1.038
$YRSEX^2$	- 0.48	-.471
YRSR	6.41	.138
YRSCH	12.83	.114
EVAL	53.26	.078
ABSNT	1.86	.024
ADMD	65.30	.098
TEN	99.25	.179
PROD	0.04	.029
MMKT	117.89	.161
SMKT	199.92	.133
SEX	129.36	.183
AGE	1.12	.044
PWO	-46.83	-.051
DEPTS	- 3.32	-.038
ASP	27.92	.048
BUS	41.12	.055
TECH	7.04	.012
DFTE	- 0.03	-.009
MSTAT	- 0.14	-.000
PEVAL	42.58	.066
R^2	.8808	
$S.E._{est}$	95.42	
N	166	

This model, $R^2_{Y.RMN}$, represents the inclusion of all independent variables into the regression equation. The increment in MSAL variance due to the nonrational equity variables, above and beyond that already accounted for by the regression of MSAL on the rational and marketplace variables, is obtained from $R^2_{Y.RMN} - R^2_{Y.RM}$.

Findings and Interpretations: Regression coefficients for the full model (4.3) are presented in Table 6. The full model accounts for 88 percent of the variance in MSAL, a relatively high R^2 when compared with the results from other studies. The nonrational equity variables contribute an additional 4 percent (.8808 - .8411 = .0397) to the explained variance of MSAL, above and beyond that already accounted for by the rational equity and marketplace variables. This figure exceeds the 3 percent criterion established by the decision rule and, therefore, the nonrational equity variables are regarded as meaningful contributors to the understanding of MSAL.

The standard error of the estimate ($S.E._{est}$) for the full model represents a measure of the error with which any observed value of MSAL could be predicted from given values of the independent variables using the determined equation of (4.3). The $S.E._{est}$ of model (4.3) equals 95.42 dollars. The accuracy of this measure largely depends on meeting the assumption of homoscedasticity; that is, that the residuals have a common variance. To visually check the homoscedasticity assumption each residual was converted to a 'unit normal deviate' (Draper and Smith, 1966:88) and plotted along a -3 to +3 continuum. This procedure revealed that the homoscedasticity assumption is satisfied, i.e., 95 percent of the unit normal deviates were found between the limits -1.96 and +1.96.

Research Question: Do selected independent variables interact to more fully explain the variance in salary?

Methodology: Interactions are carried by products of variables in a multiple regression analysis (Cohen and Cohen, 1975:291-298). Two variables, say U and V, are said to interact in their accounting for variance in a dependent variable, when over and above any additive combination of their separate effects, they have a joint effect. More specifically, a nonzero U x V interaction effect means the regression of the dependent variable on U varies with changes in V (and that the regression of the dependent variable on V varies with changes in U).

As there are 21 independent variables in the full model, the number of two-way interactions, ignoring higher order interactions, is enormous. More exactly, the number of two-way interactions possible with 21 independent variables is given by the binomial coefficient:

$$\frac{n!}{k!(n-k)!}$$

where n is the total number of independent variables, k is the number of variables taken in combination and ! is the factorial operator. Hence, the possible number of two-way interactions among 21 independent variables is:

$$\frac{21!}{2!\,19!} = 210 \text{ two-way interactions.}$$

An attempt to generate all possible interactions or even a relatively large number of them would be unwise. Interaction variables should only be included in the model if there is serious reason to believe they are real. Fourteen interaction variables were generated from a priori considerations. More specifically, the focus of interest centered on whether or not three variables (YRSEX, YRSCH and SEX) interacted with other independent variables to more fully explain the variance in MSAL. The interactions tested for YRSEX included:

YRSEX x YRSCH
YRSEX x ADMD
YRSEX x SEX
YRSEX x MMKT
YRSEX x SMKT
$YRSEX^2$ x SEX.

The interactions associated with YRSCH included:

YRSCH x SEX
YRSCH x EVAL
YRSCH x ADMD.

Finally, the other generated interactions with SEX included:

SEX x ADMD
SEX x PWO
SEX x MMKT
SEX x SMKT
SEX x AGE.

All of the above interaction variables were added to equation (4.3). MSAL was then regressed simultaneously on a total of 35 independent variables.

TABLE 7

Inclusion of the Interaction Variables[a]

	Full Model	Full Model Plus Interaction Variables[a]
R^2	.8808	.9036
$S.E._{est}$	95.42	90.30
N	166	166

[a]Interaction variables defined in text.

Findings and Interpretations: As the present focus of interest is on the contributed increment in R^2 that the interaction variables account for, attention is drawn to Table 7 where the relevant information is reported. As shown, the increment in R^2 due to the inclusion of the interaction variables is minimal; only 2.28 percent. As this increment in R^2 is less than the 3 percent criterion, the inclusion of the interaction variables is not regarded as meaningful.

III. A PARSIMONIOUS REGRESSION MODEL OF SALARY

In this section an attempt is made to determine the best reduced-rank model for parsimoniously, but effectively, describing how measurable differences in the characteristics of the faculty lead to measurable differences in faculty salaries. The attempt to gain the greatest amount of understanding of MSAL from the smallest number of variables is accomplished with little loss in explanatory power and lower levels of multicollinearity.

Research Question: Can a parsimonious model be obtained from the full model?

Methodology: The decision rule adopted earlier concerning the relative size of the standardized partial regression coefficients was applied. Variables were deleted from the full model (4.3) that had beta weights less than .05. The variables deleted from the full model are: ABSNT, PROD, AGE, DEPTS, DFTE, and MSTAT. Only one of the categorical variables representing divisional affiliation, BUS, exceeded the .05 criterion. To determine if the divisional variables, in total, exceeded the .05 criterion, a procedure to estimate a 'sheaf coefficient' (Heise, 1972) was adopted. The obtained sheaf coefficient was less than .05 and, therefore, the divisional variables were deleted from model (4.3). The parsimonious model is thus represented by:

$$(4.4)\quad MSAL = a_0 + b_1 YRSEX + b_2 YRSEX^2 + b_3 YRSR + b_4 YRSCH + b_5 EVAL + b_6 ADMD + b_7 TEN + b_8 SEX + b_9 PWO + b_{10} PEVAL + b_{11} MMKT + b_{12} SMKT + e$$

Findings and Interpretations: Regression coefficients for the parsimonious model are reported in Table 8. The percentage of MSAL variance explained by the model declined by less than one-half of a percent (R^2 = .8768) when compared to that obtained in the full model. Also, due to the fact that R^2 is virtually the same as in the full model and that there are fewer independent variables in the equation, a slight improvement in the standard error of the estimate is observed ($S.E._{est}$ = 94.10). Another plus for the parsimonious model is the lower level of collinearity among some of the variables in the parsimonious model as compared to that which is observed in the full model.

TABLE 8

Parsimonious Multiple Regression Model

Variable	Unstandardized Coefficient	Standardized Coefficient
Constant	1076.55	
YRSEX	36.61	1.095
$YRSEX^2$	- 0.52	-.503
YRSR	7.22	.155
YRSCH	16.92	.151
EVAL	56.94	.083
ADMD	68.45	.102
TEN	100.65	.181
MMKT	119.83	.164
SMKT	196.91	.131
SEX	123.57	.174
PWO	-45.33	-.050
PEVAL	34.67	.054
R^2	.8768	
$S.E._{est}$	94.10	
N	166	

Table 9 presents R^2's between any one of the independent variables in the regression equation and the remaining independent variables (for both the full and parsimonious models). The deletion of nine variables from the full model greatly reduces the multicollinearity in YRSR and YRSCH and moderately reduces it for MMKT and SMKT. Smaller reductions in R^2 are observed for the remainder of the independent variables. The only variables to demonstrate 'harmful' multicollinearity, as defined by Farrar and Glauber (1967), are YRSEX and $YRSEX^2$. The high level of multicollinearity found in these two variables is expected as YRSEX and $YRSEX^2$ quadratic components through construction of the quadratic variable. Omitting $YRSEX^2$ is an alternative solution to the problem, but it is rejected due to a greater danger found in structural misspecification; that is, sensitivity of the parameters to changes in specification when a relevant variable is omitted from the regression model (Slovacek, 1976:13-19).

The homoscedasticity assumption was checked to determine if the parsimonious model yields residuals without a common variance. As in the full model, each residual was converted to a unit normal deviate and plotted along a -3 to +3 continuum. Again, this procedure revealed that the homoscedasticity assumption is satisfied.

TABLE 9

Multicollinearity in the Full and Parsimonious Models As Measured by R^2 Among the Independent Variables

Variable	Full Model	Parsimonious Model
YRSEX	.9748	.9642
YRSEX2	.9540	.9490
YRSR	.6943	.1599
YRSCH	.6938	.2143
EVAL	.4844	.4246
ABSNT	.1026	-----a
ADMD	.3635	.2784
TEN	.7371	.7167
PROD	.3184	-----a
SEX	.6568	.6418
AGE	.8775	-----a
PWO	.6952	.6766
DEPTS	.6984	-----a
ASP	.6954	-----a
BUS	.5506	-----a
TECH	.4628	-----a
DFTE	.7331	-----a
MSTAT	.2327	-----a
PEVAL	.5309	.4907
MMKT	.2797	.1633
SMKT	.2031	.1587

[a]Variable not included in the parsimonious model.

To conclude this section, the economy of description found in the parsimonious model is accompanied by little loss in explanatory power, a slight improvement in the standard error of the estimate, lower levels of multicollinearity and a continuation of meeting the homoscedasticity assumption.

IV. AN EXAMINATION OF THE EFFECTS OF THE INDEPENDENT VARIABLES ON SALARY

Now that a parsimonious regression model of MSAL has been obtained, the analysis turns to an examination of the effects of each independent variable on MSAL, controlling for the effects of all other independent variables. Two research questions are associated with this interest:

1) In terms of dollars, how much does each independent variable contribute to MSAL? and, 2) Because the independent variables are measured in different units of measurement, which ones are relatively more important in influencing MSAL? Each question is answered in the order given.

Research Question: In terms of dollars, how much does each independent variable contribute to MSAL, controlling for the influence of all the other independent variables in the parsimonious model?

Methodology: The appropriate coefficients for providing the answer to the above research question are the unstandardized partial regression coefficients (b_i). Each b_i represents the average or expected change in MSAL for each unit change in the independent variable when the value of each of the remaining independent variables is held constant. The sign of the coefficient also indicates the nature of the relationship between MSAL and the independent variable. A positive coefficient indicates a direct relationship, while a negative coefficient reveals an inverse relationship.

Findings and Interpretations: The unstandardized partial regression coefficients for the parsimonious model are reported in Table 8. It should first be noted that the coefficients associated with YRSEX and $YRSEX^2$ do not have separate interpretations - they must be considered simultaneously (Stolzenberg, 1980:466). The effect of YRSEX on MSAL is measured by the partial derivative MSAL/YRSEX. In the parsimonious equation of (4.4), according to the rules of calculus, MSAL/YRSEX is equal to $b_{YRSEX} + 2b_{YRSEX^2}YRSEX$ Thus, the effect of YRSEX on MSAL changes by $2b_{YRSEX^2}$ units per unit change in YRSEX. The obtained coefficients for YRSEX and $YRSEX^2$ are 36.61 and -0.52 dollars, respectively. By applying the formula for the partial derivatives, the effect of YRSEX on MSAL can be determined at different years of experience: given X years of experience, the effect of years of experience on MSAL is 36.61 + 2(-0.52)X. The effect of YRSEX on MSAL at various years of experience is shown in Table 10. It is observed that the effect of YRSEX on MSAL declines as years of experience increases.

TABLE 10

Unstandardized Effect of Years of Experience on MSAL at Different Values of Years of Experience

Years of Experience	Metric effect of years of experience
1	35.57
5	31.41
10	26.21
15	21.01
20	15.81
25	10.61
30	5.41

The interpretation of the other coefficients is straightforward. For convenience, the interpretations of the coefficients are stated without repeating the words "with all other independent variables controlled," but should be regarded in this light. An additional year of related experience (YRSR) adds 7 dollars to MSAL, while an additional year of schooling (YRSCH) is worth nearly 17 dollars. Years of schooling is more highly rewarded than years of related experience. A one point increase in a current evaluation score (EVAL) is rewarded with an increase of nearly 57 dollars per month. A one point advantage in an evaluation score in 1973-74 (PEVAL) is still contributing 35 dollars per month to the faculty member's salary. A faculty member with status as a department chairman (ADMD) can expect an additional 69 dollars per month. Tenure status is worth 100 dollars per month.

The influence of the marketplace is substantial. Faculty who were hired under conditions of moderate marketplace influences (MMKT) are rewarded with nearly 120 dollars more per month than those hired under conditions of weak marketplace influences. For those fortunate faculty who were hired under conditions of strong marketplace influences (SMKT), nearly 200 dollars per month is added to their salaries as compared to those faculty hired under weak marketplace influences.

Advocates of equal pay for equal work will be disappointed with the coefficient associated with sex. Males, on the average, are rewarded with 124 dollars more per month than female faculty. Also, increases in the percentage of women (PWO) in a department tends to depress faculty salaries, regardless of sex.

Research Question: As the independent variables in the parsimonious model are measured in different metrics, which ones are relatively more important in influencing MSAL?

Methodology: The standardized partial regression coefficients (B_i), often referred to as beta weights, are useful in assessing the relative importance of independent variables (Blalock, 1967a, 1967b, 1968; Schoenberg, 1972; Tukey, 1954; Wright, 1960). The size of the coefficient reveals the magnitude of the influence, controlling for all other independent variables. Also, as with the unstandardized coefficients, the sign of the coefficient reveals the nature of the relationship. If X_i represents an independent variable, then a change of one standard deviation in the value of X_i will be accompanied, if all other independent variables remain constant, by a change of B_i standard deviations in the dependent variable. Table 8 reports the standardized coefficients obtained from the parsimonious model.

Findings and Interpretations: As with the interpretation of the unstandardized coefficients associated with YRSEX and YRSEX^2 the interpretation of the betas associated with these variables must be made simultaneously (Stolzenberg, 1980:466-467). The standardized effect of YRSEX on MSAL is obtained by first calculating MSAL/YRSEX from the formula MSAL/YRSEX = $b_{YRSEX} + 2b_{YRSEX^2}$YRSEX and then multiplying the result by the ratio of the standard deviation of YRSEX divided by the standard deviation of MSAL. The standarized effects of YRSEX on MSAL are shown in Table 11. It is observed that the standardized effect of YRSEX varies according to the value of years of experience. As the goal in this subsection is to rank the relative importance of the independent variables, it would be convenient to have one value to summarize the importance of YRSEX. This is accomplished by calculating the standardized effect of YRSEX on MSAL at the population mean of YRSEX. Using the population mean of YRSEX (11.27), the calculated standardized effect of years of experience on MSAL is .744. Using this value to summarize the standardized effect of YRSEX on MSAL and ranking the values of the remaining coefficients produces the ranked order of variables shown in Table 12. Clearly, Table 12 demonstrates the strong and paramount influence of YRSEX on MSAL. TEN and SEX follow far behind in magnitude, but in second and third positions, respectively.

TABLE 11

Standardized Effect of Years of Experience on MSAL at Different Values of Years of Experience

Years of Experience	Standardized Effect of Years of Experience
1	1.060
5	.939
10	.784
15	.628
20	.473
25	.317
30	.162

TABLE 12

Relative Importance of the Independent Variables

Variable	Rank	Standardized Coefficient
YRSEX	1	.744[a]
TEN	2	.181
SEX	3	.174
MMKT	4	.164
YRSR	5	.155
YRSCH	6	.151
SMKT	7	.131
ADMD	8	.102
EVAL	9	.083
PEVAL	10	.054
PWO	11	-.050

[a]Calculated at the population mean of years of experience (11.27 years).

V. A RECURSIVE PATH MODEL OF SALARY

In this section, the causal model depicted in Figure 8 is tested and interpreted. (This causal model should not be confused with the block variable model which is evaluated later.) The path diagram describes the assumptions guiding the analysis. It is postulated that rational equity, nonrational equity and marketplace variables affect both evaluation and monthly salary. Further, it is postulated that evaluation affects monthly salary. The causal ordering of the variables shown in Figure 8 is consistent with the temporal ordering of the variables and, therefore, the specification of the model presents little difficulty. Given the diagram, path analysis is capable of more fully explicating the relations among the data than straight-forward multiple regression techniques.

Research Questions: The adoption of the recursive path model shown in Figure 8 implies a number of research questions:

1. What are the total, direct and indirect effects of the exogenous variables on MSAL?

2. Will path analysis alter the relative rankings of the importance of the exogenous variables when compared to the rankings provided in the parsimonious regression model of MSAL?

3. How much of a direct effect does the endogenous variable, EVAL, have on MSAL?

4. How much of the variance in MSAL and EVAL is accounted for by the model?

5. How much of a direct effect do the exogenous variables have on EVAL?

6. Is the recursive path model consistent with the relations in the data?

Methodology: The methods and techniques of path analysis were applied to the recursive model. First, a preliminary analysis was undertaken to find a parsimonious causal model. A full-scale recursive model was first specified. Paths not meeting the .05 criterion of meaningfulness were deleted to obtain a parsimonious path model of MSAL and EVAL. A reproduced correlation matrix reveals that the model is consistent with the relations in the data.

Preliminary Analysis: A Search for a Parsimonious Path Model

The standarized coefficients obtained from the full-scale recursive model displayed in Figure 8 are reported in Figure 9 and Table 13. In Figure 9 it is noted that the standardized coefficients for the categorical variables were obtained by calculating a sheaf coefficient, whereas in Table 13 the standarized coefficients associated with the actual dummy variables are reported.

Some standardized coefficients in the full-scale recursive model do not meet the .05 criterion of meaningfulness and are thus deleted from their relevant equations to produce a parsimonious path model. The variables excluded from the paths leading to MSAL are ABSNT, PROD, AGE, DEPTS, DIVN, DFTE, and MSTAT. Likewise, the paths not meeting the .05 criterion of meaningfulness for EVAL are SEX, AGE, and DEPTS.

The first attempt at parsimonious model is represented by Figure 10, which includes the standarized path coefficients. Note that whereas the path coefficient associated with years of schooling (YRSCH) in the full-scale model exceeded the .05 criterion of meaningfulness, it does not exceed the criterion for the path leading to EVAL in the parsimonious model. The reason for this phenomena is probably due to the operation of a suppressor variable(s) in the full-scale path model which makes the path coefficient exceed the criterion of meaningfulness (Cohen and Cohen, 1975:84-91). Once the suppressor variable is deleted for reasons of parsimony, the path coefficient no longer meets the criterion of meaningfulness. As such, YRSCH is excluded from the path leading to EVAL.

The second attempt to find a parsimonious recursive path is displayed in Figure 11, which includes the standarized path coefficients. All paths leading to the endogenous variables, MSAL and EVAL, meet the criterion of

TABLE 13

Standardized Coefficients for the Full-Scale Recursive Model

Predetermined Variables	Dependent Variable MSAL	EVAL
YRSEX	1.038	-1.099
$YRSEX^2$	-.471	.830
YRSR	.138	-.104
YRSCH	.114	-.053
ABSNT	.024	-.086
ADMD	.098	.135
TEN	.179	.336
PROD	.029	.137
SEX	.183	-.014
AGE	.044	.049
PWO	-.051	.132
DEPTS	-.038	-.037
ASP[a]	.048	.156
BUS	.055	.040
TECH	.012	-.049
FTE	-.009	.086
MSTAT	-.000	.124
PEVAL	.066	.529
MMKT[b]	.161	.072
SMKT	.133	-.131
EVAL	.078	---
R^2	.8808	.4844
$S.E._{est}$	95.42	.29
N	166	166

[a]ASP, BUS and TECH represent, in total, DIVN, which is represented as a sheaf coefficient in Figure 9.

[b]MMKT and SMKT represent, in total, MKT, which is represented as a sheaf coefficient in Figure 9.

meaningfulness and, therefore, the path model shown in Figure 11 is regarded as a parsimonious model. The parsimonious attempt at theory trimming (Heise, 1969) was checked by reproducing the correlation matrix from the parsimonious model. If the observed correlations deviate significantly from those calculated from the path model, then the recursive path model should be rejected as a viable theoretical possibility (Duncan, 1966). This method simply checks whether or not the correlational data are consistent with the proposed causal model. Heise's (1969) matrix solution for the reproduction of the correlation matrix was utilized. (For those unfamiliar with matrix operations, Duncan, Featherman and Duncan (1972:18-30) provide a tedious but workable algebraic solution.)

The original and reproduced correlations obtained from the application of the path model are shown in Table 14. Inspection of these correlations reveal no meaningful discrepancies between the reproduced and the original correlations. Thus, the pattern of correlations in the data are consistent with the parsimonious model. This conclusion should not be viewed as "proving" the model to be a "true" model. No known method exists to reach that conclusion. The point is that the similarity of the original and reproduced correlations indicates that the data are consistent with the model (Kerlinger and Pedhazur, 1973:305-330; Heise, 1969:38-73). Furthermore, along these same lines of evaluating the fit of the model to the data, Mcpherson and Huang (1974) suggest that any evaluation must consider the model as a whole and, therefore, recommend inspections of R^2, the coefficient of determination. While R^2's for EVAL and MSAL are not reported in Figure 11, they are easily determined by the formula 1 minus the square of the corresponding residual path. As such, R^2 for MSAL is nearly equal to 88 percent, while the R^2 associated with EVAL nearly equals 48 percent. Thus, the model is parsimonious, consistent and explains a substantial portion of EVAL and MSAL variance.

Findings and Interpretations:

Analysis of the Parsimonious Path Model

Now that a parsimonious path model has been obtained, the analysis shifts to a direct investigation of the research questions associated with the causal model.

First, what are the total, direct and indirect effects of the exogenous or predetermined variables on MSAL? The general method adopted for decomposing total effects into their constituent direct and indirect effects is provided by Alwin and Hauser (1975). Also, Stolzenberg (1980) provides useful insight into the decomposition of effects which are nonlinear, like $YRSEX^2$. As was observed earlier in the analysis, the effect of years of experience varies with given values of the variable. In order to obtain one value to summarize the importance of YRSEX, the direct effect of YRSEX on MSAL was calculated at the population mean of YRSEX (11.27 years).

Following Alwin and Hauser's methodology for decomposing effects, MSAL was first regressed on only the exogenous variables, followed by a regression of MSAL on the exogenous variables plus the intervening variable, EVAL. The parameters obtained from each of these regressions are referred to as reduced-form and structural coefficients, respectively. The results of these two regressions are reported in equations (1) and (2) in Table 15. This data was then used as input to decompose total effects into direct and

TABLE 14
Original and Reproduced Correlations from the Application of the Parsimonious Path Model

Predetermined Variable	Endogenous Variable: EVAL Original	EVAL Reproduced	MSAL Original	MSAL Reproduced
$YRSEX^2$	.130	.130	.799	.799
YRSEX	.112	.113	.663	.663
YRSR	-.086	-.086	.298	.297
YRSCH	.219	.231	.159	.161
ABSNT	-.038	-.038	.045	.023
ADMD	.151	.155	.387	.387
TEN	.208	.206	.739	.739
PROD	.056	.056	-.009	-.020
SEX	-.165	-.154	.310	.311
PWO	.239	.235	-.250	-.250
ASP	.169	.167	.012	-.012
BUS	.092	.093	-.023	-.054
TECH	-.172	-.169	.099	.107
FTE	.118	.119	.041	.066
MSTAT	.124	.126	.223	.211
PEVAL	.580	.578	.436	.435
MMKT	.115	.115	-.064	-.062
SMKT	.156	.154	-.053	-.052
EVAL	----	----	.230	.234

indirect effects. In effect, by comparing coefficients for the variables which appear in these successive equations, the extent to which the effect of any exogenous variable is mediated by EVAL can be readily determined. These results are reported in Table 16.

The total effect of years of experience on MSAL is large, as compared to the total effects of the other variables. Tenure, sex, years of schooling and the influence of the marketplace follow in relative importance, as measured by their total effects. The relative ranking of the importance of the variables obtained from this decompositional analysis is similar to the ranking obtained from the straight-forward regression analysis (see Table 12). The rankings are identical for the first, second, third and fourth positions, with the only difference being a reversal of the fifth and sixth positions. The reason for this similarity in the rankings of the relative importance of the variables is due to the fact that EVAL does not, in an overall sense, mediate much of the total effect of the exogenous variables.

TABLE 15

Reduced-Form and Structural Coefficients for the Decomposition of Total Associations[a,b]

Predetermined Variable	Dependent Variable and Equation MSAL (1)[a]	MSAL (2)[b]
YRSEX[c]	.709	.744
YRSR	.147	.155
YRSCH	.154	.151
ADMD	.109	.102
TEN	.206	.181
SEX	.176	.174
PWO	-.042	-.050
PEVAL	.101	.054
MMKT	.167	.164
SMKT	.118	.131
EVAL	----	.083

[a]Equation (1) represents the reduced-form equation of regressing MSAL on all of the exogenous variables.

[b]Equation (2) represents the most complete structural equation of the parsimonious model.

[c]The coefficient for YRSEX was calculated at the population mean of years of experience (11.27 years).

For example, given the total effect of years of schooling (.154), only about 2 percent ((.154 - .151)/.154 = .019) is mediated by the intervention of EVAL. Only 6.4 percent of the total effect of ADMD is mediated by EVAL. Likewise, only 1 percent of the total effect of SEX is mediated by EVAL. All of this, of course, means that, in the general case, the influence of the exogenous variables on MSAL can only in a minor way be attributed to the indirect mediating effects of EVAL. The influence of the exogenous variables rests quite solidly on their direct effects, the effect which remains when the intervening variable EVAL has been held constant. Little of the total effects of the exogenous variables is transmitted by EVAL.

TABLE 16

Decomposition of Total Effects for MSAL

Variable	Total Effect	Indirect Effect Via EVAL	Direct Effect
YRSEX	.709	-.035	.744
YRSR	.147	-.008	.155
YRSCH	.154	.003	.151
ADMD	.109	.007	.102
TEN	.206	.025	.181
SEX	.176	.002	.174
PWO	-.042	.008	-.050
PEVAL	.101	.047	.054
MMKT	.167	.003	.164
SMKT	.118	-.013	.131
EVAL	.083	----	.083

One major exception to these general causal observations is found in the strong mediating influence EVAL exhibits for past evaluation (PEVAL). Of the total effect of past evaluation on MSAL, almost 47 percent is mediated by current evaluation. Thus, nearly half of the influence PEVAL has on MSAL is transmitted or mediated by EVAL.

At the same time, however, more than 60 percent of the association of EVAL with MSAL may be attributed to its association with the exogenous variables (compare the zero-order correlation of EVAL with MSAL (.230) with its path coefficient (.083)). Clearly, the effect of EVAL on MSAL is, to a large degree, a reflection of the mutual dependence of EVAL and MSAL on causally prior variables. Nevertheless, over one-third of the association between EVAL and MSAL is attributable to the direct influence of current performance appraisal on monthly salary. To summarize this point, while a substantial portion of the association between EVAL and MSAL is spurious, a significant portion of its association is represented by its direct effect on MSAL.

The total effect of SEX on MSAL is nearly as great as that observed for the marketplace or years of schooling. Although little of the influence of SEX on MSAL is transmitted by EVAL, over two-fifths of the association between SEX and MSAL is the result of their mutual association with the other exogenous variables (compare the correlation of SEX with MSAL (.310) with its structural coefficient (.174)). Given that a substantial portion of the association of SEX with MSAL is attributable to such associations, still over 50 percent of its association is attributable to the direct influence of SEX on MSAL.

It is apparent from this analysis that the path to higher faculty salaries is obtained through accumulating years of experience. Faculty that have tenure and are of the male gender make greatest use of this route. Further, it is advantageous for these faculty if the influence of the marketplace works in their favor. In addition, but to a lesser degree, possessing relatively more years of experience in a professionally related activity increases monthly salary. For advocates of merit pay based on evaluation scores, this analysis may be disheartening. With the effects of the exogenous variables taken into account, a one point increase in an evaluation score is worth about 57 dollars per month, or a little over 500 dollars per year. For those that believe that this value is too low, the small variance of EVAL might also signal the difficulty associated with attempts to increase the evaluation score by one full point.

Similarly, for advocates of equal pay for equal work, the path analytic model and the associated results will probably be disappointing, as viewed from an equity perspective. Two distinct methodologies - multiple regression and path analysis - have revealed the salary advantages of male faculty, net the influence of other variables. Path analysis puts the advantage, as measured by the total effect, at 125 dollars per month. This figure is about 1 dollar more than that indicated by the parsimonious regression model.

On the other hand, advocates of equitable salary administration should be pleased with the finding that, to a large extent, faculty salaries are governed by legitimate equity variables. As a matter of fact, more of the illegitimate equity variables did not meet the criterion of meaningfulness than rational equity or marketplace variables. While a single index summarizing the overall effect of each of the three constructs - rational equity, nonrational equity and marketplace influences - remains to be interpreted in a later section (dealing with a block variable model), path analysis has revealed the strong influence of many rational equity variables on salary.

An Analysis of the Endogenous Variable, Evaluation

While the primary focus of interest of this research is on MSAL, the parsimonious recursive model (Figure 11) also displays some interesting findings relating to the influence of the exogenous variables on EVAL. Standardized and unstandardized partial regression coefficients for EVAL are displayed in Table 17.

First, the exogenous variables explain nearly 50 percent of EVAL variance. While the exogenous variables do a good job of accounting for the variance in EVAL, these same variables explain considerably more of the variance in MSAL (88 percent). Two factors may account for this. First, MSAL probably reflects more strongly the influence of the exogenous variables as professional experience increases. Second, the variance of EVAL (.141) is low, which tends to reduce the observed correlations correspondingly (Blalock, 1964:107). Clearly, years of experience and past performance appraisals are important variables for understanding current

TABLE 17

Regression Coefficients Associated with EVAL as Depicted in Figure 4.5

Variable	Unstandardized Coefficient	Standardized Coefficient
Constant	1.701	
YRSEX	-.050	-1.023
$YRSEX^2$	.001	.797
YRSR	-.005	-.079
ABSNT	-.009	-.083
ADMD	.133	.137
TEN	.260	.321
PROD	.000	.134
PWO	.182	.137
ASP	.109	.129
BUS	.028	.026
TECH	-.048	-.056
FTE	.000	.054
MSTAT	.140	.129
PEVAL	.486	.519
MMKT	.081	.076
SMKT	-.283	-.128
R^2 .4777		
$S.E._{est}$ .2864		
N 166		

performance evaluations. The two coefficients associated with years of experience (YRSEX and $YRSEX^2$ demonstrate that faculty with fewer years of experience receive lower evaluations than more experienced faculty, controlling for the influence of the other exogenous variables.

The influence of past performance evaluations has a substantial impact on current performance appraisals. A one-point advantage (on a scale of one to six) in a previous evaluation is worth nearly half that advantage in a current evaluation, net the influence of other exogenous variables. Tenure status is worth over a quarter of a point to the faculty achieving such status.

An examination of previous coefficients revealed that faculty that are hired under the condition of strong marketplace influences (SMKT) are

rewarded with higher salaries; but, as shown in Table 17, these same faculty acquire lower evaluation appraisals which, when linked to merit pay considerations, reduces their salary advantage acquired from the marketplace. It would be interesting to speculate about the reasons for this phenomena but the data provide no clues for its occurrence. With regard to faculty hired under moderate marketplace influences (MMKT), no inverse relationship is observed.

With respect to the influence of the other variables affecting EVAL, it is observed that faculty having administrative duties are rewarded with higher evaluation scores than faculty without such responsibilities. Interestingly, the greater the percentage of women (PWO) in the department, the higher the performance appraisals. Being married (MSTAT) is also associated with higher evaluation scores. An inverse relationship is observed for the relationship between evaluation and absenteeism, although it is not very strong. Faculty productivity (PROD) has a direct and moderate relationship with EVAL, but departmental productivity (DFTE) has a rather weak effect on EVAL. Finally, faculty in the Arts, Science and Preprofessional Division (ASP) enjoy higher evaluation scores than those in the other divisions.

Before departing from this analysis of EVAL, it is interesting to note which variables are excluded from Table 14. Two variables, YRSCH and SEX, did not meet the criterion of meaningfulness in the analysis and were, therefore, deleted from the paths leading to EVAL. For those supporting the advantages of more schooling, the fact that YRSCH does not have a meaningful impact on EVAL may be disappointing. With respect to the deletion of the path from SEX to EVAL, proponents of equity may feel comfortable in the knowledge that, net of the influences of the other exogenous variables, gender has no meaningful effect on performance evaluations.

VI. A BLOCK VARIABLE MODEL OF SALARY

In this analysis, variables have been grouped by a unifying feature distinguishing them from other variables. Thus, for example, YRSEX, YRSR, TEN and other variables have been grouped under the label of 'rational equity factors'. Likewise, groupings have been formed for nonrational equity and marketplace factors. Given this way of thinking, it is of considerable interest to develop a summary statement concerning the relative impact of the three groups of variables on MSAL. The objective in this part of the analysis is to calculate and interpret summary coefficients for the block variable model displayed in Figure 12.

The variables on the far left side of Figure 12 are indicators which have paths leading to the three abstract constructs - rational equity, nonrational equity and marketplace influences. Hence, sets of variables have been combined to form theoretical "blocks" with the objective being to use the observations on the indicators to assess the relations between the three constructs and MSAL. A single index of each block effect summarizes the importance of the construct (Blalock, 1969; Heise, 1972; Hauser and Goldberger, 1971).

Research Question: Given the block variable model of Figure 12, what are the summarizing effects of each of the three abstract constructs - rational equity, nonrational equity and the marketplace - on salary?

Methodology: The specific methodology adopted for estimating the coefficients for the block variable model is found in Heise (1972:147-173). In essence, Heise's method relies on the calculation of a sheaf coefficient which summarizes the impact of block variables on other variables. For a definable solution to estimate the coefficients in the block variable model, it is assumed that each set of indicators perfectly defines their unmeasured constructs. For this reason, all variables have been included in the model as indicators of their latent constructs.

Findings and Interpretations: Sheaf coefficients revealing the relative importance of the unmeasured constructs for the block variable model are shown in Figure 13. It is immediately apparent that the rational equity block is far more important in predicting and explaining MSAL than either the nonrational equity or marketplace blocks. As the sheaf coefficient is a standardized coefficient, the influence of rational equity on MSAL can be seen to be far superior to the block influences of the other two latent constructs.

The nonrational and marketplace blocks reveal nearly equal effects, with the nonrational block edging the influence of the marketplace by a slight margin. While advocates of equity will probably be pleased with the powerful effect revealed by the rational equity block, they may be disheartened to learn that the nonrational factors of salary determination have an almost equal influence on MSAL as the marketplace.

VII. NONRECURSIVE MODEL OF SALARY

Of the two basic varieties of causal models, recursive and nonrecursive models, only recursive models of MSAL have been interpreted so far. The difference between the two models is that recursive models depict one-way causation only, whereas nonrecursive models depict reciprocal causation or feedback. In this section a nonrecursive model depicting reciprocal causation between EVAL and MSAL is postulated. The logic of the reciprocal feedback between EVAL and MSAL comes from the work of Birnbaum (1977) and Ramsay (1977). Their point is that single equation models, which recursive models represent, may not only abstract from reality but may also distort it. Reality may be such that not only do higher salaries go hand in hand with higher evaluations, but also higher evaluations are the result of the impact of higher salaries. Such a feedback loop in the context of the exogenous variables is visually depicted in Figure 14. In this section, this nonrecursive model is tested for meaningfulness, and, if found to be meaningful, it will be tested to determine if the model is consistent with the relations among the data.

If it is true that the cyclical process involving MSAL and EVAL proceed like an ever-rising spiral along a time dimension of an individual's career, it would be expected that the endogenous variables should show up as dominant. But if this process is regulated by such factors as years of experience or years of schooling, then the exogenous variables should emerge as strong causal agents.

Research Question: Is the nonrecursive relationship between MSAL and EVAL meaningful, and, if meaningful, is the nonrecursive model consistent with the relations among the data?

Methodology: The endogenous equations depicted in Figure 14 are:

$$(4.5)\quad X_{17} = P_{17,1}X_1 + P_{17,2}X_2 + P_{17,3}X_3 + P_{17,4}X_4 + P_{17,6}X_6 + P_{17,7}X_7 + P_{17,9}X_9 + P_{17,13}X_{13} + P_{17,14}X_{14} + P_{17,15}X_{15} + P_{17,16}X_{16} + P_{17,e_{17}}X_{e_{17}}$$

$$(4.6)\quad X_{16} = P_{16,1}X_1 + P_{16,2}X_2 + P_{16,3}X_3 + P_{16,5}X_5 + P_{16,6}X_6 + P_{16,7}X_7 + P_{16,8}X_8 + P_{16,10}X_{10} + P_{16,11}X_{11} + P_{16,12}X_{12} + P_{16,13}X_{13} + P_{16,14}X_{14} + P_{16,15}X_{15} + P_{16,17}X_{17} + P_{16,e_{16}}X_{e_{16}}$$

The variables in the equations are in standard form and the P_{ij} are path coefficients, which are equivalent to standardized partial regression coefficients or beta weights.

The fact that MSAL (X_{17}) and EVAL (X_{16}) are involved in a feedback loop implies that the disturbance terms in each equation will ordinarily be correlated with the independent variables in that equation, thereby invalidating the use of ordinary least squares (OLS) (Johnston, 1972:231-236; Maddala, 1977:242-251). Since, in such situations, OLS would yield biased and inconsistent estimates of the coefficients, an alternative, such as two-stage least squares (TSLS), is required. The general principle behind TSLS is basically "that of purifying the endogenous variables that appear in the equation to be estimated in such a way that they become uncorrelated with the disturbance term in that equation" (Namboodiri, Carter and Blalock, 1975:514).

To use TSLS for equations (4.5) and (4.6), it must first be established that these equations satisfy identification conditions; that is, that a sufficient number of instrumental variables are available (Heise, 1975:175-181). Rank and order conditions of identification for equations (4.5) and (4.6) were employed using a technique advocated by Maddala (1977:222-225). In essence, the order condition checks to determine if the total number of variables excluded from the equation is at least as great as the total number of endogenous variables in the model, less one. Equations (4.5) and (4.6) are overidentified, according to the order condition. (TSLS can be applied to overidentified equations.) The sufficient condition for identification (the so-called 'rank condition') demonstrates that each equation in the nonrecursive model is distinct from the other equation. All of the foregoing is to say that in order to estimate the reciprocal relationship between MSAL and EVAL, instrumental variables are needed for each of the two endogenous variables. That is, variables are needed which directly affect one of the endogenous variables but not the other, which are not causally determined by the endogenous variables, and which are not correlated with the unspecified sources of the endogenous variable for which it is not an instrument (Duncan, 1975; Heise, 1975:160-161).

Once the conditions for identification were established, Heise's (1975) systematic TSLS procedure was followed. The estimates were made using OLS in two steps, making the appropriate corrections for the standardized coefficients as outlined by Hout (1977). The TSLS procedure assures that the disturbance terms will be uncorrelated with the independent variables of each equation, so long as the exogenous variables are truly exogenous. This means that they are uncorrelated with the disturbances, an assumption that was tested and is supported. The correlations of the residuals were obtained using a methodology suggested by Luskin (1978).

<u>Findings and Interpretations</u>: The results from regressing all of the exogenous variables on EVAL and MSAL are reported in Table 18. This is the first stage of TSLS. The metric coefficients in this table were used to calculate the predicted value for each nonrecursive source (EVAL and MSAL), using the reduced-form formulas listed at the bottom of Table 18. The predicted values of MSAL were then inserted into the equation for EVAL, whereas the predicted values of EVAL were inserted into the equation for MSAL. Once all of the original scores for MSAL and EVAL were replaced by the predicted values of MSAL and EVAL, equations (4.5) and (4.6) were estimated using OLS, the second state of TSLS.

Coefficients obtained from the second stage of TSLS are displayed in Table 19 and Figure 15. As partial slopes, these parameters meter the change induced in an endogenous variable by a change of one unit in one of its direct causes, acting without mediation and with other variables held constant. Correlations among the residuals associated with EVAL and MSAL are also displayed in Figure 15. It is important to note that in the calculation of the correlation between the residuals, the original endogenous independent variables, rather than their predicted score versions, were employed (Luskin, 1978).

The correlation between the EVAL and MSAL disturbances (-.011) "expresses the extent to which those equations fail to recognize major causes of their dependent variables that are either the same or correlated" (Luskin, 1978:450). Thus, the low correlation between the model's residuals implies that the variables equations (4.5) and (4.6) neglect are different, and weakly correlated, or that they constitute a relatively unimportant part of at least one of the disturbances.

TABLE 18

First Stage Results of Two-Stage Least Squares[a]

Exogenous Variable		Endogenous Variable			
		EVAL (X_{16})		MSAL (X_{17})	
		Metric	Standardized	Metric	Standardized
Intercept		1.72		1158.15	
YRSEX	X_1	-0.05	-.979	33.23	.994
YRSEX^2	X_2	0.00	.758	- 0.43	-.420
YRSR	X_3	-0.01	-.094	6.85	.147
YRSCH	X_4	0.01	.051	19.59	.175
ABSNT	X_5	-0.01	-.081	1.30	.017
ADMD	X_6	0.14	.140	73.35	.110
TEN	X_7	0.24	.294	112.50	.203
PROD	X_8	0.00	.121	0.04	.031
SEX	X_9	-0.03	-.032	121.33	.171
PWO	X_{10}	0.19	.144	-39.05	-.043
FTE	X_{11}	0.00	.078	- 0.10	-.032
MSTAT	X_{12}	0.15	.137	14.60	.020
PEVAL	X_{13}	0.49	.519	65.08	.101
MMKT	X_{14}	0.07	.065	117.76	.161
SMKT	X_{15}	-0.31	.140	-179.29	.119
R^2		.4653		.8748	
$S.E._{est}$		.29		95.81	
N		166		166	

[a]Model specifications for the first stage of TSLS:

$$X_{16} = a_0 + \sum_{i=1}^{15} b_i X_i$$

$$X_{17} = a_0 + \sum_{i=1}^{15} b_i X_i$$

where the variables (X_1 to X_{17} are in raw form, the b_i represent unstandardized regression coefficients, and a_0 represents the intercept constant. These equations represent the reduced-form equations (Namboodiri, Carter, Blalock, 1975:513-516).

TABLE 19

Second Stage Results of Two-Stage Least Squares[c]

Variable		Metric	Standardized[a]	Metric	Standardized[a]
		EVAL		MSAL	
Intercept		1.42		1097.37	
YRSEX	X_1	-0.05	-1.632	36.30	1.161
$YRSEX^2$	X_2	0.00	1.182	- 0.50	-.524
YRSR	X_3	-0.01	- .180	7.13	.163
YRSCH	X_4	b	b	16.26	.155
ABSNT	X_5	-0.01	- .122	b	b
ADMD	X_6	0.12	.177	23.87	.107
TEN	X_7	0.22	.391	36.62	.203
PROD	X_8	0.00	.161	22.16	.223
SEX	X_9	b	b	b	b
PWO	X_{10}	0.27	.293	b	b
FTE	X_{11}	0.00	.131	b	b
MSTAT	X_{12}	0.14	.191	b	b
PEVAL	X_{13}	0.47	.740	54.41	.067
MMKT	X_{14}	0.05	.063	23.19	.179
SMKT	X_{15}	-0.33	-.221	55.58	.137
EVAL	X_{16}	NA	NA	91.49	.042
MSAL	X_{17}	0.00	.207	NA	NA

[a]The standardized coefficients for the endogenous predictors are adjusted by using Hout's recommended formula (Hout, 1977). The metric coefficients do not require adjustment.

[b]Variable not included in this equation.

[c]R^2 is not reported in this table because in non-recursive models TSLS dooms any attempt to interpret R^2 as the proportion of variance explained by the model (Luskin, 1978:460-465).

Further, the interpretation of this low correlation among the residuals must be made in the context of the strength of the residual path coefficients. As these are low, as compared to many of the residual paths obtained in behavioral research, some confidence results for the previously mentioned interpretation of the residual correlations. Further, as Land (1971) and Duncan, Haller and Portes (1971) reject models with large residual correlations, some additional confidence in the model results. However, the invalidating feature of the nonrecursive model is that the path from EVAL to MSAL (.042) is less than the criterion established for meaningfulness. Therefore, as the path from EVAL to MSAL is not meaningful, the nonrecursive model is rejected. The recursive model, then, stands as both a meaningful model and one that is consistent with the relations in the data.

VIII. DECOMPOSITION OF SALARY DIFFERENTIALS

As revealed in the review of the literature, women faculty in American colleges and universities, on the average, receive lower salaries than their male counterparts. A similar finding is reported in this study in Table 20. Along with the salary differential between male and female faculty, Table 20 reports the salary differentials between faculty in the four instructional divisions at the college. In this section, these salary differentials are decomposed into their component parts. The interest of this section then is to determine how much of the salary differential can be attributed to differences in objective characteristics, to differences in rates of return associated with objective characteristics, to differences in starting salaries, and to differences that result from interaction effects. The salary differential between male and female faculty is examined first, followed by an analysis of salary differentials between faculty in the four instructional divisions.

TABLE 20

Salary Differentials Between Male and Female Faculty and Between Faculty in the Four Instructional Divisions

Comparison	Means	Differential
1. Gender Comparison Male - Female	2088.42 - 1864.17	224.23
2. Divisional Comparisons		
TECH - TRADE[a]	2097.28 - 2021.32	75.96
TECH - ASP	2097.28 - 2059.04	38.24
TECH - BUS	2097.28 - 2036.31	60.97

[a]TECH represents faculty in the Technical Division, ASP represents faculty in the Arts, Science and Pre-professional Division, and TRADE represents faculty in the Trades Division.

Decomposition of the Salary Differential Between Male and Female Faculty.

Research Question: How much of the salary differential between male and female faculty is attributable to:

a. Different returns to their characteristics;
b. Different endowments (i.e., years of experience, years of related experience, etc.);
c. Different intercept constants, i.e., different starting salaries; and,
d. The interaction component?

Methodology: The attempt to disentangle factors producing differences between groups in the level of the dependent variable being studied has produced a variety of methodological techniques. Althauser and Wigler (1972) and Iams and Thornton (1975) summarize these techniques. The methodology to decompose the salary differential between male and female faculty corresponds to a procedure suggested by Iams and Thornton.

For explanatory purposes, let:

Y_m = the overall mean of MSAL for male faculty,

Y_f = the overall mean of MSAL for female faculty,

X_{im} = the mean of the i'th explanatory variable for male faculty,

X_{if} = the mean of the i'th explanatory variable for female faculty,

b_{om} = the regression constant for male faculty,

b_{of} = the regression constant for female faculty,

b_{im} = the partial regression coefficient for the i'th explanatory variable for male faculty,

b_{if} = the partial regression coefficient for the i'th explanatory variable for female faculty.

Then, given two regression equations for both sexes (i.e., $Y_m = b_{om} + \quad b_{iw}X_{iw}$ and $Y_f = b_{of} + \quad b_{if}X_{if}$), the decomposition of the difference $Y_m - Y_f$ is provided by:

$$(4.7) \quad Y_m - Y_f = (b_{om} - b_{of}) + \quad X_{if}(b_{im} - b_{if}) + \quad b_{if}(X_{im} - X_{if}) + \quad (X_{im} - X_{if})(b_{im} - b_{if}).$$

The terms on the right-hand side of the equation represent four decompositional components of $Y_m - Y_f$. The first component, $b_{om} - b_{if}$, represents the portion of the salary differential attributable to the different intercepts of the equations for the two groups. It captures that part of the salary differential which is due to differences in starting salaries. The second component reflects the different returns to the characteristics of each group. It reflects the differences in slopes. The third term reflects that portion of the salary differential produced by differences in the means of the independent variables. It captures the portion of the salary differential due to differing endowments. The fourth term is referred to as the interaction component. It is interpreted as the effect of changing both means and regression coefficients together over the effects of changing them one at a time (Winsborough and Dickinson, 1969).

Model (4.8) represents the regression equation used for the decomposition of salary differences between male and female faculty.

$$(4.8)\quad MSAL = a_0 + b_1 YRSEX + b_2 YRSEX^2 + b_3 YRSR + b_4 YRSCH + b_5 EVAL + b_6 ABSNT + b_7 ADMD + b_8 TEN + b_9 PROD + b_{10} MMKT + b_{11} SMKT + e.$$

Findings and Interpretations: The metric coefficients for model (4.8) are shown in Table 21 for both male and female faculty. Using this data as

TABLE 21

Metric Coefficients for Male and Female Faculty Utilizing Model (4.8)

Variable	Unstandardized Coefficients Female Faculty	Unstandardized Coefficients Male Faculty
Constant	690.54	1246.16
YRSEX	111.39	33.34
$YRSEX^2$	- 4.00	- 0.45
YRSR	8.10	6.78
YRSCH	36.64	15.62
EVAL	138.27	73.08
ABSNT	11.25	- 0.45
ADMD	-187.71	75.76
TEN	-214.87	172.35
PROD	- 0.08	0.01
MMKT	226.14	131.54
SMKT	126.74	224.00
R^2	.8309	.9095
$S.E._{est}$	98.56	80.45
N	26	140

input for equation (4.7), the equation which decomposes $Y_m - Y_f$ into component parts, produced the decompositional results reported in Table 22. A large portion of the salary differential of 224 dollars between male and female faculty is due to the difference in intercept constants (556 dollars). Male faculty tend to be hired at a higher salary level. In addition, the interaction component, reflecting the effect of changing both means and regression coefficients together over the effects of changing them one at a time, contributes an additional 245 dollars to the salary differential, in favor of male faculty. However, a large portion of the male faculty advantage found in the intercept and interaction components is offset by the negative figures associated with the composition and returns components. Male faculty are paid at a lower rate of return (-408 dollars) and receive less from their endowments (-168 dollars) than their female counterparts. Still, the advantages male faculty have in the intercept and interaction components exceed the negative composition and returns components by 224 dollars.

TABLE 22

Decomposition of Salary Differentials Between Male and Female Faculty

	Components			
Salary Differential ($Y_m - Y_f$)	Composition	Interaction	Returns	Intercepts
224.23	-168.20	245.00	-408.20	555.63

However, Blinder (1973) maintains that a measure of "labor-market discrimination" is found by adding the figures associated with the intercept and returns components. Adding these components equals 147 dollars. This figure is nearly equal to the SEX regression coefficient (129 dollars) found in the full regression model (see Table 6). In addition, it is recalled that the recursive path model of MSAL put the cost of being a female faculty member, on the average, at 125 dollars per month. Thus, three methodologies have revealed nearly equal costs of being a female.

Decomposition of the Salary Differential Between Faculty in the Four Instructional Divisions.

Research Question: How much of the salary differential between faculty in the four instructional divisions in the college is attributable to:

a. Different returns to their characteristics;
b. Different endowments;
c. Different intercept constants; and
d. The interaction component?

Methodology: The same methodology that was used to decompose the salary differential between male and female faculty was adopted for the decomposition of salary differentials between faculty in the four instructional divisions. Four regressions using equation (4.8) were estimated to provide the necessary input for the decompositional analysis. As faculty in the Technical Division receive the highest salaries, comparisons were made with each of the other divisions with the Technical Division faculty used as the reference category. For notational purposes, let

Y_{TECH} = the mean of MSAL for faculty in the Technical Division

Y_{TRADE} = the mean of MSAL for faculty in the Trade Division

Y_{BUS} = the mean of MSAL for faculty in the Business Division, and

Y_{ASP} = the mean of MSAL for faculty in the Arts, Science and Pre-professional Division.

Findings and Interpretations: The metric coefficients obtained from estimating equation (4.8) for faculty in the four instructional divisions are displayed in Table 23.

Using this data as input for the decompositional analysis produced the results presented in Table 24.

The 76 dollar salary differential between Technical and Trade Division faculty is largely accounted for by the positive values associated with intercept and interaction components, 50 and 118 dollars, respectively. As compared with their colleagues in the Trade Division, Technical Division faculty appear to be hired at an initially higher salary level. Likewise, the covariation or collinearity between the means (composition) and the coefficients (returns) of the two populations work in favor of the Technical Division faculty. An additional 10 dollars per month in the salary differential is explained by the superior endowments of the Technical Division faculty. However, the advantages in salary that accrue to Technical Division faculty that are the result of these intercept, interaction and composition components are partially offset by the higher rate of return Trade Division faculty enjoy for their endowments, a 101 dollar per month advantage. The combined influence of these four components, of course, still results in 76 dollar per month advantage to

TABLE 23

Metric Coefficients for Faculty in the Four Instructional Divisions, for Model (4.8)

VARIABLE	INSTRUCTIONAL DIVISION TECHNICAL	TRADES	ASR	BUSINESS
Constant	1362.48	1244.47	1271.56	491.23
YRSEX	0.89	36.31	60.19	- 9.18
$YRSEX^2$	-0.37	- 0.45	- 0.95	1.76
YRSR	6.69	6.80	5.53	8.25
YRSCH	21.44	-11.22	25.17	26.69
EVAL	49.32	68.11	6.28	226.81
ABSNT	0.03	- 1.31	9.32	-12.61
ADMD	96.27	101.52	16.14	67.84
TEN	84.45	74.99	22.99	247.46
PROD	0.08	0.10	0.04	0.30
MMKT	45.02	93.73	211.52	481.34
SMKT	59.74	188.28	325.21	507.60
R^2	.9115	.8244	.9031	.8892
$S.E._{est}$	79.60	116.51	103.28	130.51
N	43	55	45	23

TABLE 24

Decomposition of Salary Differentials Between Faculty in the Four Instructional Divisions

Components	Decomposition $Y_{TECH} - Y_{TRADE}$ (75.96)	$Y_{TECH} - Y_{ASP}$ (38.24)	$Y_{TECH} - Y_{BUS}$ (60.97)
Composition	9.59	2.13	154.76
Interaction	49.59	- 8.10	-128.63
Returns	-101.23	-46.71	-836.41
Intercepts	118.01	90.92	871.25

Technical Division faculty. Using Blinder's measure of labor-market discrimination, that is, the addition of the returns and intercept components, Trade Division faculty are only underpaid by 17 dollars per month, a value that approximates equity given the complexity of salary administration.

Turning to the salary differential between faculty in the Arts, Science and Pre-professional (ASP) Division and those in the Technical Division, it again appears that the 38 dollar per month advantage of Technical Division faculty is largely due to their higher starting salaries, the difference in intercept constants being 91 dollars per month. The endowments of the Technical Division faculty only contribute 2 dollars per month to the differential, reflecting near equality in composition characteristics. However, these salary advantages are partially offset by the comparatively higher rates of return enjoyed by ASP faculty, 47 dollars per month. Also, the interaction component, the effect of composition and rates beyond their individual effects, partially mediates the effects of the higher starting salaries and somewhat superior endowments of Technical Division faculty, by about 8 dollars per month. Acting simultaneously the four components of the decompositional analysis explain the 38 dollar per month salary differential between Technical and ASP Division faculty.

Finally, the 61 dollar per month salary differential between Technical and Business Division Faculty is explained along similar lines. Technical Division faculty are rewarded with a much higher starting salary than Business Division faculty and enjoy the benefits of superior endowments, the amounts being 871 and 155 dollars, respectively. These salary advantages of Technical Division faculty are largely mediated by the effects of higher returns to the endowments possessed by Business Division faculty, 836 dollars, and the effect accounted for by the interaction component, 129 dollars. The salary advantages of the Technical Division faculty are not, however, completely mediated, providing a 61 dollar per month advantage to faculty in the Technical Division. However, of this 61 dollar advantage, nearly 35 dollars of it can be identified as labor-market discrimination, using Blinder's definition and calculation of the measure.

Three trends can be identified from the analysis of the salary differentials between Technical Division faculty and faculty in other divisions. The first is that in every decomposition, Technical Division faculty were seen to enjoy the comparative benefits of higher starting salaries. Second, in each analysis, faculty in the Technical Division were shown to benefit from superior endowments. Finally, in every case, the salary advantages accruing to Technical Division faculty because of higher starting salaries and superior endowments are largely mediated by the effects of higher rates of return to the endowments possessed by faculty in the other divisions. Thus, while Technical Division faculty are rewarded by higher starting salaries, by comparison, faculty in the other divisions enjoy the benefits of steeper slopes. The only inconsistent pattern of the analysis was the behavior of the interaction component. In two out of the three analyses, the interaction component worked in favor of faculty outside the Technical Division. Only in the Trade Division's decomposition did the effect of the interaction component reward faculty in the Technical Division. Overall, rather consistent patterns in the decompositions have been observed.

SUMMARY

The purpose of this study was to examine, analyze and ascertain the degree to which measurable differences in the characteristics of faculty in a two-year comprehensive college lead to measurable differences in faculty salaries. External marketplace influences and structural determinants of faculty salaries were incorporated into the research design to capture their influence and to provide for a more complete specification of the model. The specification of the model is consistent with the parity-equity model of salary variation. As such, three sets of variables - rational equity, nonrational equity, and marketplace influences - were viewed as determinants of faculty salaries.

Since the assumption of multiple causation of salary differences was made, statistical procedures permitting the simultaneous examination of many predictor variables were needed. Multiple regression and path analysis offered such an examination. Given that the assumptions of the utilized statistical techniques were satisfied or that the weakening of the assumptions was handled by the robustness of regression analysis, the investigation examined salary variation in terms of a causal scheme, or in the terminology of Tukey (1954), a functional method of analysis was utilized.

This mode of analysis provided a number of advantages for the understanding of salary variation. First, the amount of variance explained by each major construct in the parity-equity model was identified. In addition, the amount of variance explained by the full model provided an indication of how well the parity-equity model explains and predicts faculty salaries. On the other hand, the methods of this analysis also provided useful information on the amount of salary variance unexplained by the model and an indication of how much error exists in the prediction of individual faculty salaries. In short, the control of variance and the prediction of faculty salaries have been very well accomplished by the statistical tools of this analysis.

Second, the functional method of analysis provided an assessment of the influence of each independent variable on faculty salaries. This assessment involved an examination of the influence of each variable as measured by both its metric and standardized effects. To further explore the relationships in the data, a recursive path model of salary was specified which provided an opportunity to examine the total, direct and indirect effects of the exogenous variables on salary. Path analytic procedures provided reduced-form expressions of the exogenous variables' influence on faculty salaries. These reduced-form expressions defined the values of the dependent variable in terms of the values of the system inputs. Comparing these reduced-form expressions with the structural coefficients provided a means to determine if the endogenous variable (evaluation) dominates salary outcomes, or whether the exogenous variables emerge as strong causal agents. Path analysis also provided an opportunity to test the goodness of fit of the data to the parity-equity model.

Third, a block variable model provided a means to assess the overall influence of the three major constructs of the parity-equity model.

Fourth, a nonrecursive model specifying a feedback relationship between salary and evaluation provided an opportunity to assess the meaningfulness and the goodness of fit of the nonrecursive specification.

Finally, the methods of analysis provided a procedure to decompose salary differentials between male and female faculty members, and between faculty in the four instructional divisions of the institution. This procedure identified the amount of the salary differentials attributable to differences in starting salaries, to differences attributable to different endowments, to differences due to different returns, and to differences due to interaction effects.

Converting these statements to more specific information, the most important findings of this study are:

1. Over 80 percent of the variance in monthly salary is explained by the rational equity variables. Marketplace variables contribute meaningfully to the explanation of MSAL variance by increasing the proportion of variance accounted for to 84 percent. The nonrational equity variables contribute an additional 4 percent to the explained variance of MSAL, above and beyond that already accounted for by the rational equity and marketplace variables. The full model R^2 of 88 percent is accompanied by a standard error of the estimate of only 95 dollars, indicating substantial ability not only to understand MSAL variance, but also to predict MSAL. The parity-equity model appears to do an excellent job in explaining and predicting faculty salaries at a two-year postsecondary institution.

2. A parsimonious regression model was obtained with little loss in explanatory power, a slight improvement in the standard error of the estimate, lower levels of multicollinearity and a continuation of meeting the homoscedasticity assumption.

3. In terms of dollars, the rational equity and marketplace variables have a substantial impact on MSAL, as measured by their unstandardized partial regression coefficients. Only three variables in the nonrational equity set (sex, percent women, and past evaluation) contribute meaningfully to MSAL, as determined by the economy of description found in the parsimonious regression model.

4. As measured by standardized effects, years of experience has the greatest impact on faculty salaries. Its coefficient (.744) far exceeds in magnitude the effects revealed by the other coefficients. Tenure status and sex rank second and third in respective impacts on salary.

5. A parsimonious path model of salary explains a substantial portion of EVAL and MSAL variance, 48 and 88 percent, respectively. In addition, the relations in the data are consistent with the parsimonious model. The relative ranking of the importance of the variables obtained from path analysis is similar to the ranking obtained from straight-forward regression analysis. The reason for this similarity is due to the fact that the endogenous variable EVAL does not, in an overall sense, mediate much of the total effect of the exogenous variables. The influence of the exogenous variables rests quite solidly on their direct effects. The major exception to this generalization is the strong mediating influence EVAL exhibits for past evaluation (PEVAL). Path analysis also reveals that while a substantial portion of the association between EVAL and MSAL is spurious, a significant portion of its association is represented by its direct effect on MSAL. Further, path analysis demonstrates that the total effect of SEX on MSAL is nearly as great as that observed for the marketplace or years of schooling.

6. The block variable model of MSAL summarizes the importance of the three constructs - rational equity, nonrational equity and the influence of the marketplace - on MSAL. The influence of rational equity on MSAL is far superior to the block influences of the other two latent constructs. The nonrational equity and marketplace blocks reveal nearly equal effects, with the nonrational equity block edging the influence of the marketplace by a slight margin.

7. The nonrecursive model postulates a feedback relationship between EVAL and MSAL. The application of two-stage least squares to the nonrecursive equations reveals that the feedback relationship is not meaningful, as evaluated by decision rules adopted earlier. The recursive model, then, stands as both a meaningful model and one that is consistent with the relations in the data.

8. The decomposition of the 224 dollar salary differential between male and female faculty members reveals that nearly two-thirds of the differential may be attributed to labor-market discrimination. The decomposition of salary differentials between Technical Division faculty, who receive on average the highest salaries, and faculty in the other divisions, reveals that the faculty in the Technical Division enjoy the comparative benefits of higher starting salaries and superior endowments. However, the salary advantages accruing to Technical Division faculty because of higher starting salaries and superior endowments are largely mediated by the effects of higher rates of return to the endowments possessed by faculty in the other divisions.

As evaluated by straight-forward regression and path analysis, the parity-equity model of faculty salaries fits the data well. It accounts for a substantial portion of the variance in faculty salaries and is consistent with the pattern of correlations in the data. The parity-equity model is also successful in predicting faculty salaries.

Rational equity variables are the dominant determinants of salary, but nonrational equity and marketplace influences are the dividers of reward. Rational equity variables dominate salary outcomes, but the nonrational equity and marketplace influences adjust salaries according to conditions in the marketplace and the possession of illegitimate, ascribed characteristics.

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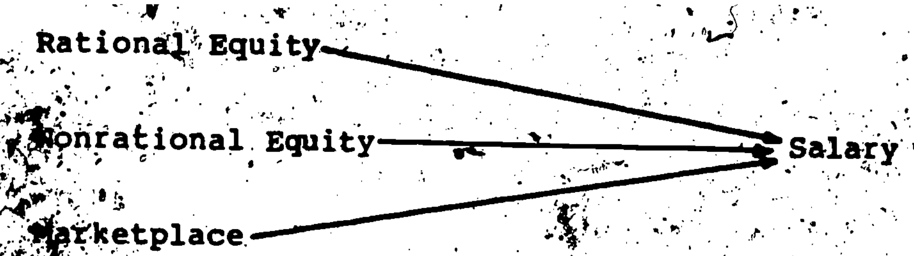

Figure 1
A Schematic Representation of the Parity-Equity Model

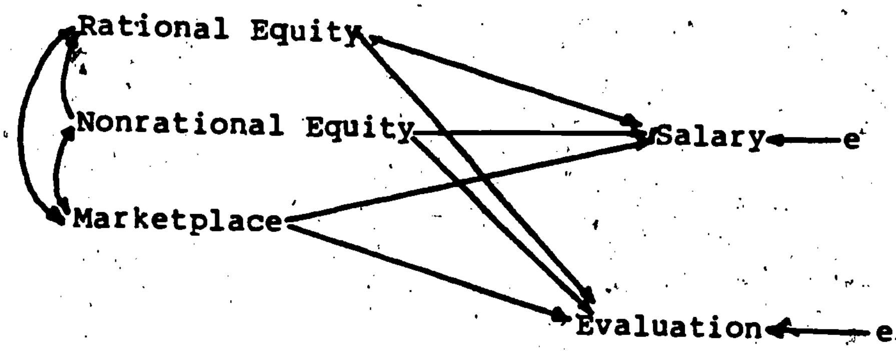

Figure 2
A Recursive Path Model of Salary

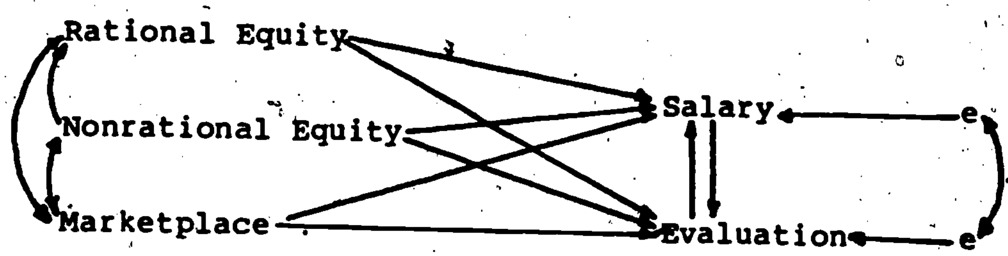

Figure 3
A Nonrecursive Model of Salary

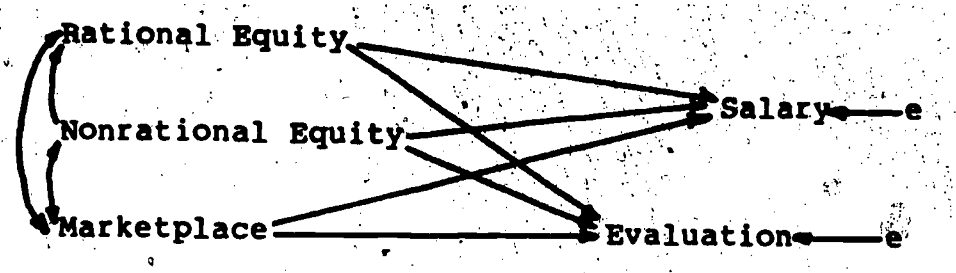

Figure 4
A Recursive Path Model of Salary[a]

[a]For purposes of clarity, the variables included as exogenous variables are summarized as three sets. This model, however, does not represent a block variable model.

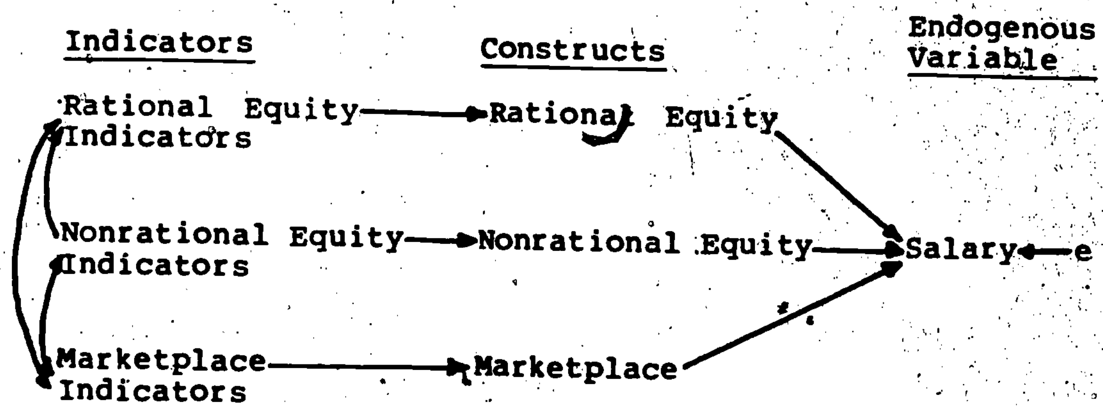

Figure 5
A Block Variable Model of Salary[a]

[a]For purposes of clarity, the indicator variables are summarized as sets.

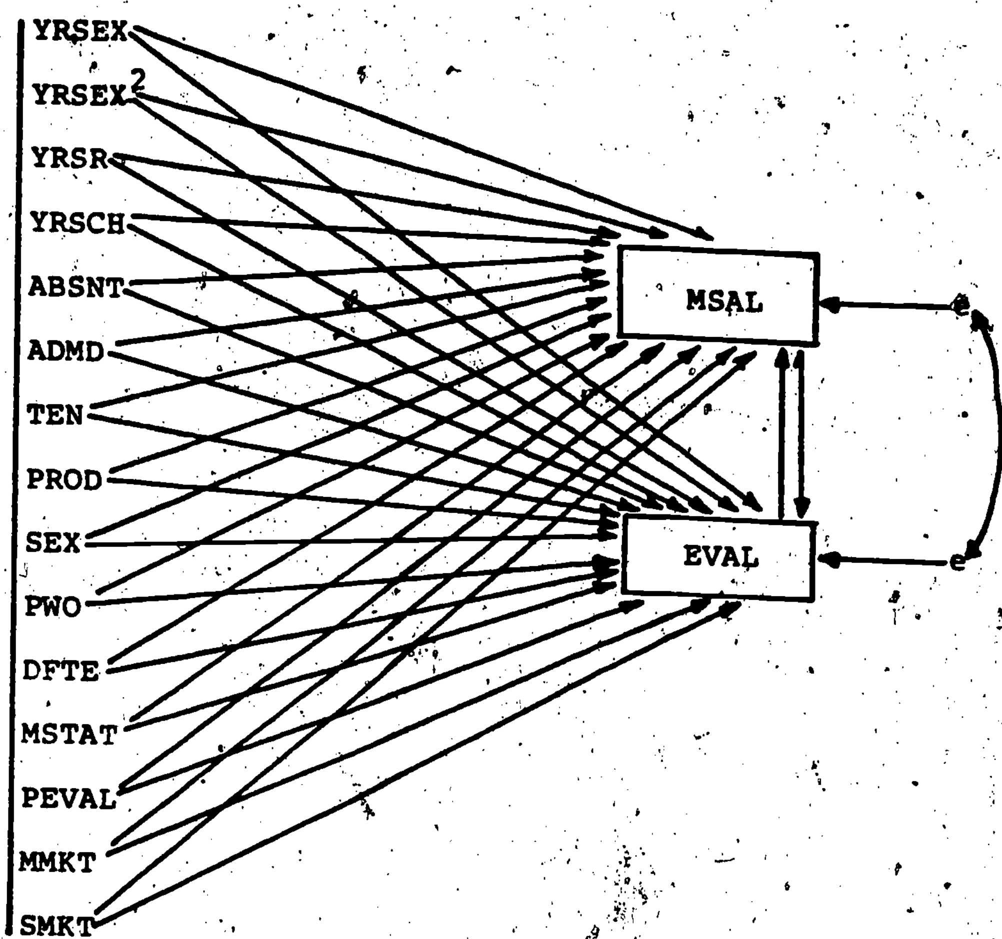

Figure 6
A Nonrecursive Model of Salary[a]

[a]The vertical line represents all possible correlations among the exogenous variables.

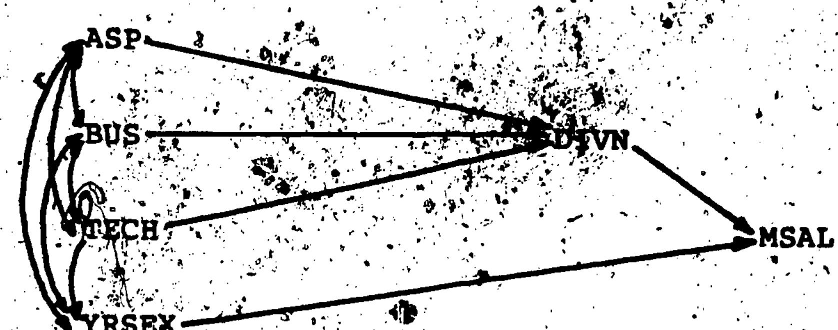

Figure 7
An Example of the Use of a Sheaf Coefficient for Summarizing the Effect of Nominal Variables

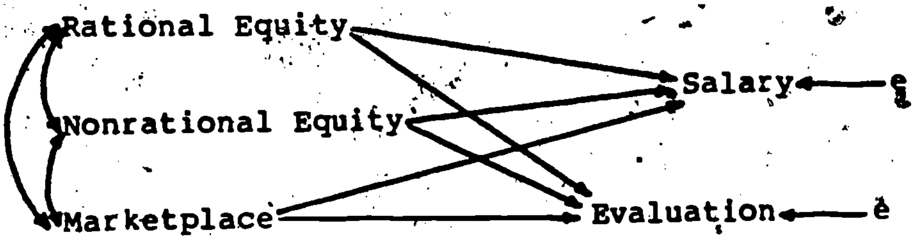

Figure 8
Recursive Path Model of Salary[a]

[a]For purposes of clarity, the variables included as exogenous variables are summarized as three sets. This model, however, does not represent a block variable model.

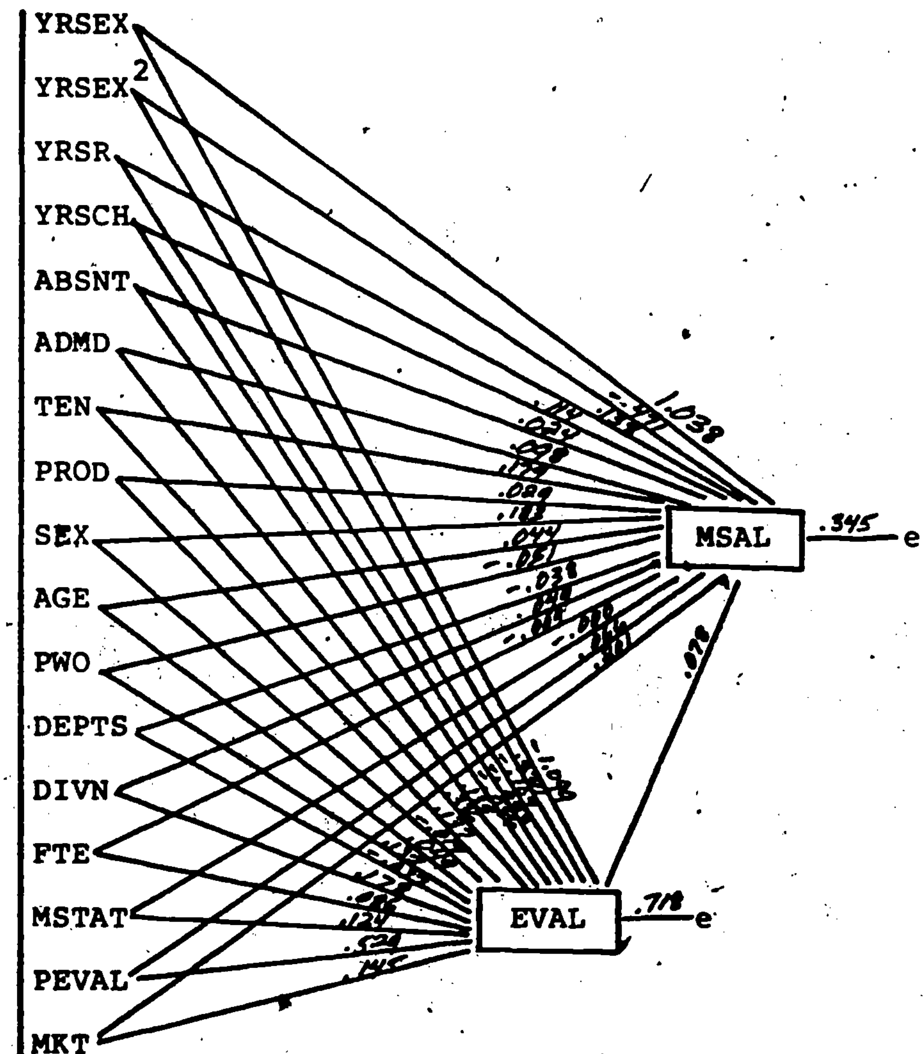

Figure 9
A Full-Scale Recursive Model[a]

[a]Coefficients for the categorical variables are sheaf coefficients. The vertical line summarizes the correlations among all exogenous variables.

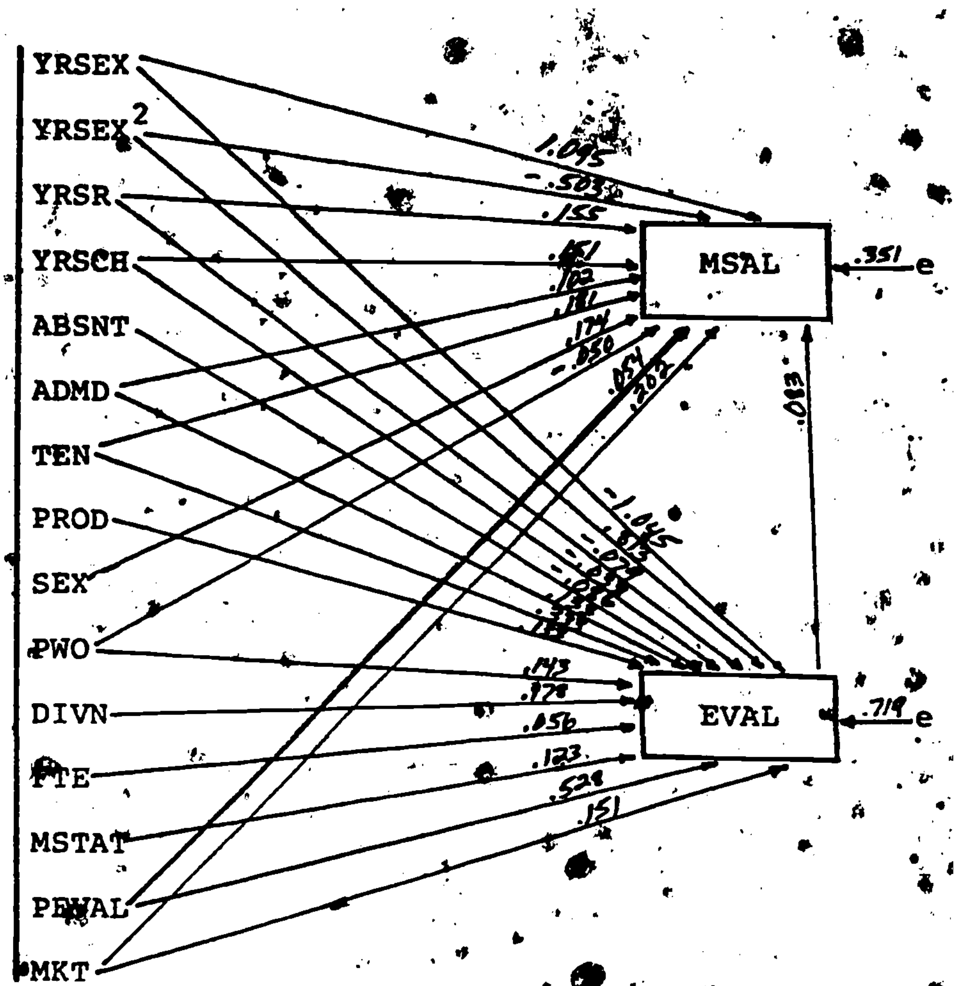

Figure 10
A First Attempt at a Parsimonious Path Model[a]

[a]Categorical variable coefficients are sheaf coefficients. The vertical line summarizes the correlations among the exogenous variables.

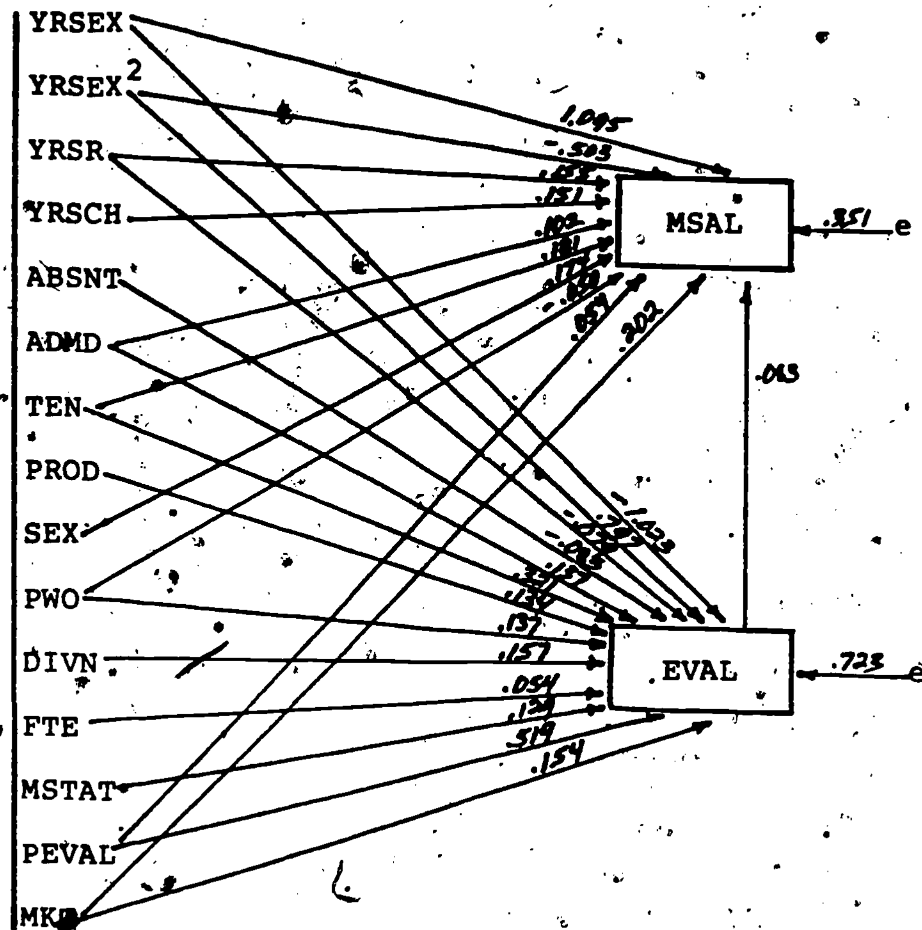

Figure 11
A Second Attempt at a Parsimonious Recursive Path Model[a]

[a]Categorical variable coefficients are sheaf coefficients. The vertical line summarizes all correlations among exogenous variables.

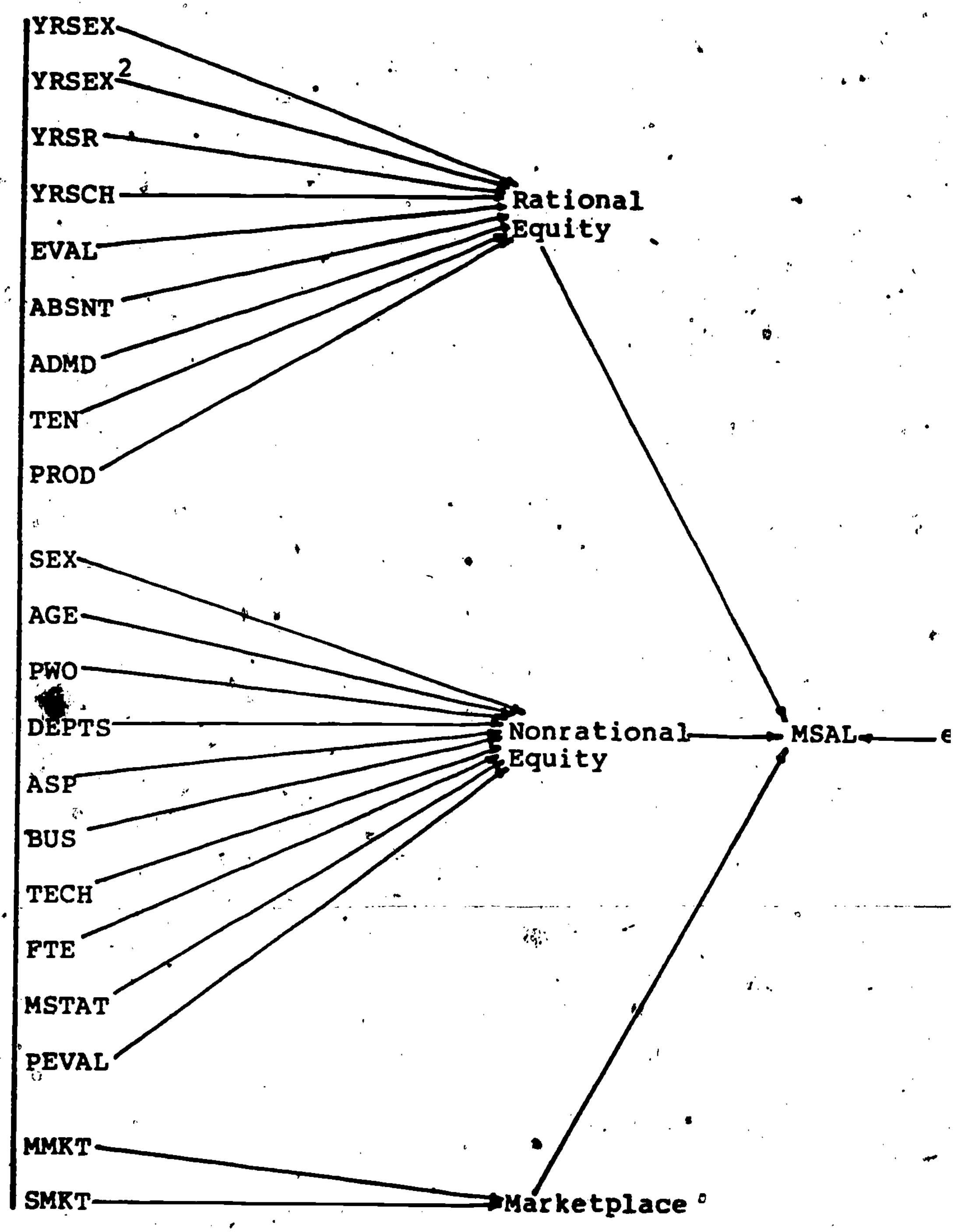

Figure 12
A Block Variable Model of MSAL[a]

[a]The vertical line represents all possible correlations among the indicators.

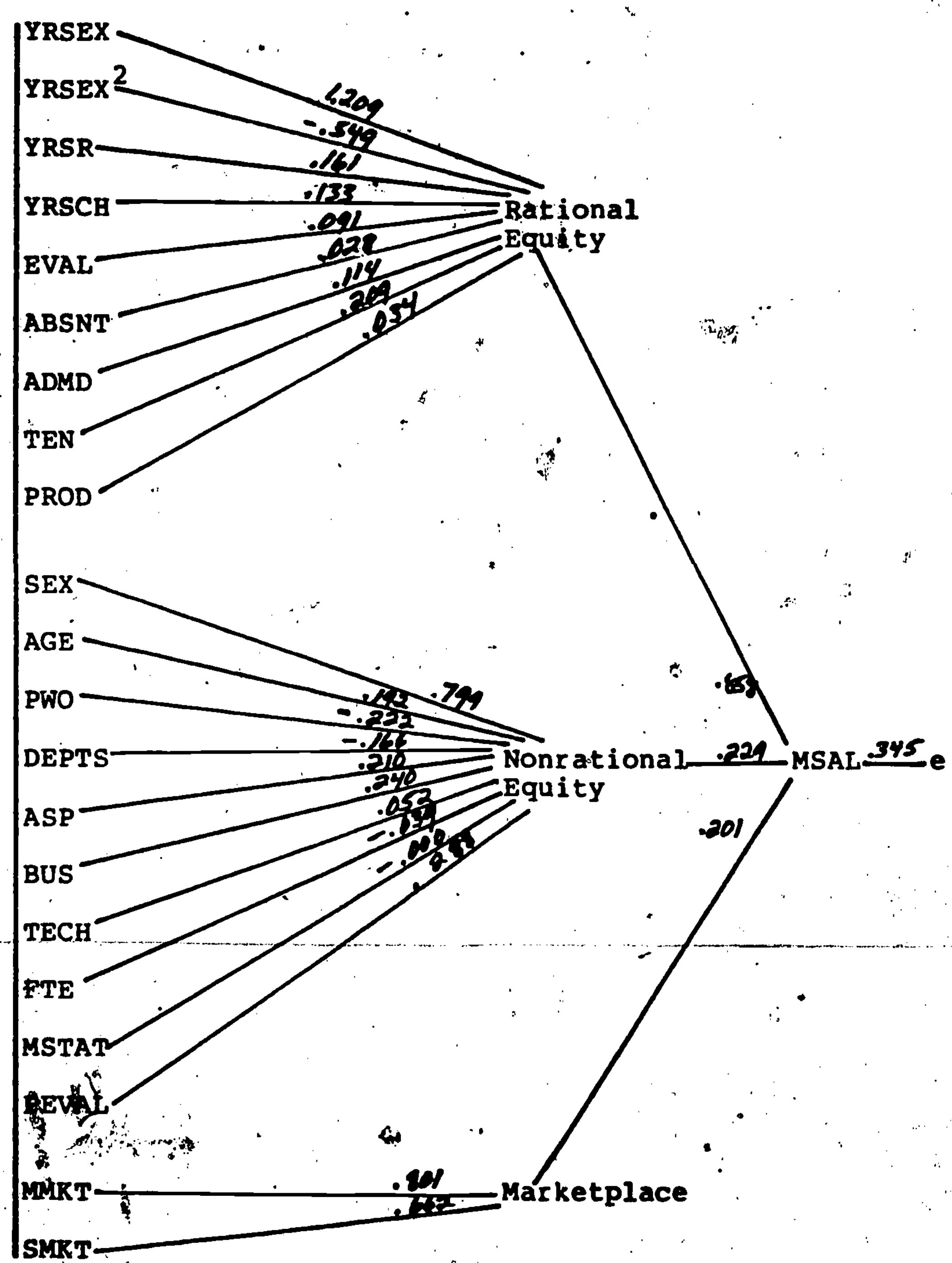

Figure 13
A Block Variable Model of MSAL with Sheaf Coefficients[a]

[a]The vertical line represents all possible correlations among the indicators.

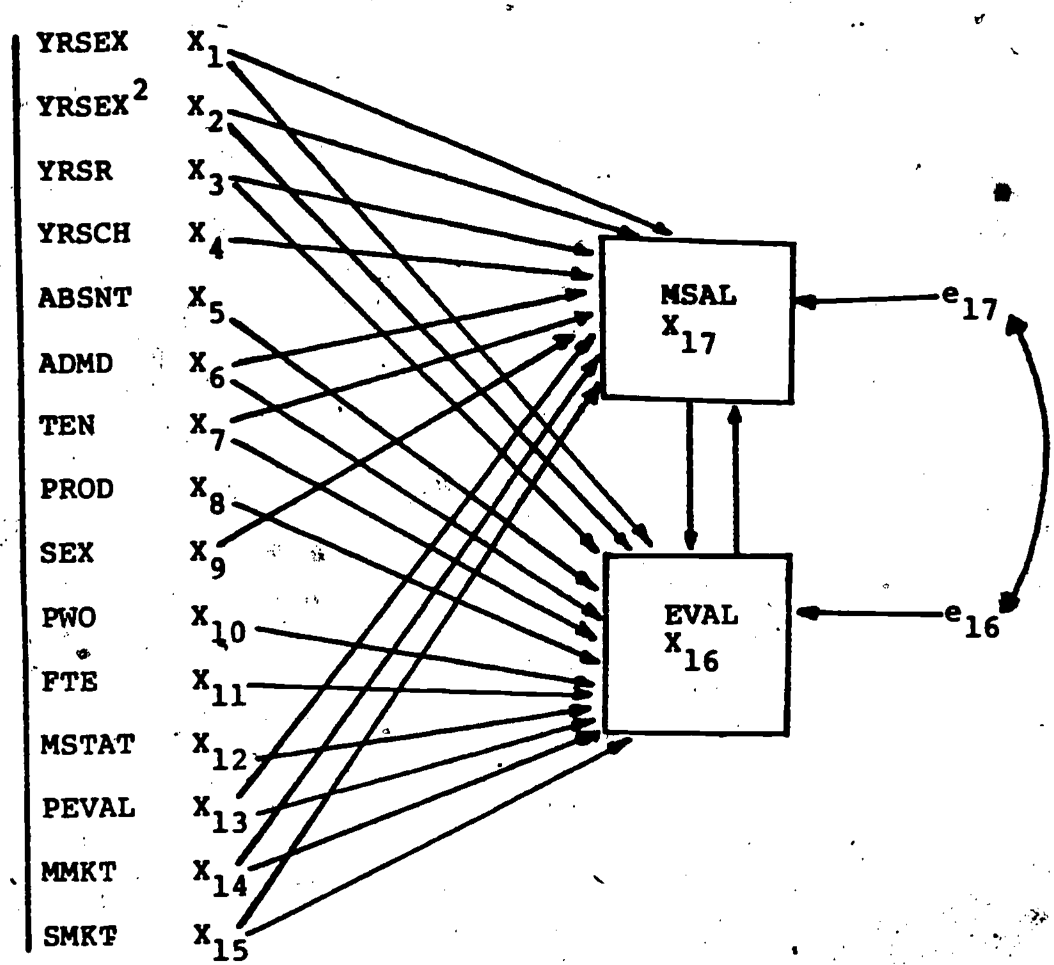

Figure 14
A Nonrecursive Model of Salary[a]

[a]The vertical line represents all possible correlations among the exogenous variables.

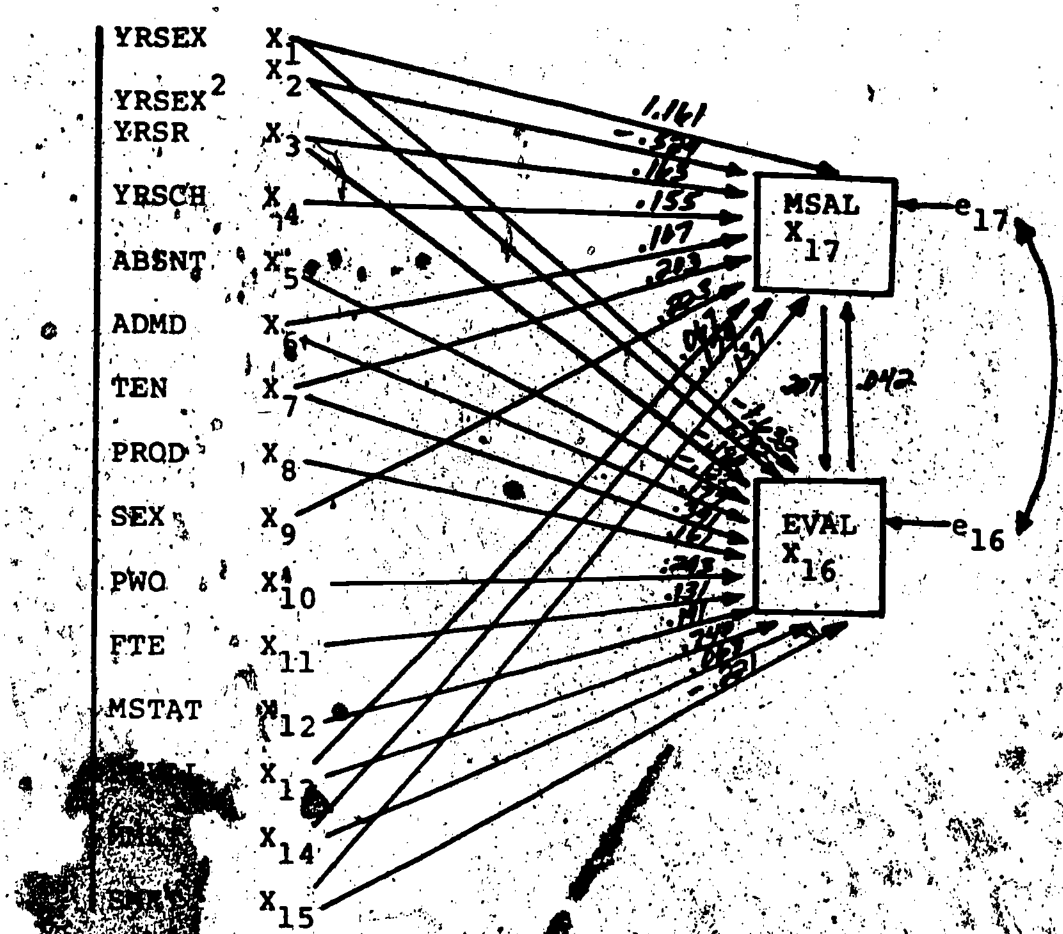

Figure 15
A Nonrecursive Model of EVAL and MSAL with Path Coefficients[a]

[a]Vertical line represents correlations among all exogenous variables.