

THE ADOPTION OF THE MULTIDIVISIONAL FORM OF ORGANIZATION: A CONTINGENCY MODEL*

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ABSTRACT

This article examines the proposition that the multidivisional structure is determined by both power and efficiency imperatives. It is theorized that combining the coalitional power and information-processing perspectives of organizational choice enables us to explain and predict organizational form. The theory is tested on 291 Fortune 500 firms. The results largely confirm theoretical expectations. It is submitted that the multidivisional paradigm illustrates the central premises of the article: (1) a synthesis of efficiency and power perspectives is a viable research programme; and (2) theoretical pluralism increases empirical content and should be valued by those concerned with progress in the emerging field of strategic management.

INTRODUCTION

The decentralized multidivisional form of corporate organization may well have been 'American capitalism's most important single innovation of the twentieth century' (Williamson, 1971, p. 382). A stream of research in strategic management has considered the adoption of the multidivisional (M-form) as an adaptive response to the problems of bounded rationality (March and Simon, 1958; Simon, 1976). An information-processing imperative, and opportunism of organizational members (Anderson, 1988) where control and auditing systems are inadequate to mitigate the agency problem of the separation of ownership and control (Berle and Means, 1932; Williamson, 1975) necessitate an organizational response.

A second stream of research has considered organizational decisions from a coalitional power perspective (Cyert and March, 1963; Pfeffer, 1982; Pfeffer and Salancik, 1978). While many researchers advocate combining the efficiency and power frameworks (Goldberg, 1980; Jemison, 1981; Lindblom, 1977; Ulrich and Barney, 1984) there has been little empirical work (with the notable exception of Palmer *et al.*, 1987) that combines these theoretical perspectives.

From the efficiency perspective, the M-form has an information-processing advantage relative to the large functional enterprise (Ansoff and Brandenburg, 1971; Egelhoff, 1982). In the functional organization, the major sub-units deal with business functions such as engineering, production and sales.

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General management occurs solely at the topmost level and the co-ordination of the functional sub-units is one of its important responsibilities (Chandler, 1956; Hill and Jones, 1989; Rumelt, 1974). In contrast, the top-level managers of the multidivisional form are not involved with routine functional activities within these units. Due to the comprehensive nature of the functional manager's role, the functional form is subject to cumulative control loss and a transformation of strategic formulation (Mintzberg, 1979). Loss of control results from serial reproduction loss as fragmentary or erroneous information moves up, and instructions are inadequately operationalized as they move down the hierarchy (Williamson, 1971). In addition, lower-level managers may intentionally falsify information to their advantage (Williamson, 1970).

Strategy formulation may be altered as expansion of the functional form ultimately overwhelms the ability of the top-level managers to provide corporate planning decisions and daily co-ordination of operations (Galbraith and Nathanson, 1978; Mintzberg, 1979). The M-form is viewed from the efficiency perspective as in institutional response to problems of interdependence, subgoal pursuit and confounding of strategic and operating decisions (Williamson, 1980).

In addition to efficiency explanations for the emergence of the multidivisional organization, an explanation based on the power of coalitions in the organization has been proposed (Cyert and March, 1963). The organization is viewed as a coalition of interests and groups each attempting to obtain something from the collectivity and each with its own objectives and preferences (Pfeffer and Salancik, 1978). Coalitions within the organization are engaged in an ongoing competition for scarce resources. Palmer *et al.* (1987) argue that the conflict between top management and two types of external ownership interests, family and financial institutions, may influence organizational choice.

Ultimately, the usefulness of these perspectives must be determined empirically. This article maintains the general view that theoretical pluralism is a legitimate methodology which increases empirical content. This view is gaining momentum in philosophy (Goodman, 1978; Rorty, 1989), in economics (Boland, 1982; Caldwell, 1982; McCloskey, 1985) and in strategy research (Bourgeois, 1984; Bowman, 1990; Huff, 1981; Jemison, 1981; Jick, 1979). As Allison (1971) so convincingly demonstrated, there is much to be gained by taking diverse theoretical perspectives as alternative conceptual lenses that may well lead to different inferences from the same data. If facts are determined by theory, then theoretical pluralism is best seen as a method of widening one's theoretical framework as empirical materials are interpreted (Denzin, 1989). Specifically, I suggest that the multidivisional form of organization may be best understood by incorporating economic, administrative and power perspectives (Bettis and Prahalad, 1983; Dale, 1952; Greenwood, 1974; Khandwalla, 1977).

THE RESEARCH MODEL: A CONTINGENCY MODEL OF THE M-FORM

The multidivisional model, depicted in Figure 1, is a contingency model for predicting the likelihood of the adoption of the multidivisional form of

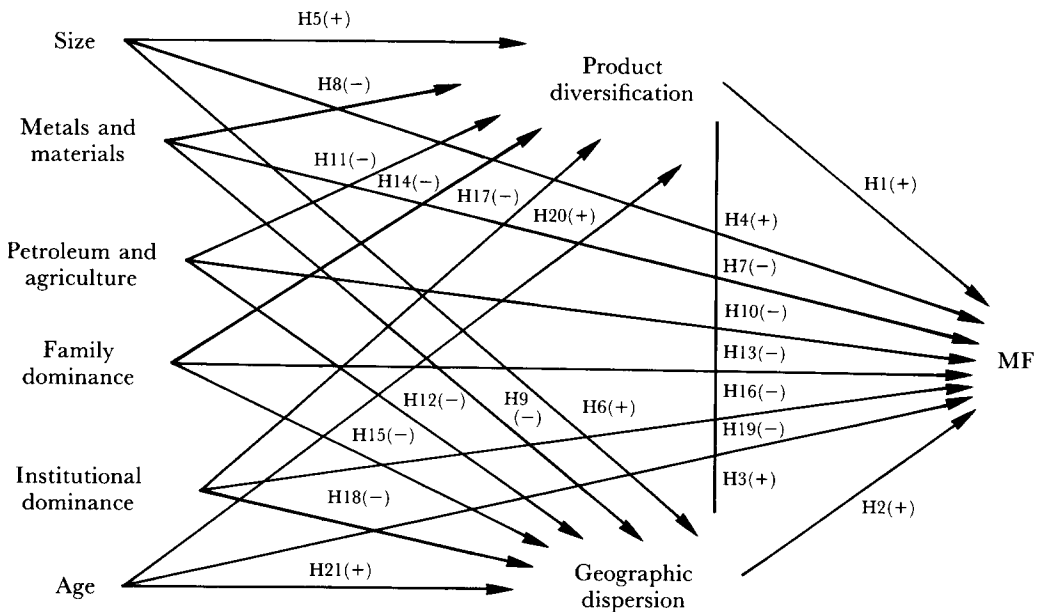


Figure 1. A path model of the determinants of the multidivisional form

organization. In the model, I analyse the effects of firm size, firm strategy (diversification), environmental uncertainty and coalitional power on organizational choice, as suggested by Palmer *et al.* (1987). I posit that management has some discretion in the choice of organizational form (Allen, 1979; Child, 1972).

A well-grounded theoretical perspective is that structure follows strategy (Chandler, 1962) and that in particular the multidivisional structure follows the strategy of diversification (Channon, 1973; Chenhall, 1984; Didrichsen, 1972; Dyas and Thanheiser, 1976; Pavan, 1976; Rumelt, 1974; Suzuki, 1980). The strategy of diversification – whether motivated by a resource-based imperative (Penrose, 1959; Rubin, 1973; Wernerfelt, 1984); to obtain technological capability (Nelson and Winter, 1982; Teece, 1982); for financial reasons (Bowman, 1980; Dundas and Richardson, 1982; Jensen and Ruback, 1983; Song, 1983), for managerial reasons (Amihud and Lev, 1981; Mueller, 1969); to achieve synergies (Ansoff, 1965; Baumol *et al.*, 1982); to reduce dependencies (Pfeffer and Salancik, 1978); to reduce transactions costs (Williamson, 1985); to utilize slack capacity (Chandler, 1977); or to increase market power (Scherer, 1980) – leads to problems of accountability, control, and co-ordination (Fouraker and Stopford, 1968; Franko, 1974; Pitts, 1977; Zannetos, 1965).

A diversity of product lines tends to overload the decision process of centralized organizations (Galbraith, 1977; Galbraith and Kazanjian, 1986; Vancil, 1978). The reorganization from the functional to the M-form minimizes information overload problems. The M-form of organization is characterized by the division of firms into quasi-firms. Each quasi-firm is responsible for a given product or geographic area and has its own sales, finance,

purchasing and manufacturing decisions; each is therefore self-sufficient (Hennart, 1982). The M-form structure constitutes a near-decomposable system to mitigate bounded rationality constraints (Simon, 1962). The total system of decisions is factored into 'loosely coupled' subsystems (Orton and Weick, 1990; Weick, 1976).

An ideal multidivisional form involves the following: (1) identification of separate economic activities and in particular a separation of strategic and operating functions; (2) constructing quasi-autonomous divisions where profitability is observable and measurable; (3) monitoring the efficiency of each division by a specialized corporate staff; (4) awarding incentives to promote profit-seeking behaviour; (5) allocating cash flows to high yield uses; (6) performing strategic planning (Hill and Hoskisson, 1987; Williamson, 1975). Arguably, the most important functions of the M-form are the creation of its own miniature capital market to achieve an efficient allocation of capital (Heflebower, 1960; Jones and Hill, 1988; Williamson, 1981), and the attenuation of bounded rationality and opportunistic behaviour (Williamson, 1985).

The multidivisional form may also mitigate the agency problem of the separation of ownership from control (Berle and Means, 1932) since internal auditing and control systems installed by the M-form overcome problems of asymmetric information. Several studies support the M-form hypothesis that multidivisionals, by lessening the problem of asymmetric information between corporate, business, and functional units, increase profitability (Armour and Teece, 1978; Burton and Obel, 1980, 1988; Hill, 1985; Hoskisson and Galbraith, 1985; Steer and Cable, 1978; Teece, 1981; Thompson, 1981). However, a few studies do not support the M-form hypothesis (Cable and Dirrheimer, 1983; Cable and Yosuki, 1985; Harris, 1983), while others suggest a contingency theory for the advantages of the M-form (Hill, 1988a; Hill, 1988b; Hill and Pickering, 1986; Hoskisson, 1987).

Hoskisson and Hitt (1988) suggest that even on theoretical grounds, the M-form does not completely solve the agency problem as the highly diversified multidivisional leads to a focus on short-term profitability (Hayes and Abernathy, 1980; Loescher, 1984). This latter group of studies questions whether the multidivisional is an unequivocally superior organizational form. If the contingency paradigm is correct (Galbraith, 1973; Thompson, 1967) then the M-form needs to be linked with the interactive effects of efficiency and power variables in predicting (and prescribing) organizational form.

Efficiency Perspective

From the Chandler–Williamson efficiency perspective, I consider a structural equation model (Palmer *et al.*, 1987) to examine whether diversification increases the likelihood of the adoption of the M-form (*H1*). Also, geographic dispersion is expected to increase co-ordination and control problems, and consequently is predicted to increase the likelihood of the adoption of the M-form (Chandler, 1962) (*H2*). Grinyer *et al.* (1980) found this relationship positive and statistically significant. A model which tests the separate effects of diversification and geographic dispersion on organizational form must also take into account the impact of an increase in diversification increasing the geographic dispersion of the enterprise (*H3*).

The generalizations of diversity–structure linkages must be qualified by consideration of size. Self-contained product divisions may be too small to have their own marketing, research, or production department. Williamson (1975) argues that increased size leads to the possibility of control loss within the centralized organization and is an important variable in determining organizational form. In contrast to Williamson's theoretical perspective, Stopford and Wells (1972) argue that absolute size by itself does not have a direct relationship with (divisionalized) structure, that it is diversity that induces divisionalization. Thus, the model needs to test the hypothesis that increased size induces the adoption of the M-form structure (*H4*) or whether an increase in size (capacity) leads to an increase in diversity (*H5*) and/or geographic dispersion (*H6*) which result in the M-form (Donaldson, 1982, 1986, 1987). Grinyer and Yasai-Ardekani (1981) found that size exerts a direct causal influence towards adopting the M-form. However, Donaldson (1982) found that the association between size and the use of the M-form disappeared when industrial diversity is controlled in partial correlations. In both Donaldson's study and our sample, only Fortune 500 firms are considered so that the importance of size may be underestimated.

A major impediment to divisionalization is the existence of a common technical system that cannot be segmented. Chandler (1962) asserts a technological rationale for determining in which industries one may find diversification and ultimately the multidivisional form. Chandler (1962) found that industries that did not accept the M-form structure were: (a) copper and nickel; (b) steel; (c) aluminum; and (d) materials (firms in these industries we shall designate as METMAT). Industries that only partially accepted the M-form were: (a) petroleum companies; (b) processors of agricultural products (PETAGR). Industries that widely accepted the M-form: (a) electrical and electronics; (b) power machinery and automobiles; (c) chemicals (ELMACHEM).

An aluminum producer, despite large sales, a diversity of customers and a variety of end products, may be forced to retain a functional structure due to interdependence (Jones and Hill, 1988) and because it can only afford one smelter. Thus, it is not surprising to find that the aluminum, copper, nickel and steel industries have been among those which have been late to adopt the M-form (Chandler, 1962). Technologies with low product applications (steel, metal industries) imply that the M-form will not be adopted (*H7*) (Burton and Obel, 1980) and that diversification and geographic dispersion will be low (*H8* and *H9*). Conversely, technologies with an abundance of product applications (electronics, chemicals, power machinery) imply diversification and consequently the likelihood of the adoption of the M-form is expected to be much higher than those industries with moderate product applications, such as petroleum and agricultural firms (Chandler, 1962). Thus, it is predicted that the petroleum and agricultural firms will also experience low adoption of the M-form (*H10*) as well as low diversification (*H11*) and low geographic dispersion (*H12*).

It should be noted that, in addition to the technological rationale, Chandler also suggests that firms that follow the strategy of vertical integration are less likely to adopt the M-form. This strategy is pervasive in the cases of metal and

petroleum firms. Whether technology or strategy is the dominant force in these cases is an identification problem which is still open for empirical testing.

Coalitional Power Perspective

In addition to the economic explanations for the emergence of the multidivisional form, an explanation based on the power of coalitions in the organization has been articulated by Cyert and March (1963) and by Pfeffer and Salancik (1978). A conflict may develop between top management and two types of external ownership interests (families and financial institutions) which influence organizational choice. In particular the structural equation model tested in this study, considers whether family-dominated firms prefer centralized control of operations and have a direct negative effect on the likelihood that firms choose the M-form (*H13*). Also, it is hypothesized that family-dominated firms may not diversify (because it would dilute their ownership and control over the firm) (*H14*). Similarly, family-dominated firms may have low geographic dispersion since it may threaten their influence (*H15*). Several case studies have observed that family-dominated firms do not adopt the M-form (Chandler, 1962; Channon, 1973; Pavan, 1976). Furthermore, Channon (1973) found that family-controlled companies proved to be less diversified than non-family-controlled companies.

Palmer *et al.* (1987) hypothesized that institutionally-dominated firms (defined below) will be slow to adopt the M-form because the M-form threatens the demand for the economy-wide investment information and expertise of financial institutions. Since these financial institutions are in competition with the large multidivisional ('a mini-bank'), the hypothesis is that institutionally-dominated firms will imply a direct negative effect on the M-form (*H16*). Also, it is predicted that institutionally-dominated firms are less diversified (*H17*) and less geographically dispersed (*H18*), and that these indirect effects will also lead to a lower likelihood of the adoption of the M-form (Palmer *et al.*, 1987, pp. 30–1).

Finally, concerning life-cycles of the organization, I test whether older firms, due to structural inertia, have a direct negative effect on the adoption of the M-form (Fligstein, 1985; Hannan and Freeman, 1984) (*H19*). On the other hand, older firms may be larger and may pursue diversity (*H20*) and geographic dispersion (*H21*) which would lead to an indirect positive effect on the choice of the M-form (Chenhall, 1984).

METHOD

A sample of 325 of the 500 largest US industrials in 1965 was selected and I classified the enterprise along functional or multidivisional lines, using the guidelines of Williamson and Bhargava (1972). Missing data reduced the sample to 291 in all analyses. The year 1965 was chosen because there were still a significant number of functional (F-form) organizations remaining in the Fortune 500. Between 1966–71, many of the remaining F-form structures

became M-form organizations (Bhargava, 1982; Hoskisson, 1987). This surge in the diffusion process warrants closer scrutiny (Mahajan *et al.*, 1988; Teece, 1980).

In the sample 194 firms (2/3) were classified as multidivisional and 97 firms (1/3) were classified as functional. What I refer to in this article as the multidivisional form of organization is, of course, a diverse family of institutions consisting of several distinct types (Allen, 1978; Berg, 1965; Pitts, 1977; Williamson, 1975). I ignore these distinctions (which are difficult to measure) because I am interested in modelling the adoption of the multidivisional structure, not in the factors that influence the implementation of various types of multidivisional forms (Hill and Pickering, 1986). Seven previous works were used to validate the classifications (Armour and Teece, 1978; Bhargava, 1972; Chandler, 1962; Harris, 1983; Palmer *et al.* (1987); Rumelt, 1974; Teece, 1981).

Of the 291 firms in the sample, 139 were classified by Palmer *et al.* (1987) and 12 of the 139 (8.6 per cent) were inconsistent with my classification. Of the 291 firms, 173 were classified by Rumelt (1974) and 10 of the 173 (5.8 per cent) were inconsistent with my classification. Consistency of classification of organizational form made independently by several researchers increases validity and replicability (Montgomery, 1982).

Geographic dispersion is measured by three proxies: (1) the number of geographically separate (non-adjacent) plants; (2) the number of cities in which the firm's plants operated; (3) the number of states in which the firm's plants operated. Data on the location of each corporation's plants and on the industries in which they produced were obtained from the Fortune 500 Plant and Product Directory (1966).

Due to the large sample size, I chose to utilize SIC-based measures of diversification, rather than Rumelt's classification scheme. Montgomery (1982) found that the 2-digit, 3-digit, and with one exception at the 4-digit level, SIC-based measures of diversification (such as the Berry–Herfindahl index) increase consistently with the strategy categories. Thus, there is a high degree of correspondence between the continuous and categorical measures. Montgomery noted that the Berry–Herfindahl measure is particularly well suited for large sample cross-sectional analysis. Diversification indices are simple, easy to compute, objective and replicable.

Several SIC measures have been articulated in the literature. The proxy used by Palmer *et al.* (1987) was a product count measure. The analyses here will consider both product count (Gort, 1962; Rhoades, 1973) and Berry (1975) measures of diversification.

A drawback of the product count measure is that undue weight is given to minor activities and the SIC classifications are somewhat arbitrary. Merely counting product lines exaggerates the overall significance of diversification since most firm's product volume distributions are highly skewed, with a few product lines accounting for the bulk of sales or employment while numerous other lines are relatively small. A firm with 99 per cent of its output accounted for by a single 4-digit product is not diversified, regardless of the number of 3-digit industries represented by the remaining 1 per cent. On the other hand, a

firm with its productive activity equally divided among four 3-digit industries is likely to be 'diversified', even if no more than four 4-digit products are involved.

To correct for this drawback of the product count measure, I also use the Berry index which corresponds to the Hirschman–Herfindahl index:

$$B = 1 - \sum_{i=1}^N (P_i)^2$$

where P_i = ratio of the firm's output in the i^{th} industry to the total output. This measure of diversification considers not only the *number* of industries in which a firm is active, but also the distribution of the firm's production activity among those industries.

The Berry index takes on a value of 0 for a specialized firm acting in a single industry and approaches unity when a firm produced equally in a large number of industries = $(1 - 1/N)$, where N = number of industries in which it is active. The index is comparatively insensitive to minor secondary activities. The empirical analysis considers the Berry–Herfindahl index across 2-digits, 3-digits and 4-digits. The average Berry index for 1965 across 2-digits for my 291 firm sample was 0.406, the average across 4-digits was 0.679.

The size of the sample firms is measured by four alternative proxies: (1) sales; (2) assets; (3) invested capital; and (4) employees. Corporate age is measured by the number of years (in decades) between 1965 and the year the firm was incorporated. The year of incorporation was obtained from *Moody's Handbook of Common Stocks*. The primary industry in which each firm produced was obtained from the US Bureau of the Census (1977).

Burch's (1972) study of the largest 500 US industrial corporations in 1966 was used to measure dominance by family coalition. Three categories suggested by McEachern (1975) were used:

'Free of family influence' – if no identifiable group of related people owned more than 4 per cent of their stock;

'Family owned' (FOWN = 1) – if more than 4 per cent of their stock was owned by a group of related people, none of whom were inside board members, otherwise FOWN = 0;

'Family owned and controlled' (FOAC = 1) – if more than 4 per cent of their stock was owned by a group of related people, at least one of whom was an inside board member, otherwise FOAC = 0.

The US Congress House Committee publication on Banking and Currency, Pattman Subcommittee on Domestic Finance (1968) was used to measure dominance by bank coalition. This volume lists the amount of stock and number of board seats which 49 large financial institutions held in the largest 500 US industrial corporations in 1966:

If no bank or combination of banks owned at least 5 per cent of a firm's stock, it was considered 'free of bank influence';

If more than 5 per cent of a firm's stock was owned by a bank or group of banks, but none of the board seats were held by representatives of these institutions, the firm was considered 'bank owned' (IOWN = 1; 0 otherwise);

If more than 5 per cent of a firm's outstanding common and preferred stock (with partial or full voting rights) was owned by a bank or group of banks and one or more of its board seats was held by a representative of this bank or group of banks, the firm was considered 'bank owned and controlled' (IOAC = 1; 0 otherwise).

Although there are advantages in using a continuous measure of ownership structure (Hill and Snell, 1989), this study maintains these cut-off levels in order to provide a comparable analysis to the Palmer *et al.* (1987) study.

A summary of the variables used in the study is given in table I. Table II gives details of the means, standard deviations, and correlations for all the variables. There is no apparent problem of multicollinearity, and the correlations give strong indications that the hypotheses generated earlier are on target.

A TEST OF THE MULTIDIVISIONAL THEORY

The structural-equation model, depicted in figure 1 and elaborated below, requires that we make assumptions about causality. Estimation of the model permits evaluation of the magnitude of the relationships specified, but does not allow evaluation of the premises upon which the specification is based. Assumptions about which variables cause other variables can only be evalu-

Table I. Summary of variables used in regressions presented

<i>Variable</i>	<i>Description</i>
MF	= 1 if firm is multidivisional = 0 if functional
LNST	Natural log of the number of states where the enterprise had plants (*)
BDIV4	Berry-Herfindahl 4-digit measure of diversification (**)
LNEMPL	Natural log of the number of employees of the enterprise (***)
METMAT	= 1 if enterprise's primary industry is in metals or materials = 0 otherwise
PETAGR	= 1 if enterprise's primary industry is in petroleum or agriculture = 0 otherwise
FOWN	Family-owned
FOAC	Family-owned and controlled (Defined in Methods section)
IOWN	Institutionally-dominated firm
IOAC	Institutionally-owned and controlled (Defined in Methods section)
AGE	(1965- Year of incorporation)/10

* = two other measures of geographic dispersion used.

** = six other diversification measures used

*** = three other size measures used.

Table II. Means, standard deviations and correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1 MF	0.67	0.47										
2 LNST	2.18	0.81	0.39									
3 BDIV4	0.68	0.24	0.42	0.41								
4 LNEMPL	9.83	0.97	0.32	0.39	0.31							
5 METMAT	0.15	0.35	-0.12	0.01	-0.06	-0.04						
6 PETAGR	0.22	0.41	-0.25	0.10	-0.32	-0.16	-0.22					
7 AGE	5.78	2.26	0.06	0.19	0.18	0.21	0.04	0.05				
8 FOWN	0.09	0.29	-0.09	0.05	-0.11	0.03	0.08	0.01	-0.02			
9 FOAC	0.43	0.50	-0.25	-0.15	-0.09	-0.23	-0.01	0.06	-0.02	-0.28		
10 IOWN	0.09	0.28	-0.11	-0.03	0.01	0.02	-0.03	0.03	-0.06	0.05	0.10	
11 IOAC	0.12	0.35	-0.06	-0.09	0.01	0.09	0.08	-0.05	0.01	-0.07	-0.01	-0.13

Pearson product-moment correlations are used when both variables are continuous. Spearman rank-order correlations are used when at least one variable is categorical.

ated by analysis of longitudinal data, which I do not have, or by disputation which constitutes the substance of the theoretical discussion above. I submit that the structural-equation model is well grounded due to the theoretical and empirical contributions of the many authors cited above.

Hypotheses were tested by estimating a system of structural equations:

- (1) $MF = f [LNST, BDIV4, LNE MPL, METMAT, PETAGR, AGE, FOWN, FOAC, IOWN, IOAC]$
- (2) $LNST = f [BDIV4, LNE MPL, METMAT, PETAGR, AGE, FOWN, FOAC, IOWN, IOAC]$
- (3) $BDIV4 = f [LNE MPL, METMAT, PETAGR, AGE, FOWN, FOAC, IOWN, IOAC]$

(See table I for variable definitions)

The second and third equations are estimated using ordinary-least squares linear regression (tables III and IV). Because of the binary dependent variable ($MF = 0$, or $MF = 1$), the logistic response function is used to represent the impact of the effects on the probability of becoming multidivisional in the first equation (table V). The logit model allows the use of categorical or discrete variables for both dependent and independent variables (Aldrich and Nelson, 1984; Amemiya, 1981; McFadden, 1974). Since the model contains qualitative independent variables, logistic regression is chosen over discriminant analysis (Press and Wilson, 1978). Also, the coefficient divided by its standard error is asymptotically interpretable as a t -statistic (Domencich and McFadden, 1975).

The effect of the variables on the choice of organizational form is expressed in two ways: (1) as increments in the log odds that firms use the multidivisional form (logits); and (2) the probabilities evaluated at the sample mean that

Table III.

<i>OLS regression Variable name</i>	<i>Dependent variable: LNST</i>		<i>T Ratio</i>
	<i>Estimated coefficient</i>		
	<i>Model A</i>	<i>Model B</i>	
BDIV4	1.329	0.393	7.28***
LNE MPL	0.262	0.311	5.74***
METMAT	0.180	0.222	1.55
PETAGR	0.543	0.668	5.22***
AGE	0.015	0.042	0.84
FOWN	0.240	0.296	1.64
FOAC	-0.093	-0.114	-1.08
IOWN	-0.143	-0.177	-1.24
IOAC	-0.365	-0.448	-2.59**
Constant	-1.454	-0.088	

F value 16.2

$R^2 = 0.342$; * = ($P < 0.10$); ** = ($P < 0.05$); *** = ($P < 0.01$).

Table IV.

OLS regression Variable name	Dependent variable: <i>BDIV4</i>		T Ratio
	Estimated coefficient		
	Model A	Model B	
LNEMPL	0.056	0.225	3.87***
METMAT	-0.067	-0.228	-1.77
PETAGR	-0.157	-0.650	-4.80***
AGE	0.015	0.138	2.50***
FOWN	-0.106	-0.438	-2.23**
FOAC	-0.022	-0.093	-0.80
IOWN	0.026	0.108	0.69
IOAC	-0.008	-0.034	-0.18
Constant	0.103	0.247	

F value 8.67

$R^2 = 0.198$; * = ($P < 0.10$); ** = ($P < 0.05$); *** = ($P < 0.01$).

firms adopt the M-form, ΔP s (Petersen, 1985). This logit equation and the two ordinary least square equations are each estimated twice; first with all of the variables untransformed (Model A) and second with the continuous variables, both dependent and independent standardized (Model B).

Estimation of Model A was used to assess the absolute magnitude of the

Table V.

Logit regression Variable name	Dependent variable: <i>MF</i>				Coefficient/ standard error
	Estimated coefficient				
	Model A	ΔP_A	Model B	ΔP_B	
LNST	1.0158	0.180	0.8268	0.154	4.1099***
BDIV4	2.2345	0.283	0.5385	0.107	2.9832**
LNEMPL	0.3495	0.073	0.3373	0.070	1.6469
METMAT	-1.2479	-0.302	-1.2479	-0.302	-2.7125**
PETAGR	-1.5206	-0.363	-1.5206	-0.363	-3.6192***
AGE	-0.0812	-0.018	-0.1838	-0.042	-1.1025
FOWN	-1.0136	-0.246	-1.0136	-0.246	-1.7899*
FOAC	-1.0809	-0.262	-1.0809	-0.262	-3.1613**
IOWN	-0.8892	-0.216	-0.8892	-0.216	-2.0608*
IOAC	-0.6317	-0.151	-1.1485	-0.151	-1.1485
Constant	-4.4476		-2.2570		-2.2536

* = ($P < 0.10$); ** = ($P < 0.05$); *** = ($P < 0.01$).

Log likelihood (0) = -185.23

Log likelihood function = -126.91

McFadden $R^2 = 0.31482$

Craig-Uhler $R^2 = 0.45859$

The number of correct predictions from the model was 233. The percentage of correct predictions then was 80.07 per cent.

effects. Estimation of Model *B* is required to determine the relative magnitude of the direct, indirect and total effects that independent variables have on the likelihood that the M-form is adopted., The Model *B* coefficients from the first equation (both logits and ΔP s) constitute the direct effects. The indirect and total effects were calculated by applying the multiplication rule, as specified in standard path analysis (Duncan, 1975), to Model *B*'s coefficients (table VI).

Letting $X_{1J}, X_{2J}, X_{3J}, \dots X_{10J} = X_J$ stand for the 10 factors described above for subject *J*, we have:

$$P(MF_J = 1 | X_J) = \exp \left(B_0 + \sum_{i=1}^{10} B_i X_{iJ} \right) / 1 + \exp \left(B_0 + \sum_{i=1}^{10} B_i X_{iJ} \right)$$

where $MF_J = 0$ if the enterprise is not multidivisional
1 if the enterprise is multidivisional

$P (MF_J = 1 | X_J)$ is the probability that a firm with company and market characteristics X_J uses a multidivisional structure.

Taking the natural logarithm of both sides of the equation yields the linear relation between the factors and the logit or log odds ratio:

$$LN [P(MF_J = 1 | X_J) / 1 - P (MF_J = 1 | X_J)] = B_0 + \sum_{i=1}^{10} B_i X_{iJ}$$

Table VI. Direct, indirect and total effects of variables (standardized if continuous) on the probability that firms will use the M-form

<i>Variable name</i>	<i>Direct</i>	<i>Indirect</i>	<i>Total</i>
LNST	0.154	0	0.154
BDIV4	0.107	0.019	0.159
LNEMPL	0.070	0.092	0.148
METMAT	-0.302	-0.013	-0.315
PETAGR	-0.363	-0.002	-0.364
AGE	-0.042	0.033	-0.007
FOWN	-0.246	-0.031	-0.278
FOAC	-0.262	-0.040	-0.304
IOWN	-0.216	-0.012	-0.229
IOAC	-0.151	-0.094	-0.250

Notes The direct effects are taken directly from table V.

The figures in columns 1 and 2 do not sum to those in column 3, because the direct and indirect effects of variables are not additive when expressed in probabilistic terms.

The coefficients were estimated by maximizing the likelihood function:

$$L(MF_J | X_J; B) = \sum_{J=1}^N P(MF_J = 1 | X_J)^{MF_J} (1 - P(MF_J = 1 | X_J))^{1-MF_J}$$

where N = the 291 firms on which the data have been collected.

A noteworthy feature of this model is that even though the dependent variable is binary, the model's predictions are not. Rather, the model's predictions are estimates of the probability of taking on the value of 1 (rather than 0). Maximization of the likelihood function was accomplished with the Gauss-Newton non-linear least squares method.

To test the hypothesis that the explanatory variables have no impact on the probabilities P_i , that is, the

$$B_1 = B_2 = \dots B_{10} = 0$$

the test statistic is $-2 [\ln \hat{l}(\alpha) - \ln \hat{l}(w)]$ where $\hat{l}(\alpha)$ is the value of the likelihood function evaluated at the maximum likelihood estimates and $\hat{l}(w)$ is the maximum value of the likelihood function under the hypothesis that $B_1 = B_2 = \dots B_{10} = 0$. If the hypothesis is true, then asymptotically, the test statistic has a chi-square distribution with $(K - 1)$ degrees of freedom (Judge *et al.*, 1982). From our logit regression, the value of the test statistic is $-2 (126.91 - 185.23) = 116.624$. The chi-square with 10 degrees of freedom at the 1 per cent level of significance equals 25.188, so that we can reject the hypothesis that $B_1 = B_2 = \dots B_{10} = 0$. A related summary measure is the McFadden R^2 computed as $1 - \ln \hat{l}(\alpha) / \ln \hat{l}(w) = 1 - 126.91 / 185.23 = 0.31482$. This measure has value zero when $\hat{B}_1 = \hat{B}_2 = \dots \hat{B}_{10} = 0$ and value 1 when the model is a perfect predictor. This measure is analogous to the coefficient of determination R^2 in linear regression models.

RESULTS

As table VII shows, the results support the economic explanation of the M-form, as well as the political coalition view.

An increase in diversification, as measured by the Berry-Herfindahl 4-digit index, significantly increases the likelihood that the enterprises adopt the M-form ($\Delta P = 0.107$) in support of *H1*. The results were robust across the seven diversification measures used. The results were also robust using probit analysis.

Geographic dispersion, as measured by the log of the number of states in which the enterprise had plants, significantly ($P < 0.01$) increases the likelihood that the enterprises use the M-form ($\Delta P = 0.154$), supporting *H2*. The results also hold when the log of cities or the log of plants were used as proxies for geographic dispersion. From the OLS regression (table III) we see that diversification significantly ($P < 0.01$) increased geographic dispersion in support of *H3*.

While Palmer *et al.* (1987) found a slightly negative relationship between

Table VII. Multidivisional model

<i>Hypothesis</i>	<i>Result</i>
<i>H1</i> Diversification induces the adoption of the M-form	Accept ($P < 0.05$)
<i>H2</i> Geographic dispersion induces the adoption of the M-form	Accept ($P < 0.01$)
<i>H3</i> Diversification increases geographic dispersion	Accept ($P < 0.01$)
<i>H4</i> Increased size induces the adoption of the M-form	Reject
<i>H5</i> Increased size leads to an increase in diversification	Accept ($P < 0.01$)
<i>H6</i> Increased size results in an increase in geographic dispersion	Accept ($P < 0.01$)
<i>H7</i> Technologies with low product applications (Metals & Materials) are less likely to adopt the M-form	Accept ($P < 0.05$)
<i>H8</i> The Metal and Material firms are less likely to be diversified	Reject
<i>H9</i> The Metal and Material firms are less likely to be geographically dispersed	Reject
<i>H10</i> Technologies with high product applications such as electronics, chemicals and power machinery will adopt the M-form with a higher probability than petroleum and agricultural firms	Accept ($P < 0.01$)
<i>H11</i> Petroleum and agricultural firms are less likely to be diversified	Accept ($P < 0.01$)
<i>H12</i> Petroleum and agricultural firms are less likely to be geographically dispersed	Reject
<i>H13</i> Family-dominated firms prefer centralized control and will have a direct negative effect on the likelihood that firms choose the M-form	Accept FOWN ($P < 0.10$) FOAC ($P < 0.05$)
<i>H14</i> Family-owned firms may resist diversification, which dilutes their ownership and control over the firm	Accept FOWN ($P < 0.05$) only
<i>H15</i> Family-dominated firms resist geographic dispersion	Reject FOWN and FOAC
<i>H16</i> Institutionally-dominated firms will have a direct negative effect on adoption of the M-form	Accept IOWN ($P < 0.10$) only
<i>H17</i> Institutionally-dominated firms are expected to be less diversified	Reject IOWN and IOAC
<i>H18</i> Institutionally-dominated firms are expected to be less geographically dispersed	Accept IOAC ($P < 0.05$) only
<i>H19</i> Older firms, due to structural inertia, are expected to have a negative effect on the adoption of the M-form	Reject
<i>H20</i> Older firms are expected to have greater diversification	Accept ($P < 0.01$)
<i>H21</i> Older firms pursue greater geographic dispersion	Reject

size (measured by the log of employees) and the likelihood of the enterprises adopting the multidivisional structure, in our study, an increase in size (LNEMPL) was positively associated with the M-form, but did not increase the likelihood of the M-form at a statistically significant level. This would be consistent with the Stopford and Wells (1972) argument that diversification, rather than size *per se*, has an influence on organizational form. This conclu-

sion from the data however is a tentative one. The result is not robust across size measures (Kimberly, 1976). When size is measured by the log of assets, for example, while all other regression results hold, the size variable is positive and significant ($P < 0.01$), supporting *H4*.

That an increase in size leads to an increase in the likelihood of the M-form is suggested by Williamson (1975) and is consistent with the empirical results of Grinyer and Yasai-Ardekani (1981). Further empirical work is required to determine the influence of size on organizational form. The OLS equations indicate that increased size also induces increased diversification (*H5*) and increased geographic dispersion (*H6*) each at a statistically significant ($P < 0.01$) level. These results were robust across size measures, dispersion measures and diversification measures.

Consistent with Chandler (1962), the industries associated with high capital requirements and low technologically product driven diversification were significantly less likely to adopt the M-form. The logit analysis indicates that the metals and materials firms were significantly ($P < 0.05$) less likely to adopt the M-form ($\Delta P = -0.302$) which supports (*H7*) (Chandler, 1962). The Palmer *et al.* (1987) study on the other hand, did not support Chandler's findings that the metals and materials firms were less likely to adopt the M-form. Besides using a Berry diversification measure and a larger sample size, the discrepancy between their results and ours is partly due to the discrepancy in the classification of M-form and F-form. For example, they classified such firms as Kennecott Copper Corp. and Republic Steel as multidivisional while several other independent researchers have classified them as functional. The metals and materials firms were neither less diversified nor less dispersed geographically at a statistically significant level, leading us to reject *H8* and *H9*.

The petroleum and agricultural firms ($P < 0.01$) were less likely to utilize the M-form ($\Delta P = -0.363$) than the enterprises whose primary industry was chemical, machinery, or electrical, in support of *H10*. The petroleum and agricultural firms were also significantly ($P < 0.01$) less diversified in support of *H11*, but they were significantly more geographically dispersed ($P < 0.01$) than the chemical, electrical, and machinery firms, leading us to reject *H12*.

As stated earlier, the results also support the political coalition view of the firm (Pfeffer and Salancik, 1978). Those firms that were family dominated (FOWN, FOAC) were significantly ($P < 0.10$; $P < 0.05$) less likely to adopt the multidivisional structure in support of *H13*. The family-dominated firms FOWN also diversified significantly less ($P < 0.05$) in support of *H14*. Family coalitions resist diversification because it threatens their ownership and control. If diversification via acquisitions is financed by debt, the power of banks in firms' long-run decisions increases. If acquisitions are financed by issuing new stock, then the holdings of family members are diluted and outside managers are required which reduces the power of family members. In contrast to the Palmer *et al.* (1987) study, our results indicate no effect of family-dominance (FOWN, FOAC) on geographic dispersion, leading us to reject *H15*.

Institutionally-dominated firms (IOWN, IOAC) were less likely to adopt the M-form in support of *H16*. However, only the IOWN enterprises were

significantly ($P < 0.10$) less likely to adopt the M-form. Palmer *et al.* (1987, p. 39) suggest a possible rationale for this result:

Banks may not discourage firms from adopting the M-form as vigorously when they own and control (as opposed to only own) them, because they are in a position to insure that the adoption of this form does not allow a firm to internalize the capital market. By placing representatives on the board (and perhaps the finance committee), banks may be able to control a firm's capital allocation process; when banks are only the dominant stockholders in a firm, they may not be able to exercise such influence on a regular basis.

There was no effect of institutional domination on diversification in contradiction to *H17*. However, institutionally owned and controlled firms were significantly ($P < 0.05$) less dispersed geographically in support of *H18*.

Little support was found for the organizational variant of the ecological approach. Although AGE was negatively associated with adoption of the M-form suggesting a structural inertia effect, the effect was not statistically significant, in contradiction to *H19*. However, in contrast to Palmer *et al.* (1987), the results indicated that a firm's increase in age leads to a significant ($P < 0.01$) increase in diversification in support of *H20*. On the other hand, the age of the enterprise had no effect on geographic dispersion in contradiction to *H21*.

Finally, I consider the direct, indirect, and total effects of variables (standardized if continuous) on the probability that firms will adopt the M-form (table VII). The coefficients for Model *B* are reported in tables III, IV and V. They indicate the effect of a one-standard-deviation increase in a continuous independent variable or a categorical change in a dichotomous independent variable on the dependent variable in question. These coefficients are used to calculate the direct, indirect and total effects that a one standard deviation increase in an independent variable has on the likelihood that a firm adopts the M-form. These effects are expressed in probabilistic terms.

Geographic dispersion, product diversification and size all have a significant total effect on increasing the likelihood of the adoption of the M-form of organization (ΔP s = 0.154; 0.159; and 0.148 respectively). The primary industry also has a significant impact on the likelihood of the adoption of the M-form. On the other hand, the age of the firm has total little effect on the adoption of the M-form ($\Delta P = -0.007$). Lastly, family and institutional dominance have a significantly negative total effect on the likelihood of the adoption of the M-form.

DISCUSSION

In this article, I have analysed a combined power and efficiency model that considers traditional industrial economics variables (such as the Berry–Herfindahl index and the influence of the primary industry), and a coalitional view of the firm (Cyert and March, 1963; Pfeffer and Salancik, 1978), where

family dominance and bank dominance are important factors in explaining and predicting an enterprise's strategy and structure. The model enables us to explain and predict organizational form.

Although some of the results were not consistent with Palmer *et al.* (1987), the overall conclusion is that the model proved quite robust to changes in sample and proxies, for this time period. A question to be addressed in future research is, 'How well does the model predict organizational form for later (or earlier) time periods?' The model presented stands up quite well to the criteria of multiple connectedness and replicability. A well-grounded theoretical and empirical literature suggests that the model is generalizable. Of course, this latter assertion must be backed with the hard currency of further empirical efforts.

A second extension of the article would be to consider the combined power and efficiency model to test the crucial role of organizational form on profitability that has been somewhat neglected in structure-strategy-performance models utilized by industrial organization economists and strategic management researchers (Caves, 1980). That economists (with the exception of Williamson, Teece, and a few others) have neglected organizational form may be explained by their 'black box' theory of the firm, which suppresses organizational issues. Management researchers should address this deficiency. The impact of various organizational design decisions (not just M-form versus functional form) on performance can, of course, be analysed within the industry structure-strategy-performance paradigm (Hay and Morris, 1979; Scherer, 1980). Feedback effects of performance-strategy-organizational structure may be captured by the use of simultaneous equation models.

A third issue, which is raised here, concerns the cogency of the power perspective. Williamson (1985), for example, tends to dismiss the power approach. In fact, the agency perspective (Fama and Jensen, 1983; Jensen and Meckling, 1976) provides an alternative efficiency explanation for the negative impact of family and institutional dominance on diversification and the likelihood of the adoption of the M-form. If we consider family and institutional ownership as proxies for ownership concentration then, when ownership is concentrated, the interests of managers and owners are more closely aligned. Thus, the firm is more likely to pursue profit-maximizing as opposed to growth-maximizing (*i.e.*, diversification) strategies. If one accepts that much diversification is subject to diminishing returns, one would expect a negative relationship between family and institutional ownership and diversification for these reasons (Hill and Snell, 1989).

Moreover, greater family and institutional control suggests fewer problems associated with the separation of ownership and control and consequently a lower need for the M-form structure. Taking a pluralistic stance, I find merit in both the power and efficiency (agency) perspectives. I am inclined to agree with Eisenhardt's recommendation to resist reductionism and to utilize multiple theories along with agency theory (1989, p. 71).

Finally, it is submitted that the multidivisional paradigm illustrates the central premises of the article: (1) a synthesis of efficiency and power perspectives is a viable research programme (Bettis and Prahalad, 1983;

Ulrich and Barney, 1984; and (2) theoretical pluralism increases empirical content (Denzin, 1989; Rorty, 1979) and should be valued by those concerned with progress in the emerging field of strategic management (Huff, 1981; Jemison, 1981; Mahoney *et al.*, 1992). In fact, it is submitted that the acceptance of the legitimacy of theoretical pluralism is a scientific attitude that is unique to strategy research (Bourgeois, 1984; Bowman, 1990; Eisenhardt, 1989) and is a source of the discipline's growing vitality.

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