

1986

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Cullen, John B.; Anderson, Kenneth S.; and Blaker, Douglas D., "Blau's Theory of Structural Differentiation Revisited: A Theory of Structural Change or Scale?" (1986). *Management Department Faculty Publications*. 199.

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BLAU'S THEORY OF STRUCTURAL DIFFERENTIATION REVISITED: A THEORY OF STRUCTURAL CHANGE OR SCALE?

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The major objective of this study was to determine if Blau's (1970) theory of structural differentiation better captures differences in scale between organizations or structural changes within organizations. Data gathered on 134 Ph.D.-granting universities over nine years permitted us to compare results of within-organizations tests of Blau's theory with those from both cross-sectional and longitudinal between-organization tests. The findings suggest that the theory's power lies in explaining structural differences between organizations rather than in explaining structural change.

In an area that has been called a "theoretical wasteland" (Kimberly, 1976: 573), Blau's (1970) theory of structural differentiation in organizations provided a major theoretical statement concerning the effects of organizational size on structure. This theory has inspired considerable research and debate (e. g., Mileti, Gillespie, & Haas, 1977; Miller & Conaty, 1980). The theory has also influenced many studies of formal organizational structure not directly concerned with testing the theory's propositions, probably because of the emphasis given to organizational size and the causal priority the theory grants to size over other dimensions of structure. The large number of citations referencing Blau's initial theoretical paper evidences the extent of his theory's influence. *Current Contents/Social and Behavioral Sciences* recently designated the 1970 article a "citation classic" (Blau, 1983). Moreover, interest has not waned; citations of the initial articles on the theory (Blau, 1970; Blau & Schoenherr, 1971) continue to be numerous more than a decade after their publication (Institute for Scientific Information, 1984).

In spite of the effect of the theory of structural differentiation on many current studies of organizational structure, even recent empirical tests of the theory have used cross-sectional data (Beyer & Trice, 1979). This situation is surprising since a small but growing body of general organizational research

We would like to thank three anonymous reviewers for their comments on an earlier draft of this paper. All errors remain the responsibility of the authors.

has shown that cross-sectional differences in structure found among organizations do not necessarily reflect processes of structural change (Freeman & Hannan, 1975). Although a few tests of Blau's theory have used longitudinal data (Meyer, 1972), they merely used change-over-time as a variable in cross-sectional comparisons among organizations (Ford, 1980a). There are virtually no within-organization, time series investigations of the basic relationships that Blau hypothesized. Thus, although his propositions concerning the relationships among size of organization, differentiation, and size of administration continue to influence organizational scholars, especially those concerned with organizational size, the proper sphere of the theory of structural differentiation remains undefined. To what extent is it a theory of *scale* among organizations? To what extent is it a theory of *change* within organizations?

In light of longitudinal research on organizational structure, it seems increasingly clear that both theoretical and empirical work should specify structural relationships that occur because of: (1) differences among organizations in the scales of their operations, (2) differences among organizations in the degrees of change in their structures, and (3) changes within organizational structures over time. Because Blau's work is perhaps the most influential theoretical consideration of organizational size, differentiation, and size of administrative components, it seems appropriate to examine it in terms of these three issues.

Thus, this study had two objectives. The first objective was to test the fundamental aspects of the theory using longitudinal data and a within-organization design. We used within-organization analyses to examine the theory's proposed relationships among the structural dimensions of size, differentiation, and administrative components over time and for individual organizations. The second objective was to compare these results with two types of models: (1) models like those typically reported for studies using cross-sectional data, and (2) models like those reported for studies using longitudinal data and between-organization designs.

BLAU'S THEORY OF STRUCTURAL DIFFERENTIATION

In his formal theory of differentiation, Blau (1970) inferred two generalizations from cross-sectional data on 53 governmental agencies and their local branches. The generalizations were: "Increasing size generates structural differentiation along various dimensions at decelerating rates" (1970: 204) and "Structural differentiation in organizations enlarges the administrative component" (1970:213). Blau operationally defined organizational size as number of employees, differentiation as number of formal structural components such as levels or divisions, and an administrative component as the number of staff personnel who provide support services for an organization.

Blau derived numerous propositions from the two generalizations. These propositions hypothesized at least three basic relationships: (1) increasing organizational size reduces the relative size of an administrative component,

(2) increasing organizational size increases differentiation, and (3) increasing differentiation increases the relative size of an administrative staff. Blau (1972) later expressed the proposed empirical relationships in path analytic form, as shown in Figure 1.

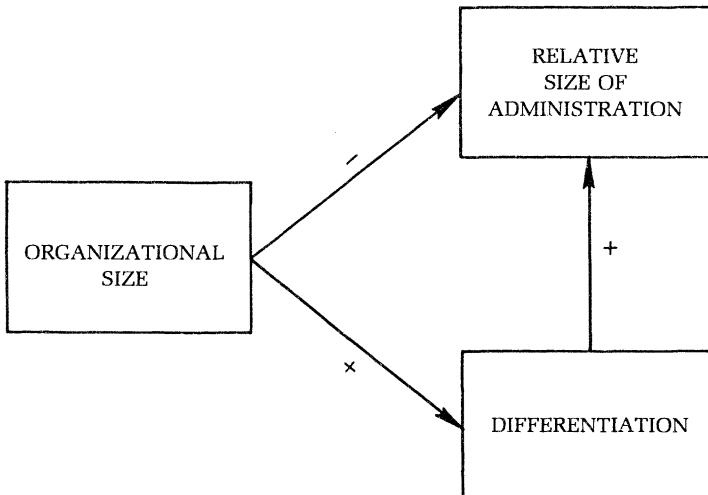
Although Blau used cross-sectional data to derive his theory, the focus of his basic generalizations on *changes* in structural components implied a temporal dimension to organizational variability. However, the vast majority of research related to this theory has used cross-sectional data and examined only differences among organizations. As the literature reviewed in this study shows, the theory of structural differentiation is useful for explaining differences in scale among organizations. Yet we know little concerning its applicability to processes of change within organizations. As a result, the basic relationships of the theory still need to be examined over time for individual organizations if Blau's theory is to be considered a viable explanation of processes of organizational change.

Issues Emerging from the Study of Change

Research that examines Blau's basic hypotheses over time, especially with a within-organization design, should consider two issues that neither he nor the few longitudinal tests of his theory have addressed.

The first issue is the lag structure, or the time period it takes relevant variables to respond to each other. Cullen and Baker (1984) demonstrated that the responsiveness of changes in size of administration to changes in enrollment varied widely in a random sample of colleges and universities. These findings were similar to those in other fields where within-subject time series analyses are more common (e. g., Assmus, Farley, & Lehmann,

FIGURE 1
Simplified Model of the Theory of Structural Differentiation



1984). Little is known about how long it takes differentiation to respond to changes in size or how long it takes administration to respond to changes in differentiation. More than just an empirical issue, investigation of lag structures addresses an unspecified theoretical point in Blau's work. All theories of change need to specify when one variable will respond to changes in another variable. Lacking such specification, any theory becomes irrefutable since hypothesized relationships will nearly always occur at some unspecified time in the future.

The second issue is how the theory of structural differentiation should be interpreted for declining as well as growing organizations. Although its originator phrased the theory's generalizations and propositions in terms of growth, the derivation of the theory of structural differentiation from cross-sectional data relies on an assumption concerning the results of earlier changes in structure. It implies that changes—growth, decline, or both—result in similar combinations of structural characteristics at particular levels of size at any time. Stated otherwise, “[organizational] levels represent the sum of all change up to the point of measurement” (Dewar & Hage, 1978: 112). As a result, Blau's theory at least implies hypotheses concerning decline as reversal of growth. If growth hypotheses are reversed, the following situations are necessary during decline in order for the sum of differences created by growth or decline to produce cross-sectional relationships consistent with the theory.

Since relationships between size and differentiation and size and administration are not proportional during growth, they should not be proportional during decline. Blau's theory states that during growth, decentralization occurs at a decelerating rate because the average size of the subunits increases (Blau, 1970: 206-207). This hypothesis says that there is absolutely more but relatively less differentiation with an increase in size. On the basis of this more general hypothesis concerning differentiation, Blau also hypothesized that the relative size of an administrative staff declines with increases in an organization's size (Blau, 1970: 210). Because it is based on cross-sectional data, the theory of structural differentiation presumes that a decline returns an organization to an earlier state. Therefore, if proportionately larger administrative staffs are expected for smaller organizations, the theory implies that in decline, administrative size decreases slower than organizational size. Similarly, differentiation should decline proportionately less than size declines. Because Blau did not specify whether the relationship between differentiation and administration is proportional during growth, support for his theory only requires that the form of this relationship be similar in growth and decline.

Although the logic of the theory of structural differentiation has not been tested previously with growing and declining organizations, evidence from both between-organization (Freeman & Hannan, 1975) and within-organization (Ford, 1980a) longitudinal studies challenges this implicit hypothesis that growth and decline produce the same cross-sectional relationships among components of organizational structure.

In response to these issues, the within-organization models of the theory of structural differentiation used in this study (1) considered different lag structures for organization size, and (2) carefully examined differences between growing and declining organizations.

PREVIOUS RESEARCH

The following sections review selected previous research on the major relationships that Blau hypothesized. We differentiated studies reviewed along two dimensions: (1) whether they used longitudinal or cross-sectional data, and (2) whether their research designs were within- or between-organizations. The cross-sectional research we examined focused on two or more of the variables that figure in Blau's theory. Cross-sectional studies necessarily used between-organization designs examining differences among or between organizations. Longitudinal research having within- or between-organization designs examined two or more of the theory's variables over two or more time periods. Between-organization studies used longitudinal data to develop change variables for assessing variance in the theory's variables across samples of organizations; within-organization studies examined variance in these variables over time for single organizations.

Cross-Sectional Studies

Cross-sectional research examining the hypotheses posited by Blau essentially replicated his findings (1970, 1972, 1973). Several investigators have studied the relationship between organization size and structural differentiation. Most have found a positive association. Goldman (1973) found strong relationships between organizational size and three forms of differentiation—spatial, horizontal, and vertical. Mileti and colleagues (1977) observed positive curvilinear relationships between size and vertical and horizontal differentiation and a linear relationship between size and spatial differentiation. Miller and Conaty (1980) pooled data from three different sources: (1) federal and state agencies studied by Mileti and colleagues (1977), (2) department stores studied by Goldman (1973), and (3) an original heterogeneous sample contributed by Miller. They concluded that size is related positively to differentiation. In a study attempting a direct replication of the theory of structural differentiation's hypothesis concerning differentiation, Beyer and Trice (1979) found size to have greater effects on division of labor, vertical differentiation, and horizontal differentiation than did Blau and Schoenherr (1971).

Among the relationships postulated in the theory, the effects of size on administration have received the most attention; this was true even before Blau developed his theory. He hypothesized a positive correlation between organizational size and the absolute size of the administrative component and a negative relationship between organizational size and the relative size of the administrative component (Blau, 1970: 208). In their review of the literature, Jackson and Morgan (1978: 238) found unqualified support for a

positive relationship between the absolute size of both components. Bedeian's (1980) review of 26 cross-sectional studies with data on organizational size and administrative ratios reported that 18 studies observed a negative relationship between organizational size and relative size of administration. Gillespie and Mileti (1976) concluded from their literature review that, with size controlled, there are positive associations between the ratio of administrators to organizational size and both vertical and horizontal differentiation. All of these findings are consistent with the theory of structural differentiation.

Between-Organization Longitudinal Studies

Most longitudinal studies investigating organizational structure employ between-organization designs. Such studies (e. g., Akers & Campbell, 1970; Freeman & Hannan, 1975) use changes observed within individual organizations in comparisons across or between cases or organizations. For example, in a between-organization design with longitudinal data, once an organization's percentage of growth or decline has been measured, the analysis uses this variable—just like any other variable measured at one point in time—for estimating relationships across or between organizations.

A small number of data points on which change can be measured and the variability of patterns of change within organizations make it difficult to determine how well relationships for change variables derived from between-organization research pertain to the same changes within individual organizations (Ford, 1980a: 617). For example, since between-organization studies usually apply one lag time to all variables and to all organizations studied, differences among the lag structures for individual organizations may obscure subtleties of relationships. Similarly, a single estimate of a relationship between change variables for an entire sample is sensitive to outliers in ways that may mask findings. It is possible, for example, that most organizations in a sample could have a relationship over time when a between-organization slope suggested no such relationship.

However, since between-organization studies with longitudinal data do consider change and can contrast processes of growth and decline, it is unfortunate that only a few such studies exist—especially investigating the theory of structural differentiation or its constituent relationships. Using data collected at two points, Meyer (1972) confirmed his hypothesis that the relationship between size and differentiation was unidirectional; he found that size affects differentiation. In contrast, a later study by Dewar and Hage (1978) concluded that organizational size did not affect vertical or horizontal differentiation.

In a six-year study that supported aspects of Blau's theory, Hendershot and James (1972) found a negative association between organizational size (enrollment) and administrative intensity (the ratio of principals and supervisors to teachers) in rapidly growing organizations. However, they found no consistent associations for organizations that grew slowly. Daft and Becker (1980) hypothesized and found that organizational size had a positive relationship with the absolute size of the administrative component.

Freeman and Hannan (1975) examined organizational size and size of the administration for both growing and declining school districts. The relationship in growing districts between district size and supportive components—an inclusive measure of administration—was positive, proportional, and relatively consistent with Blau's theory. Declining organizations removed members from their teaching or direct components faster than from their supportive components. Similarly, Freeman (1979) found a positive relationship between district size and size of the supportive components in both growing and declining districts. Enrollment had a stronger positive effect on supportive components in growing districts than in declining districts.

If the cross-sectional differences found originally in the derivation of Blau's theory represent the results of changes that predated his analysis, the diseconomies in administration associated with small organizations should also be produced in formerly larger organizations moving into the smaller size because of decline. Thus, findings of decreased economies of scale with decline are logically consistent with the theory of structural differentiation, even though Blau did not deal with decline explicitly. However, critics have suggested that highly rational approaches to organizational change, such as Blau's, ignore the possibility that the political power of administrators becomes manifest during decline and is used to maintain the positions of those in power (Hannan & Freeman, 1978).

Without direct study of the politics of decision making in an organization it is difficult to assess the degree to which rationality or political power prevail. Hannan and Freeman's (1978) findings did indicate indirectly that political power operates to increase retention of administrators in decline more than in growth. Ford (1980b) also argued that the relationships between size and various components of structure in growing organizations will not mirror those relationships found in declining organizations. During periods of decline, organizational decision makers may offer employees inducements to stay in an attempt to stem the processes of decline. Ford referred to this as the participation problem (1980b: 592-593). Commitment of an organization's decision makers to its status quo—their resistance to change—may shape relationships in decline. Finally, like Hannan and Freeman (1978), Ford argued that political considerations during decline may lead to an organization's members wishing to maintain their positions, thus limiting the organization's ability to adapt.

Daft and Becker (1980) hypothesized that organizational complexity is related positively to size of the administrative component. They found a positive but weak association between complexity and changes in size of administrative components. Moreover, the relationship was reciprocal, with an additional weak but positive association between size of administrative components and changes in complexity.

Although longitudinal research with between-organization designs has tended to support the major hypotheses of Blau's theory, these studies provided less support than has cross-sectional research.

Within-Organization Longitudinal Studies

A within-organization longitudinal design typically examines relationships over time for single organizations. Data are thus compared within individual organizations rather than between different organizations. Such studies then use regression models to explain variance in a time series for two or more organizational variables. Regressions for single organizations are usually compared descriptively.

In spite of some early within-organization research (Tsouderos, 1955), longitudinal studies of organizational structure with within-organization designs are still rare (Kimberly, 1976). The difficulty of obtaining numerous data points in a time series probably accounts for this scarcity. We know of no within-organization studies of the theory of structural differentiation that have considered organizational size, differentiation, and size of administration simultaneously. However, there is at least one recent within-organization study of organizational size and size of administration.

Ford (1980a) collected data over ten years (1968-77) on 24 public school districts, hypothesizing little convergence between the results of cross-sectional analyses and the results of longitudinal analyses. He concluded that it was "problematic" (1980a: 627) to infer organizational processes from the results of research using cross-sectional designs. Ford used size elasticities—proportional changes over time—to assess administrative economies of scale in growing and declining organizations. For school districts with growing enrollments, he found diseconomies of scale for instructional administrators while approximately 50 percent of the school districts had economies of scale for noninstructional administrators. Most declining school districts added both types of administrators. Although the inverse of Blau's hypothesis of administrative economies of scale would suggest diseconomies during decline, these diseconomies should be slightly greater than proportional in order for the differences in scale between organizations to remain consistent with his theory, which states that small organizations have proportionately more administrators. However, the absolute increases in administrative size during decline that Ford found are diseconomies exceeding those predicted by Blau; they perhaps result from the differential power of administrators (Hannan & Freeman, 1978), or from structural hysteresis (Ford, 1980b).

Summary

Although the investigations cited in the preceding sections represent only some of the research on the major variables of the theory of structural differentiation, they illustrate the basic trends in the findings for three different methodologies (cross-sectional, between-organization with longitudinal data, and within-organization analyses). Most cross-sectional research has tended to confirm the theory's major hypothesized relationships for size, differentiation, and administration. For growing organizations, within- and between-organization longitudinal research has tended to support the

hypothesis of administrative economies of scale. In addition, studies that have looked at organizations declining in size have often found support for the inverse of the hypothesis of economies of scale during growth; diseconomies with decline were found. However, these diseconomies have often been more extreme than those suggested by the theory of structural differentiation, with many organizations actually increasing the absolute sizes of their administrative staffs. The few longitudinal studies of differentiation, either as a predictor of administrative size or as a dependent variable to organization size, have been inconclusive in their assessment of Blau's theory.

It is noteworthy that there has been almost no research examining the three major variables of Blau's theory simultaneously and longitudinally. Moreover, those longitudinal investigations that do exist have between-organization designs. Thus, to better understand the processes that Blau and others implicitly hypothesized to take place over time, further longitudinal research on the theory of structural differentiation seems necessary (cf. Meyer, 1971, 1972). Cross-sectional research has already provided fairly strong support for the theory. Results from within-organization longitudinal research—when contrasted with those from cross-sectional and between-organization longitudinal research—can help determine the degree to which the theory applies to changes within individual organizations or to differences among organizations in the relative scales of their structural characteristics. The study reported here does just this by testing selected basic hypotheses of Blau's theory using cross-sectional models, between-organization longitudinal models, and within-organizational models. The within-organization models show internal change processes in individual colleges and universities over a nine year period.

METHODS

Population and Data Source

Four-year universities that granted Ph. D. degrees were chosen as the population of organizations. We collected data on these organizations over nine academic years, from 1975-76 through 1983-84. For simplicity, we will refer to this period as 1975 through 1983. An original population of 251 Ph. D.-granting universities appeared in the 1973 version of the *American Universities and Colleges* (Furness, 1973). Missing data reduced the number of organizations we studied to 134. As a result, there were 1,206 observations or data points (9 years \times 134 organizations).

The source of data was the *Yearbook of Higher Education*, volumes 7-15 (Marquis Academic Media, 1975/76-1983/84). Observations began with the 1975-76 volume because the *Yearbook* began reporting data consistently on faculty size during that year. Before that time, the only measure of size available was student enrollment. Since Blau's theory deals with differentiation in organizational workforces, data on faculty size were necessary to provide an appropriate measure.

Although published data sources are invaluable for providing time series data on organizations (Miller & Friesen, 1981), they provide few variables for introducing statistical control. We selected universities that granted Ph.D. degrees because we needed a population that was relatively homogeneous in organizational purpose but varied in size, differentiation, and administration. Public universities represented 55.2 percent of the data set. Relationships reported in the Results section were not changed substantially when controls were introduced for public auspices.

The academic year was used as the period of measurement because universities normally adjust budgets, students, faculty, and administrators yearly.

Variables

In line with the theory of structural differentiation, variables representing organizational size, size of administration, and structural differentiation were included in the study. As did Blau's (1973) study of colleges and universities, this test of his theory focused on academic workforces and academic administrative components.

The measure of structural differentiation was the number of academic departments. In Blau's test of his theory with academic organizations (1973), he used number of academic departments to indicate academic division of labor. Because faculty comprise the primary workforce differentiated into academic departments by universities, the number of faculty was used as the measure of organization size. Full-time equivalent faculty was defined as the number of full-time faculty plus half of all part-time faculty.

Although the *Yearbook* reports data on all types of administrators above the level of department chairpeople, many of these administrators deal with business, finance, or student personnel functions rather than with faculty in academic and teaching activities. Thus, we used the number of full-time academic administrators above the level of department chairpeople to represent size of administration. Academic administrators were defined as those with direct or indirect authority over teaching or research functions. Independent classifications of administrators into academic or nonacademic categories on the basis of titles showed 91.7 percent agreement between two coders. The senior author resolved discrepancies between coders. Academic administrators included presidents or chancellors; all academic deans; and all division heads for instruction, academic affairs, special research or teaching programs, adult or continuing education, and research. Titles for division heads included vice-president or vice-chancellor, dean, and director.

Several arguments supported choosing academic administrators above the level of department chairpeople as the administrative category. First and most important in terms of the theory of structural differentiation, we assumed that academic administrators were the administrative component most directly linked to changes in academic differentiation and to changes in the size of academic workforces. Second, the most detailed data published in the *Yearbook* concerned academic administrators. Third, it is generally better to

investigate a homogeneous category of administrators since relationships between sizes of administration and other variables might differ among various possible categories of administration—an issue raised even before the publication of the functional theory of differentiation (Rushing, 1966). Fourth, although the *Yearbook* reported some data for administration in areas such as business and finance, these data alone were not sufficient to test Blau's theory since no data were reported on either size or departmentalization of nonfaculty workforces. Fifth and finally, we examined academic administration above the level of department chairpeople to avoid definitional dependency between size of administration and differentiation; such dependency is a common danger in relating components of organizational structure (Meyer, 1971). Since departmentalization was the measure of horizontal differentiation, adding the number of chairpeople to the size of an administrative staff would have been virtually equivalent to adding number of departments, an independent variable, to size of administration, the dependent variable. The relationship between these variables would then have been biased.

Although Blau's theory does not give theoretical prominence to one type of differentiation, it does hypothesize that differentiation occurs along two basic dimensions—the horizontal and the vertical. Academic departments exhibit two forms of horizontal differentiation—into subunits and into specialized tasks. Previous researchers have noted both positive and negative simple correlations between horizontal and vertical differentiation (Beyer & Trice, 1979; Miller & Conaty, 1980). Positive relationships have sometimes disappeared (Blau & Schoenherr, 1971) when studies have controlled for size. One interpretation of such findings is that one form of differentiation may substitute for the other, especially within given size levels (Blau, 1973: 58), even though size shapes both forms. As a result, an inclusive test of Blau's theory with longitudinal data would require examining vertical as well as horizontal differentiation. Unfortunately, no information was available in the *Yearbook* for vertical differentiation or number of levels in the organizational hierarchy of the university sample.

This lack seemed less of a problem for testing Blau's theory with academic organizations than it would have been for a test using another type of organization. Our basic reason for this assertion is that, perhaps for historical reasons, there is little variance and a restricted range in the number of hierarchical levels in academic organizations. Blau's (1973) sample of universities and colleges showed a mean of 4.4 levels (s. d. = 0.7). Blau (1973) argued that most organizations had four levels (in terms of his measure): (1) faculty-chair, (2) chair-dean, (3) dean-vice-president, (4) vice-president-president (1973: 29-30). He noted further that "very few [organizations] have more than five or fewer than three levels" (1973:30). Given the nature of these data, it was not surprising that his test of the theory of structural differentiation (Blau, 1973: 54-56) explained considerably more variance in college and university departmentalization ($R^2 = 0.73$) than in number of hierarchical levels ($R^2 = 0.36$). Thus, although vertical differentiation in academic organi-

zations is associated with size, it does not seem to be their major form of differentiation.

Procedures

The analyses focused on the three basic relationships shown in Figure 1: (1) organizational size predicting size of administration, with differentiation controlled, (2) organizational size predicting differentiation, and (3) differentiation predicting size of administration, with organizational size controlled. When these three relationships are considered as a path model, two regression equations are necessary to examine them: the regression of differentiation on organizational size, and the regression of administration size on organizational size and differentiation.

Blau (1970: 210, 214) initially tested the hypothesis of an economy of scale in administration for the simple bivariate relationship between size and administration and for the direct effect of size on administration with differentiation controlled. The present study considered only the direct effect, as this was the procedure Blau used in his later work (1973) on colleges and universities. Moreover, this procedure is consistent with the equation suggested by Figure 1 when the figure is considered a path diagram.

Within-organization analyses. We computed separate ordinary least squares (OLS) regressions over time for each organization. For each organization, two basic equations were estimated to test the hypothesized within-organization (time series, $t = \text{years}$) relationships:

$$DIFF_t = SIZE_t, \quad (1)$$

$$ADMIN_t = DIFF_t + SIZE_t. \quad (2)$$

OLS estimates were used because examination of the Durbin-Watson statistic showed only a small degree of autocorrelation. Moreover, parameter estimates are usually unbiased even with autocorrelated disturbances (Ostrom, 1978).

Following Ford (1980a), we did not use inferential statistics since the organizations studied were not a random sample, nor were the observation years sampled randomly over organizational life spans. Regressions over the observation years merely describe yearly changes in the characteristics of the observed individual organizations during the time of the study. We considered Blau's theory confirmed or negated on the basis of two criteria, slope direction and magnitude. This procedure is not inherently biased for or against Blau's theory but only reveals whether the observed organizations behaved consistently with the theory from 1975 through 1983. We make no attempt to generalize to all academic organizations or to the entire life spans of the organizations examined.

For two reasons, we transformed all variables to a proportional scale. First, the theory of structural differentiation considers proportional or relative changes in relationships among variables, such as the administrative economy of scale during growth in size. Second, earlier within-organization

¹ $DIFF$ = differentiation; $SIZE$ = organization size; $ADMIN$ = administration size.

studies (Ford, 1980a) have shown the value of using size elasticities to examine the results of proportional changes in size over time. For both independent and dependent variables, we used a logarithmic scale of base 10 to assess the elasticity or responsiveness of a proportional change in one variable to a proportional change in another variable.

Using proportional transformations on both sides of an equation makes a straightforward interpretation possible. A slope of 1 in a regression equation indicates that a change of one percentage point in the independent variable produces a change of one percentage point in the dependent variable. A slope of less than 1 indicates a proportionally smaller change in the dependent variable, and a slope of greater than 1 indicates a proportionally greater change in the dependent variable. For example, a positive slope of less than 1 shows an administrative economy of scale for a growing organization. Such transformations have the additional advantage of showing proportional changes without using potentially suspect ratio variables (Freeman & Kronenfeld, 1973; MacMillan & Daft, 1979). Although many authors, including Blau (1970, 1973), used logarithmic transformations of size in estimating the nonlinear or declining effect of size on untransformed measures of administration and differentiation, theoretical interpretation of regression slopes is more ambiguous with this method than it is when both sides of an equation are measured proportionally.

Growing and declining organizations were analyzed separately, consistent with previous longitudinal investigations (Ford, 1980a; Freeman & Hannan, 1975). An organization was defined as growing if the slope of the regression of organizational size on the yearly observation dates was positive. A negative slope indicated a declining organization. This is essentially the same as comparing the mean size of an organization in the later years of the study with its mean size in the earlier years.

Time lags for administrative changes following changes in organization size vary (Cullen & Baker, 1984; Freeman, 1979). Moreover, researchers in other fields have observed variable lag structures for organizational actions (Assmus, Farley, & Lehmann, 1984). Given these considerations, we examined three lag structures for organizational size in testing Blau's theory: (1) contemporaneous, with organizational size and the dependent variables, differentiation and size of administration, measured over the same years; (2) the one-year lag, with size observed one year earlier than the dependent variables; and (3) the two-year lag, with size observed two years earlier than the dependent variables. The following six equations were computed for each organization:

$$DIFF_{77-83} = SIZE_{77-83} \quad , \quad (3)$$

$$DIFF_{77-83} = SIZE_{76-82} \quad , \quad (4)$$

$$DIFF_{77-83} = SIZE_{75-81} \quad , \quad (5)$$

$$ADMIN_{77-83} = DIFF_{77-83} + SIZE_{77-83} \quad , \quad (6)$$

$$ADMIN_{77-83} = DIFF_{77-83} + SIZE_{76-82} \quad , \quad (7)$$

$$ADMIN_{77-83} = DIFF_{77-83} + SIZE_{75-81} \quad . \quad (8)$$

Because previous research has identified no best lag structure for the effects of organizational size on size of administration (Cullen & Baker, 1984), the within-organization tests of the theory's basic hypotheses reported in this study were based on each organization's best lag model for relationships of administration and differentiation with size. The following criteria were used to determine the best lag models for the relationships of organizational size with size of administration and differentiation. If the R^2 for a size lag (either contemporaneous, one-year, or two-year) was .1 or larger than the other two, we selected that model as the best lag structure for size. If the highest R^2 for any equation was not at least .1 or larger than the other two, we classified the lag structure for organizational size as ambiguous and used the contemporaneous model for analyses. If no variance in the dependent variable was shown, there was no relationship and hence no appropriate lag structure.

Cross-sectional and between-organization longitudinal analyses. The same relationships tested within organizations were tested using cross-sectional models and between-organization longitudinal models. For illustrative purposes, we used 1977 and 1983 data for two cross-sectional tests of the theory of structural differentiation. Between-organization longitudinal models used the same two years as data points for the development of change variables. We chose 1977 and 1983 to facilitate comparisons with the within-organization analyses where variation in administration from 1977 to 1983 represented the final variable in the tests of Blau's theory. Multiple regression equations representing the relationships posited in Figure 1 were used in both types of analyses for 134 organizational subjects.

Variables were the same as those used for the within-organization analyses. However, three different measurement strategies were used to match the measurement approach used in this study's within-organization analyses and measurement procedures found commonly in the literature. First, for both the cross-sectional and between-organization longitudinal analyses, we transformed all variables logarithmically to compare them directly with the within-organization models reported in this study. Second, we used absolute measures of all variables for consistency with previous research that has examined these variables in absolute terms. Third, we used ratio measures of administration size only in the two cross-sectional regressions to achieve consistency with much of the past cross-sectional research including Blau's. The Results section presents more details on these analytical strategies.

RESULTS

Within-Organization Analyses

Of the 134 organizations in the sample, 96 were growing in size and 38 were declining. Table 1 presents a cross-tabulation of the best lag models for organizational size by the two relevant relationships hypothesized in Blau's theory and by growth and decline. No one lag structure was found appropriate for size under conditions of either growth or decline. Separate chi-square

TABLE 1
Percentages of Best Lag Models for Size by Growth and Decline in Size
and by Relationships with Size^a

Direction of Change	Relationships	Best Lag Models ^b				No Variance
		0	1	2	?	
Growth	SIZE → DIFF	19.8 (19)	15.6 (15)	19.8 (19)	37.5 (36)	7.3 (7)
	SIZE → ADMIN	19.8 (19)	10.4 (10)	12.5 (12)	51.1 (49)	6.2 (6)
Decline	SIZE → DIFF	13.2 (5)	26.3 (10)	26.3 (10)	31.6 (12)	2.6 (1)
	SIZE → ADMIN	36.9 (14)	7.8 (3)	21.1 (8)	31.6 (12)	2.6 (1)

^aSeparate chi-square tests were computed as follows: distribution of models by size relationships in growing organizations ($\chi^2 = 4.65, df = 4, p = 0.33$); distribution of models by size relationships in declining organizations ($\chi^2 = 8.25, df = 4, p = 0.08$); distribution of models by growth/decline for the size → differentiation relationship ($\chi^2 = 4.12, df = 4, p = 0.39$); distribution of models by growth/decline for the size → administration relationship ($\chi^2 = 7.67, df = 4, p = 0.10$).

^bAbsolute numbers of organizations are reported in parentheses.

tests on the cross-tabulations of lag models by different relationships within the growth and decline categories and on the cross-tabulations of the same relationships across growth and decline were not significant.

Table 2 shows the distribution of regression slopes for the three relationships hypothesized in the theory of structural differentiation. For relationships in which size was an independent variable, data pertain to the best model, if one existed; data pertain to the contemporaneous model for relationships with ambiguous lag structures for size. Where there was no variance in the dependent variable, there was by definition no support for Blau's theory.

For growing organizations, the theory of structural differentiation hypothesizes absolute increases in size of administration and differentiation that are proportionally less than increases in organizational size. For declining organizations, the theory hypothesizes—albeit implicitly—absolute decreases in size of administration and differentiation that are proportionately less than decreases in organizational size. Since this study computed regression equations separately for all growing or declining organizations and since the slopes of these equations represent the relationships between proportionately transformed variables over time, positive slopes of less than 1 demonstrate support for the theory for either growing or declining organizations.² Positive slopes of less than 1 for regressions of differentiation or administration on growth in organizational size indicate situations where these dependent variables grew more slowly than did organizational size. That is, for such organizations, growth resulted in proportionately less differentiation and fewer administrators. Positive slopes of less than 1 in regression equations for declining organizations indicate situations where administration size or differentiation declined more slowly than did organizational size; decline resulted in proportionately more differentiation and more administrators.

Most organizations had positive slopes in the relationships of size and administration and size and differentiation regardless of whether they grew or declined during the study years. However, the forms of the relationships did not always follow expectations derived from Blau's theory.

The regression of differentiation on increases in size resulted in positive slopes for 56.4 percent of the growing organizations. Positive slopes of less than 1 occurred more frequently (39.6%) than did positive slopes greater than or equal to 1 (16.8%), indicating that increases in differentiation often occurred, as expected, less-than-proportionally to increases in size. For organizations declining in size, positive slopes indicated a reduction in horizontal differentiation for 60.5 percent of the organizations. For these organiza-

² When regressions are estimated between variables over time, neither the direction nor magnitude of the slopes obtained show relationships with time; rather they represent the covariation between the independent and dependent variables. For example, a positive slope for size of administration regressed on organizational size means only that these two variables grow or decline together, regardless of whether organizational size increases or decreases during the time period considered.

TABLE 2
Percentages of Positive and Negative Within-Organization Regression Slopes by Growth and Decline
for Relationships in Model

Direction of Change	Relationships	Slope Distribution ^a				No Variance
		Positive		Negative		
		<1	≥1	<1	≥1	
Growth in size	SIZE → DIFF	39.6 (38)	16.8 (16)	27.0 (26)	9.3 (9)	7.3 (7)
	SIZE → ADMIN	31.3 (30)	17.7 (17)	25.0 (24)	19.7 (19)	6.3 (6)
Decline in size	SIZE → DIFF	50.0 (19)	10.5 (4)	31.5 (12)	5.4 (2)	2.6 (1)
	SIZE → ADMIN	26.4 (10)	13.1 (5)	31.5 (12)	26.4 (10)	2.6 (1)
Growth in differentiation	DIFF → ADMIN	30.2 (28)	18.3 (17)	36.6 (34)	9.6 (9)	5.3 (5)
Decline in differentiation	DIFF → ADMIN	24.4 (10)	17.0 (7)	12.3 (5)	39.0 (16)	7.3 (3)

^aAbsolute numbers of organizations are reported in parentheses.

tions, differentiation changed most often with relatively less magnitude than did size—a finding consistent with Blau's theory. However, in direct contrast to that theory's expectations, approximately 40 percent of the organizations in this study either deleted departments during growth in size (shown by negative slopes), added subunits during decline (also shown by negative slopes), or did not alter their levels of differentiation in either a growth or decline.

Only the 31.3 percent of the growing organizations with administrative staffs that increased less-than-proportionately to their growth in size showed the specific type of economy of scale predicted by the theory of structural differentiation. Blau (1970, 1972, 1973) predicted consistently that increasing size increases the absolute size of an administrative component while reducing its relative size. The 44.7 percent of the growing organizations with negative slopes for regressions of size of administration on organizational size showed gains in administrative economies, but these were through absolute reductions in the sizes of their administrations. Similarly, only 26.4 percent of the declining organizations had positive slopes of less than 1, indicating the expected less-than-proportional reduction in numbers of administrators during decline. The majority of declining organizations (57.9%) had proportionately larger administrative staffs, not because size of administration decreased more slowly than did the decline in size, but because the number of administrators increased absolutely. The negative slopes in Table 2 show this finding.

To better understand the directional effects produced by regressions of size of administration on differentiation, we tested Blau's hypothesis of a positive effect of differentiation on size of administration separately for organizations undergoing growth or decline in differentiation. As with the growth and decline classifications for size, an organization was classified as growing in differentiation if it had a positive regression slope for differentiation on its observation years. A negative slope identified decline. Observation years for differentiation were 1977 through 1983. These years match those used for differentiation when it was a dependent variable regressed on organizational size for the same (1977-83) or earlier years (1976-82 or 1975-81) (Equations 3-5 in the Methods section). The majority (69.4%) of organizations grew in differentiation and the remainder declined. Slightly less than 50 percent of the organizations with growing differentiation had the expected positive relationship between differentiation and administration. In most of these cases, administration grew at a rate proportionately less than the rate at which differentiation grew. The majority of organizations with declining differentiation added proportionately more administrators in spite of decline in number of departments.

Between-Organization Analyses

For comparison with the within-organization analyses reported in the previous section and with previous between-organization research, data from two of the years covered by the within-organization analyses were used to

compute regressions representing relationships posited by the theory of structural differentiation. We conducted separate cross-sectional tests of the theory with 1977 and 1983 data. These same years also provided the data for a test using two points of longitudinal data with a between-organization design. As noted in the Methods section, we used logarithmic transformations, absolute values, and ratio measures of administration to match both previous research and our within-organization analyses. Replication of both methods and measurement of earlier between-organization studies was necessary for at least one major reason: to the extent that this study's between-organization findings are consistent with similar previous studies, they suggest that the data examined here are not unique. If they are not unique, a stronger argument can be made when within-organization analyses produce different results than between-organization analyses that cross-sectional comparisons among organizations do not reflect organizational change.

Cross-sectional analyses. Cross-sectional models supported Blau's theory to a greater degree than within-organization models based on the same data, as Table 3 shows. In two separate years, cross-sectional differences in size had a strong positive relationship with differences in differentiation and with differences in absolute sizes of administrative staffs. Unstandardized slopes for the equations in which size and administration were transformed logarithmically, shown in the column headed *LNADMIN*, demonstrated that proportional differences in size produced proportionately smaller administrative staffs. Although positive, the slopes for *LNADMIN* were less than 1. The negative effects in the two equations of administrative ratios (the ratio of administration size to organizational size) on organizational size also confirmed these findings. The regressions of administration size on the absolute amount of differentiation showed that organizations with more differentiation had more administrators even with size controlled. In addition, there were direct effects of differentiation on the administrative ratio. However, equations with logarithmic transformations indicated that the relationships

TABLE 3
Cross-Sectional Equations for Selected Years^a

Independent Variables	Years	Dependent Variables ^b			
		<i>DIFF</i>	<i>ADMIN</i>	<i>LNADMIN</i>	% <i>ADMIN</i>
<i>SIZE</i> ^c	1977	.70	.27	.71 [.42]	-.39
	1983	.73	.33	.61 [.36]	-.35
<i>DIFF</i> ^d	1977	—	.47	.02 [.02]	-.18
	1983	—	.33	.09 [.07]	-.21

^aStandardized slopes; unstandardized slopes are reported for transformed variables in brackets.

^bRegressions with administration as the dependent variable included both size and differentiation as independent variables.

^cTransformed to base 10 log for the regression of *LNADMIN* on size.

^dTransformed to base 10 log for the regression of *LNADMIN* on differentiation.

between the magnitudes of differentiation and administration were not proportional.

Between-organization analyses with longitudinal data. Table 4 reports eight equations representing two approaches used to study the major relationships posited by the theory of structural differentiation. The analysis employed a between-organization design with the 1977 and 1983 data. In the first approach, variables were transformed logarithmically. These transformed variables bear the prefix LN. The gain scores (e. g., $LNSIZE_{83} - LNSIZE_{77}$) represent proportional differences in the between-organization equations. In the second approach, we used absolute numbers for simple gain scores (e. g., $SIZE_{83} - SIZE_{77}$). As did previous research using gain scores or proportional change scores (Dewar & Hage, 1978), this study controlled for the initial level of the change variable. In addition, for both approaches the dependent variable was lagged so that the only potential variance to be explained was the change in the dependent variable that occurred between 1977 and 1983 (cf. Werts & Linn, 1970).

Naturally, the lagged dependent variable was the largest predictor in all equations. Otherwise, neither the levels nor the changes in the independent variables had appreciable effects on the changes in differentiation or administration.

An examination of the distribution of slopes (Table 2) gives some indication of possible reasons for the lack of effects produced by the change variables (gain scores) in the between-organization longitudinal data equations

TABLE 4
Between-Organization Equations for Growing and Declining Organizations^a

(a) Growing Organizations

(1) $LNDIFF_{83} = .91[.93] LNDIFF_{77} + .09[.07] LNSIZE_{77} - .00[.02] (LNSIZE_{83} - LNSIZE_{77})$

(2) $DIFF_{83} = .80 DIFF_{77} + .18 SIZE_{77} + .05 (SIZE_{83} - SIZE_{77})$

(3) $LNADMIN_{83} = .83[.83] LNADMIN_{77} + .05[.03] LNSIZE_{77} + .03[.07] (LNSIZE_{83} - LNSIZE_{77}) + .03[.02] LNDIFF_{77} + .04[.11] (LNDIFF_{83} - LNDIFF_{77})$

(4) $ADMIN_{83} = .84 ADMIN_{77} + .12 SIZE_{77} + .06 (SIZE_{83} - SIZE_{77}) - .07 DIFF_{77} - .02 (DIFF_{83} - DIFF_{77})$

(b) Declining Organizations

(5) $LNDIFF_{83} = 1.01[1.09]^b LNDIFF_{77} - .07[.05] LNSIZE_{77} + .08[.36] (LNSIZE_{83} - LNSIZE_{77})$

(6) $DIFF_{83} = .98 DIFF_{77} + .02 SIZE_{77} + .06 (SIZE_{83} - SIZE_{77})$

(7) $LNADMIN_{83} = .81[.70] LNADMIN_{77} + .01[.01] LNSIZE_{77} - .11[.32] (LNSIZE_{83} - LNSIZE_{77}) + .04[.03] LNDIFF_{77} + .13[.30] (LNDIFF_{83} - LNDIFF_{77})$

(8) $ADMIN_{83} = .70 ADMIN_{77} + .12 SIZE_{77} - .09 (SIZE_{83} - SIZE_{77}) + .01 DIFF_{77} + .01 DIFF_{77} + .09 (DIFF_{83} - DIFF_{77})$

^aMetric (unstandardized) slopes are shown in brackets. All other slopes are standardized.

^bThe predicted slope fell out of the range of the data largely due to the presence of an outlier and not because of a lack of variance in differentiation. Over 94 percent of the organizations had variance in differentiation over time. The mean change in differentiation between 1977 and 1983 for declining organizations was loss of 2.3 departments.

(Table 4). Table 2 shows that many organizations had relationships that produced regression slopes in directions hypothesized by Blau's theory. Yet there were almost always as many, if not more organizations, that had opposite effects. These results thus cancelled each other out in the overall estimates of change produced by the between-organization longitudinal data. Cross-sectional models that summarize estimates of change for a sample of organizations seem likely to show little or no effects when subsets of a sample show opposite processes of change.

Conditional Relationships in Blau's Theory

The divergent types of change shown by the within-organization analyses suggested that a search for moderating effects (conditional relationships) might be useful to specify further the conditions under which the theory of structural differentiation had more or less support. Exploratory analyses investigated the theory's basic relationships for growing and declining organizations that were (1) under either public or private control, (2) large or small, and (3) rapidly or slowly growing. In general, results did not show moderating effects except to suggest somewhat greater support for Blau's theory under conditions of rapid growth. The sample size was not big enough to analyze the distribution of slopes across these classifications, however.

DISCUSSION

In general, cross-sectional relationships were consistent with previous research and supported the theory of structural differentiation. Longitudinal analyses failed to support the theory. A detailed consideration of the within-organization findings suggests some possible reasons for this lack of convergence.

The major advantage of studying change using within-organization models rather than between-organization models is that the within-organization models show the processes of structural change in detail. This level of detail allowed us to examine hypotheses derived from the theory of structural differentiation concerning growth and decline. These hypotheses were not stated directly in the original theory, but are implicit if Blau's theory applies to change in general. The advantage of analyzing subtleties of relationships became particularly apparent when we considered the forms of relationships with growth and decline in both size and differentiation.

A reduction in differentiation was expected with a decline in size. This occurred in over 60 percent of the universities. However, in a few it happened proportionately slower than their declines, and some even added subunits during reductions in size. We expected administrative diseconomies with declines in size. This occurred for some universities (39.5%) through either greater or less-than-proportional reductions in administrative staff. However, many more added administrators during declines, perhaps to reform their organizations and stem the loss of students. Assuming that less differenti-

ation would reduce the need for coordination and control and hence reduce the need for administrative staff, we anticipated that declining differentiation would lead to decline in administration size. Again contrary to our expectations, over 50 percent of the organizations added administrators when their levels of differentiation were reduced. Essentially, Blau's theory was not a good predictor of the changes that occurred among structural characteristics during declines of size for these organizations.

For universities growing in size, neither differentiation nor size of administration behaved in line with Blau's theory. Only a few increased differentiation and administrative size by less-than-proportional amounts. Many actually eliminated departments and administrators as a reaction to increases in size. Growth in differentiation, however, did lead to the expected increase in administrative staff for a majority of the organizations studied.

The within-organization findings for administration also gave some indication about how cross-sectional differences may appear through processes unanticipated by Blau. Cross-sectional analyses have often found negative relationships between organizational size and relative size of administrative staffs. The theory of structural differentiation explains this finding as an economy of scale produced by less-than-proportional additions of administrators in growing organizations. However, within-organization analyses suggested that these differences arise over time through processes not considered by the theory of structural differentiation. The organizations studied here often eliminated administrators during growth and added them during decline. Both processes will result in larger organizations having proportionately smaller administrative staffs, even though this result need not come about through the less-than-proportional administrative growth that is a major theoretical point of Blau's theory. This illustrates at least one situation in which the results predicted by the theory can exist even when its explanation of processes is incorrect. We observed somewhat similar processes for the relationships of size and differentiation.

The findings for the within-organization analyses also raised an issue ignored by Blau's theory. Using three time lags for organizational size, we found no dominant lag structure for the regressions of size of administration and differentiation on organizational size. It appeared that organizations responded with varying degrees of speed to structural change. Distributed lag models with several lags of size and differentiation included in the model simultaneously (Kmenta, 1971) may clarify patterns of response. It is also possible that lag structures for individual organizations are moderated by factors not considered by the theory of structural differentiation.

Although these findings were derived from a homogeneous population, additional analyses not reported indicated that the findings are generalizable to all colleges and universities. An earlier phase of this research project—using a random sample of colleges and universities, a more inclusive measure of administrative size, and enrollment as the measure of organization size—produced similar findings.

CONCLUSIONS

A comparison of the findings for the cross-sectional analyses and the between- and within-organization longitudinal models suggests that the theory of structural differentiation offers better explanations of scale than of change. That is, the theory better explains differences in scale among organizations than it explains how individual organizations change. Cross-sectional regression equations showed strong support for most aspects of Blau's theory, but both between- and within-organization longitudinal models suggested little support for it. Additionally, although within-organization analyses demonstrated that the vast majority of the organizations did change over time, the patterns of change diverged from those predicted by Blau's theory. In essence, we conclude that these data fail to support the theory of structural differentiation as a theory of change. They suggest instead that it be considered a theory of scale.

One explanation of why Blau's theory can account for differences among organizations but not for changes within organizations may lie within the theory itself. Several of its propositions state that increasing size has a declining effect on other variables—for example, on the administrative economy of scale. Given these propositions, it would seem that most organizations would reach a point where the declining effects of size would become negligible after a sufficient period of growth. As a result, differences in scale would remain among organizations after they grew to some absolute level of size, but future change would have little effect. In a sense, there would exist a threshold; at a given level of size, organizations would develop certain characteristics. Under such conditions, cross-sectional tests would confirm Blau's theory if most organizations observed had histories of growth—a likely situation for most cross-sectional studies because organizations with histories of decline are not likely to have survived at the same rates as growing organizations. Population ecologists might also see other factors as determining cross-sectional differences among organizations. Such factors as norms of organizational structuring at the time of founding and size at birth would account for differences among organizations that do not result from later organizational change. Thus, we suspect that the temporal wording of Blau's theory is misleading. It appears that reaching a certain magnitude or level of size, not changes per se, leads to marginal effects on differentiation and administrative economies. The data comparing the three basic approaches to the study of the theory of structural differentiation seem to support this contention.

The theory implies rational organizational behavior by managers responding to growth or to differences in scale among organizations: Increasing differentiation in response to increasing size presumably takes advantage of the benefits of specialization. More administrators are then necessary to supervise more subunits and to manage the increasingly complex integration of the units. Differentiation aside, increased size alone increases problems of coordination and control and in turn produces a need for a bigger adminis-

trative staff. However, once basic administrative functions are in place, organizations only need to add staff marginally and thus achieve administrative economies of scale.

Although our findings indicated that Blau's theory did not explain the relationships observed, these relationships may have resulted from decision making equally as rational as that theory presumes. Adding administrators during a decline phase could be an attempt to offset decline with more administrative expertise. Declining universities might for example need more effort put into student recruitment and alumni solicitation. In addition, reduced departmentalization and resultant elimination of some department chairpeople necessitate new high-level administrators to perform administrative tasks formerly done within departments. Through reducing administrative overhead and numbers of departments, many growing organizations in our research sample were even more economical than anticipated. This high level of economy may be a reaction to the environmental changes of the 1970s. Inflationary pressures and the knowledge that many colleges and universities were declining might have inspired organizational decision makers to shape lean organizations ready to deal with actual and potential losses of resources. However, although changes in size alone do not increase organizational fragmentation or need for administrators, the logistics of managing more subunits does have its expected effect on need for administrators.

Rational explanations for why the majority of organizations studied did not follow the processes of change implied by Blau's theory are essentially hypotheses of moderating or contingent relationships. Our results bring to mind earlier studies challenging the appropriateness of one model of bureaucracy, such as the Weberian, for all situations (e. g., Stinchcombe, 1959). Rational reactions, in terms of administrative needs, to changing organizational size and differentiation may be consistent with the theory of structural differentiation under some conditions, but equally rational reactions may fail to support the theory under other conditions. Our brief exploration of moderating effects suggested that rapid growth leads organizations to behave in a manner congruent with Blau's theory. These organizations may be approaching the levels of size and differentiation that produce the associations with each other and with size of administration observed with cross-sectional data and hypothesized by his theory.

Of course, rational behavior does not completely govern organizations, nor do organizational decision makers accurately perceive their environments in all conditions (Astley & Van de Ven, 1983). Misperceptions of an environment (Rubin, 1979), historical traditions (Clark, 1972), and internal and external political behavior (Pfeffer & Salancik, 1978) are all possible moderating or intervening variables that could alter the relationships hypothesized by Blau for size, differentiation, and administration. In organizations that are in decline or experiencing scarcity of resources, power rather than reason may have more influence on decisions regarding retention of administrators or the elimination of departments (Ford, 1980b; Hannan & Freeman, 1978; Pfeffer & Salancik, 1974).

Although the data examined here did not support Blau's hypotheses when applied to changes within organizations, future replications of this research will be necessary for a more conclusive refutation of the theory of structural differentiation as a theory of change. The general lack of strong support for the theory shown by the within-organization analyses may indicate that longer lag periods should be investigated. However, as a theory derived from cross-sectional data, Blau's theory fails to suggest appropriate lag structures. Thus, for future tests of this theory as a theory of change, researchers and theorists must specify the time frame in which they expect effects of changing size and differentiation to become manifest. Without such specification, it can always be claimed that an insufficient lag period was observed. This study suggests that for many organizations any effects of changes in size may occur, if at all, over the course of more than two years.

This investigation was limited in focus and generalizability. We studied only the three major relationships hypothesized by the theory of structural differentiation and used only one type of organization. The within-organization analyses did not consider the theory's hypotheses concerning span of control, homogeneity and average size of subunits, vertical differentiation, and feedback effects. As such, future within-organization research is needed to assess more fully the theory's implications for change. In addition, since the results of this study pertain only to universities, future researchers should consider using other types of organizations. Such investigators might give special concern to vertical differentiation because academic organizations have limited variance on this variable. Attention might also be given to identifying organizational types with varied career options. Managers and administrators of nonacademic organizations, not having the typical academics' option of returning to tenured teaching positions, might well behave unlike the academic administrators observed in this study—especially during decline.

Finally, in more general terms, it should be noted that the lack of congruence between cross-sectional and longitudinal findings for Blau's theory does not indicate that one type of research design is preferable, nor does it indicate that theories of scale are less worthy of concern. Rather, these findings highlight the need to develop theories of organizational structure that consider both magnitude of scale and degree of change in the variables of interest. Empirical tests of such theories will necessarily make comparisons between organizations as well as observe changes within organizations.

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