

AMERICAN INNOVATION ABROAD:  
The Multidivisional Hypothesis in West Germany\*

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NO. 195

**WARWICK ECONOMIC RESEARCH PAPERS**

DEPARTMENT OF ECONOMICS

UNIVERSITY OF WARWICK  
COVENTRY

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- \* We should like to thank Prasad Vasireddi for data collection and Paul Fisher for programming assistance in the preparation of this paper. We are also grateful for comments and suggestions to Alfred Chandler, Sue Charles, Keith Cowling, John Cubbin, Hermann Daems, David Eucaoua, Alexis Jacquemin, Bill Ouchi, Otto Poensgen, Sig Prais, Aubrey Silberston, Paul Stoneman, David Teece, Steve Thompson and Oliver Williamson.

This paper is circulated for discussion purposes only and its contents should be considered preliminary.

I Introduction : International Diffusion of Multidivisionals and  
the Sources of M-form Gains.

Multidivisional firms account for a clear majority of the hundred leading companies in America and Britain, and significant proportions elsewhere in continental Europe. (1) Thus a sizeable proportion of total economic activity in Western, developed economies now takes place within the quasi-autonomous operating divisions of large industrial organizations, co-ordinated via a network of general offices.

The multidivisional organization is widely accepted to be an American innovation (Chandler, (1966)). (2) Its international diffusion at first sight appears to conform to the 'culture free' theory of organization : the idea that organizational and institutional patterns are converging under a common logic of work and administration, in response to technological imperatives, and increasingly independent of cultural factors (e.g. Kerr, 1960; Harbison and Myers, 1959). In line with this view the European multidivisional development may be seen in the context of Servan-Schreiber's "American Challenge" (1968) : the revitalization of European economies with the aid of superlative American organisational methods. But as Child and Kieser (1979) point out, an alternative school of thought believes socio-cultural influences will be strongly manifested in patterns of organisational behaviour (eg, Crozier, 1964; Malinowski, 1960). And on closer inspection non-trivial differences are discernible in the institutional frameworks within which multidivisionals have developed in different countries, and arguably in the nature of the multinationals themselves.

Thus the question is whether the structure and behavioural impact of the multidivisionals we observe in France, Germany and Italy, for example, correspond closely to those of their apparent counterparts in Britain and especially America. The question is important for resource allocation. The multidivisional phenomenon represents a major departure from the structural conditions of competitive equilibrium, upon which our understanding of resource allocation still largely depends. However, if the arguments of Chandler and Williamson (1970, 1975) concerning multidivisional behaviour are correct, there may be grounds for retaining both the orthodox assumptions of least-cost, profit-maximising behaviour by firms and a belief in the efficacy of capitalist resource allocation towards highest-yield uses.<sup>(3)</sup> It is important to know how far this process has gone in Western capitalism.

Following Coase (1937) and more recently Spence (1975) the multidivisional development can be viewed as the internalisation of co-ordinating functions otherwise performed by markets, in response to an organizational innovation which reduces the transactions costs of hierarchical arrangements relative to those of the market. At firm level the multidivisional hypothesis predicts superior profit performance compared with non-divisionalised firms above some threshold level of size and diversification. Williamson sees the major source of this profit gain in a reduced scope for managerial opportunism and a return to least-cost behaviour and profit goals in multidivisional (M-form) firms, in comparison with large firms retaining the traditional (U-form) or functionally delegated bureaucratic structure. Three main mechanisms can be discerned in Williamson's analysis through which the M-form hypothesis operates.

First, divisionalisation reduces the number of hierarchical levels required for a given size and span of control. This mitigates serial reproduction error and consequent control loss as information and instructions are transmitted across successive hierarchical levels in expanded U-form organizations. Secondly, a 'distance' relation is maintained between strategic policy (at head office) and operative decisions (at divisional level). In U-form firms, by contrast, the two intermingle as heads of functional divisions are drawn into top level, strategic decision-making, to ease a 'peak-coordinator overload' problem as the volume of information flowing through the system increases with growth. Third, both Chandler and Williamson attach great importance to the internal (capital) market aspect of the multidivisional firm. In effect the general office proxies the role of shareholders, but enjoys advantages over the external capital market in the capital transfer process. These centre on privileged access to information and scope to intervene in a continuous, selective fashion to steer divisional policy (by manipulation of the managerial incentive structure and internal resource allocation) as opposed to the drastic, discrete action open to shareholders (e.g. replacing the directors in response to 'egregious departures' from optimal behaviour). As well as reinforcing the curtailment of managerial opportunism within the firm this leads to a more rapid and certain metering of funds according to yield than would occur in an economy relying on external capital markets alone.

Insofar as superior M-form performance derives from curtailed managerialism, maximum M-form gains should be observed where the scope for discretionary behaviour was previously most marked. Since at least Berle and Means (1932) the separation of stockholder ownership and

managerial control has come to be regarded as typical of large American corporations,<sup>(4)</sup> ownership is widely dispersed and the transactions costs of effecting control via the external capital market are regarded as non-trivial, even within the principal-agent framework envisaged by Jensen and Meckling (1976). The same is broadly true of Britain. As these are precisely the conditions in which the M-form argument is powerful in reinstating the conclusions of the competitive model we expect substantial M-form efficiency gains, and this is largely confirmed in empirical work to date (e.g. Armour and Teece, 1978; Steer and Cable, 1978; Teece, 1981; Thompson, 1981).<sup>(5)</sup>

Elsewhere it appears that institutional structures diverge from the US/UK pattern in ways likely to affect the M-form hypothesis. A number of writers have pointed out that US-style managerialism is not typical of continental Europe, where a high degree of corporate control is exercised by families, holding companies and banks (Jacquemin and de Jong, 1977; Jacquemin and de Ghellinck, 1977; Morin, 1974; Poensgen, 1980; Thonet and Poensgen, 1979). Although the development of M-form in continental Europe has been traced (Chandler and Daems, 1980; Dyas and Thanheiser, 1976) direct estimates of the impact on firm performance are as yet lacking. But the general absence of managerialism argues for low expectations. Moreover there is evidence that in Europe institutional arrangements alternative to M-form may be capable of generating equivalent effects, such as the 'industrial group' in France (Encaoua and Jacquemin, 1981).

In this paper we focus on West Germany. To facilitate comparison we test the multidivisional hypothesis with the aid of a

model previously used on UK data by Steer and Cable (1978), adapted to German data and circumstances. Steer and Cable's results for the UK proved similar to those obtained in US studies. In the Anglo-German comparison we find striking differences both in the impact of multidivisional form on firm performance and in the environment in which they operate.

## II Multidivisional Development in the German Context

Thanheiser (1976) reports that exactly half of the top one hundred German companies had adopted multidivisional form by 1970, compared with only five per cent twenty years earlier. Divisionalisation typically occurred after an earlier phase of diversification, though often with a long lag. In the case of companies like Siemens, AEG-Telefunken and Bayer reorganization was carried out from within, but in many other cases consultants played an important role, McKinsey and Co alone being responsible for a dozen major divisionalisations.

The process of divisionalisation in Germany apparently encountered certain problems that may have been absent or less severe elsewhere. Thus companies have encountered difficulties in reconciling M-form principles with the German dual-board system, whereby a non-executive supervisory board (Aufsichtsrat) is required under German company law as well as an executive board (Vorstand). This has not infrequently resulted in compromise solutions, and Thanheiser (1976, pp 123 - 126) distinguishes three variants of the multidivisional organization. Of these only one closely approximates the pure form, and is found mainly among the very largest companies. Thanheiser also finds that the use of managerial incentives linked to divisional performance is much less widespread than in the US. Again this may well have its origin in German company law, which explicitly permits managerial participation in profits, at the discretion of the supervisory board, but relates this to the overall out-turn (Jahresuberschuss) of the company as a whole.



Finally, Thanheiser observes that the decentralization inherent in multidivisional organization involves divisional autonomy beyond the level of purely adaptive and routine tasks, which conflicts with traditional German managerial style and cultural attitudes towards authority. Corporate owners and professional top management (Unternehmer) traditionally enjoy a high social status and a position of 'ultimate' authority. This derives directly from their status and the underlying value system in contrast to the 'functional' authority of Britain and especially the US, which is earned via functional efficiency. The next level of German management (leitende Angestellte) is traditionally bound more by routine than its US and British counterparts, and in role and status has more in common with its subordinates than with its ultimate superior. Thus, Thanheiser argues, a "hierarchy of labour" begins just below board level in Germany, in contrast with the US where the distinction between labour and management is drawn much lower down. The divisional managers of quasi-autonomous operating units within multidivisional firms clearly do not fit easily into this picture of the traditional German managerial order. Likely outcomes are either disputed authority between head office and divisions or, more probably, a lack of initiative at divisional level and over-involvement by the centre in divisional operations - the "corrupted M-form" ( $\bar{M}$ ) variant in the extended classification of Williamson and Bhargava (1972). In either case superior M-form performance is not to be expected in full.

Recent work by Childs and Kieser substantiates Thanheiser's analysis of the impact of cultural factors. In an empirical comparison of British and German firms they find strong evidence of different attitudes towards authority and, significantly, "different patterns of

decentralization .. and different managerial role characteristics which could not be ascribed in a consistent manner to size or indeed to any other immediately contingent factor" (1979, p 267).

The practical and cultural problems posed by divisionalisation in Germany may be expected to erode potential performance gains at firm level. Furthermore, additional institutional factors may be expected to result in a lower level of potential gains than may be available elsewhere.

As in other continental European countries the US/UK style managerial company is untypical of Germany; Poensgen (1980) found only 26 cases of dispersed ownership in a sample of 666 companies.<sup>(6)</sup> On the other hand there are significant individual and family holdings; in its second report the Monopolkommission (1978) identified majority holdings in fourteen cases and 25-50 per cent holdings in a further four among the largest 100 companies. This relative concentration of ownership is further, greatly intensified by a system of bank control of shareholders' proxy voting rights (Depotstimmrecht). As the Monopolkommission showed, the banks controlled 36 per cent of votes in the top one hundred companies via their own (small) direct holdings plus proxies. Because the deposit system is especially attractive to small investors, the banks accrue most voting power in widely-held companies, which are often the largest. On average the banks controlled a clear majority of votes in the ten largest companies. Thus acting together, the large individual holdings and the share-deposit system produce a degree of concentration of voting power in Germany companies, and a degree of shareholder 'voice' in corporate affairs, which is quite extraordinary

by British and American standards. This alone might be expected to result in less scope for managerial opportunism, even where M-form organization is lacking.

The dual-board system of internal organization arguably puts a further curb on managerial behaviour. The supervisory board consists wholly of non-executive, shareholders' representatives while the executive board is in effect the top level of management. The system clearly provides an extra layer of resources at peak-coordinator level in German corporate hierarchies, as compared with American and British companies of comparable size. At minimum this should raise the size threshold at which capacity overload becomes critical, and dysfunctional U-form performance enters. More importantly, the dual board system institutionalizes the distinction between strategic and operational responsibilities. The supervisory board by no means corresponds to the M-form head office in all respects. In particular it is not served with independent information by an elite staff (though the many representatives of banks will have access to specialist expertise from the banks' own resources). But it does have legally-backed access to internal company information, and control of managerial incentives (with powers of appointment and dismissal to the executive board). It does not formally design strategy, only choosing among the alternatives the executive board puts forward, but its role and constitution are designed to promote shareholders' preferences. At the least, the dual board system must to some extent preserve the 'distance' relation between strategy and operating decisions, independently of M-form.

Finally, the system of company finance in Germany may at least in part be viewed as a complex of quasi-internal capital markets, centred on the banks. The stock market is a relatively unimportant source of corporate funds; in recent years only around 2 per cent of total funds have been raised from new share issues, while the issue of bonds has dwindled to almost nothing. The principal source of investible funds in Germany as in America and Britain is cash flow. But bank borrowing is the next most important and crucial source of funds for longer-term investment as well as for financing inventories etc, contributing some 20 per cent of corporate funds on average in the period 1964-78 (Samuels and McMahon, 1978).

Bank finance is supplied from a relatively small number of banks, notably the big three, and these banks are strongly represented on the supervisory boards of leading companies. According to the Monopolkommission 14.9 per cent of a total of 1203 seats on the supervisory boards of the top 100 companies were taken by banks, more than half representing the three major industrial banks. In its later, third report, the Monopolkommission (1980) shows the Deutsche-, Dresdener-, and Commerz-banks as having appointees of 38, 23 and 14 companies respectively in the 1978 top-100 group. Individuals representing particular banks commonly sit on the supervisory boards of several companies.

Thus the German banks control substantial blocks of company voting rights, provide the the principal source of external corporate finance and have representatives on company boards who have access to internal information and participate in corporate policy

formation. In the context of the M-form hypothesis, the bank stands in a position much closer to that of the M-form general office vis-a-vis its divisions than to that of a conventional creditor or shareholder in the external capital market. To be sure, internal cash flow is not pooled amongst the companies associated with particular banks, and redistributed on the basis of prospective yield. But the banks clearly are in a position to allocate the second most important category of corporate funds on this basis, sharing many of the advantages of the general office over the external capital market in so doing.

The expected overall impact of M-form on firm performance in Germany is thus somewhat ambiguous. The apparently reduced scope for managerial opportunism in the absence of M-form should attenuate potential gains. But in view of the large estimated gains obtained for the UK and US, a statistically significant, positive but small effect might reasonably be expected. The quantitative significance of the practical and cultural problems encountered with M-form in Germany is harder to assess a priori. At minimum this must reinforce the expectation of small gains, but the possibility of dysfunctional effects sufficient to produce a null or even an overall negative effect cannot be ruled out.

### III Theoretical Model

Steer and Cable's model yields an interfirm profit equation in which

$$\Pi_i = f(\underline{X}_i) + g(\underline{Z}_i) + u$$

$f(\underline{X}_i)$  denotes the profit maximising level of profit for firm  $i$  and  $\underline{Z}_i$  is a vector of variables suggested by other, managerial and behavioural theories. In principle organizational form operates via  $f(\underline{X}_i)$ , since it is an aspect of firm-level efficiency and hence ought to be captured in the production function. However, in practice organizational form effects must be incorporated through zero/one dummy variables whose allegiance to  $f(\underline{X}_i)$  in the final specification is not strong.

When  $\Pi_i$  is defined as a rate of return on capital (7) the S-C estimating equation becomes :

$$\begin{aligned} \Pi/K = \alpha + \beta_1 OF + \beta_2 T + \beta_3 OC + \beta_4 MT + \beta_5 S \\ + \beta_6 G + \sum_i \beta_i I_i + \epsilon \end{aligned}$$

where

OF = organizational form dummy (e.g. 1 if M-form  
0 otherwise)

T = organizational change of dummy (1 for firms  
recently adopting M-form)

OC = owner control dummy

MT = managerial taste (ratio of executive to total  
directors)

S = firm size

G = firm growth

$I_i$  = industry dummies.

S-C also introduced the interaction terms (OC.G) and (OF.S), yielding interesting additional insights.

In the German analysis we replace OF with a vector of binary variables from the Thanheiser classification, which allocates firms to one of four categories : functional (F), functional/holding (F/H), holding (H) and multidivisional (MD). Thanheiser unfortunately does not report a finer differentiation of multidivisional firms either according to the three variants he himself identified, or in line with the expanded Williamson and Bhargava (1972) schema, which distinguishes both 'corrupted' M-form ( $\bar{M}$ ) and the transitional category (M') from the pure case. In this respect the Thanheiser classification is coarser than that of Steer, used in the UK study.

However, the UK model omitted a potentially relevant measure of firm diversification, whereas Thanheiser provides a vector of strategic dummies based on Wrigley's (1970) categories : single- (E), dominant- (D), related- (R) and unrelated-business (U). These are important as a measure of the appropriateness of M-form structure and may be thought of either, as by Wrigley, as a diversification index or equivalently, in Williamson's terms, as capturing the degree of decomposability of activities.

For the German analysis MT is inappropriate because of the dual-board system and data on the time elapsed since adoption of

M-form (T) was lacking. On the evidence of previous studies, this enforced omission should not lead to serious bias; the relevant coefficient was never significant at better than ten per cent in S-C's results for the UK, while Armour and Teece (1978) likewise found no evidence of serious transactions cost effects in the US petroleum industry. However the omission may be more serious in Germany where multidivisional development occurred later than in the US and UK and closer to our observation period. We return to this point later.

The owner-control dummy OC is replaced by a Herfindahl index of shareholder concentration:

$$HI = \sum_j (v_j)^2$$

where  $v_j$  is the proportion of stock held by the  $j^{\text{th}}$  owner.

This makes more systematic use of the available information on shareholder diffusion than the somewhat arbitrary dichotomies that have previously been used, and more importantly can be derived as the appropriate owner-control measure from a theory of voting control (Cubbin and Leech, 1980). Three further variables are added. First, the coefficient variation of profits ( $\sigma_{\Pi}^2/\bar{\Pi}$ ) is introduced (in the absence of firm-specific estimates of  $\beta$ -risk) to allow for higher profits sought and earned to compensate shareholders for risk. (8)

Then, dummy variables are added for foreign subsidiaries (X) and for firms with significant public participation (P), together with a vector of industry dummies to normalize for industry level effects due to seller concentration and so forth.



Finally we allow for the influence of financial institutions, particularly the three major banks, as a source of company funds; in exercising proxy voting rights; and as participants in corporate strategy formulation at supervisory board level. Alternative hypotheses about the way the financial sector undertakes these roles generate a variety of specifications. The complex issues and public policy implications which are raised extend beyond the scope of the present paper and are discussed elsewhere (Cable, 1981). For present purposes we require only to allow for banking effects in such a way as to accurately observe the internal organization effects which are our prime concern. To this end, we employ a simple specification which in practice works as well as any other and involves the addition of three variables: the ratio of bank lending (long- and short-term) to total debt ( $L/M$ ); the share of total voting rights controlled by financial institutions ( $V_k$ ); and a dummy variable ( $R_k$ ) indicating the presence of one or more representatives of financial institutions on the supervisory board of the company. As it turns out the MD results are not sensitive to the way the role of banking is modelled (see also Cable, 1981).

To avoid singularity problems in estimation we drop one element of each of the vectors of industry, strategic and structural dummies. Thus the included binary variables capture deviations from our basic observation: a single-business, functionally-organized firm in the electrical engineering industry.

#### IV The Sample and Data Sources

Data limitations reduced Thanheiser's original sample of one hundred to forty-eight usable observations for regression analysis. Twenty-seven firms in the sample had adopted multi-divisional form, i.e. 56.25% of the total, compared with 50% in the top 100 as a whole. Seven were in the unrelated business category, including six multidivisionals, and nineteen had pursued a "related business" strategy of which fourteen were multidivisionals. Thus structure and strategy tended to go together in our sample, as well as in the top 100 as a whole.

Maximum and minimum asset-size among the 48 was DM 8,549m and DM 331m respectively, and the sample was significantly biased towards the upper half of the top 100 list, with 19 firms in the first quartile, 13 in the second and only 5 in the fourth. The mean (five-year average) return on capital was 3.07%, ranging from -3.14% to 8.08% (earned by the ITT subsidiary SEL).

Nine firms in the sample were foreign subsidiaries, including Ford and four oil companies as well as SEL, of which all but one were multidivisional. The sample also contained six family-owned firms (with three multi-divisionals) and five predominantly publicly-owned companies (one multidivisional). In these twenty companies the three major banks controlled only 2.3% of voting rights (or 11.5% in the 4 cases where bank control was non-negligible) compared with 21.2% of the voting rights in the remaining twenty-eight compares (or 37.2% in the 16 non-negligible cases).

The three major banks had representatives on the supervisory boards of twenty-nine companies in the sample, with the Deutsche Bank represented in fourteen cases, compared with Dresdener Bank (seven) and Commerzbank (eight). Seven companies had representatives from two of the three big banks and three had representatives from all three.

Table 1 reports mean values of certain key variables for the sample as a whole and for the multidivisional and 'other' groups of companies. The data on corporate strategy and structure is taken from Thanheiser (1976). Company financial data, size assets and growth etc came from Hoppenstedt and from company reports. Information on bank participation and voting rights is from the reports of the Monopolkommission (1978, 1980).

Table 1 : Mean Values of Key Variables, Multidivisional Firms & Others <sup>(1)</sup>

	<u>All Companies</u>	<u>Multidivisionals</u>	<u>Others</u>	<u>Difference</u>
Return on Capital	.0307 (.0237)	.0277 (.0176)	.0344 (.0294)	-.0067
Owner Control (Herfindahl)	.3877 (.3797)	.4360 (.4295)	.3256 (.2924)	.1104
Voting Rights of Financial Institutions	.2651 (.3417)	.3593 (.3874)	.1440 (.2187)	.2153
Size (Assets)	23.02 (22.56)	26.43 (24.43)	18.64 (19.04)	7.79

(1) standard deviations in parentheses.

## V Empirical Results

Our principal findings are summarised in Tables 2 - 5. The principal models reported are statistically significant overall and explain between 40 and over 60 per cent of the variations in the dependent variable  $\Pi/K$ . Except for equations 2 and 3 of Table 5, this is a five year average of each firms' profitability centered on the year 1970. Problems of multicollinearity were generally absent but for two of the banking variables:  $V_k$  and  $R_k$ . Thus the separate effects of bank control arising from voting rights and from supervisory board representation are hard to distinguish.  $R_k$  is generally insignificant in the reported equations but in fact can be shown to have a significant positive impact on profitability in alternative banking models (Cable 1981).

Extensive tests revealed no evidence of serious heteroscedasticity affecting the results. Applying the Glejser test we regressed the OLS residuals,  $e_i$ , from equation 4 of Table 2 on the two principal, continuous variables HI ( $Z_1$ ) and S ( $Z_2$ ) in the form

$$|e|_i = \gamma_0 + \gamma_1 Z_1^h$$

for values of  $h = -1, -\frac{1}{2}, \frac{1}{2}$  and  $1$ . The hypothesis  $\gamma_1 = 0$  was not rejected in all cases. Our full model left insufficient degrees of freedom for the Goldfeld-Quandt test procedure. However, this test was applied to a parsimonious model containing five principal explanatory variables, the constant term and two industry dummies (equation 1, Table 4). This specification was obtained using a stepwise regression, excluding marginal variables until the F-test just rejected the joint hypothesis of zero coefficients for all excluded variables at the five per cent level.

Table 2 OLS Estimates: Strategy and Structure Variables

Dependent Variable :  $\Pi/K$ 

Variable	Equation	2.1	2.2	2.3	2.4	2.5
Constant		.0186 (0.543)	.0325 (1.190)	.0323 (1.031)	.0332 (1.274)	.0024 (0.036)
Herfindahl (HI)		.0471** (2.870)	.0468** (3.427)	.0327** (2.201)	.0468** (3.485)	.0164 (1.081)
Voting Rights of Banks ( $V_k$ )		.0471** (2.254)	.0460** (2.582)	.0252 (1.320)	.0458** (2.628)	.0129 (0.795)
Bank Representation ( $R_K$ )		.0142 (1.170)	.0102 (1.029)	.0086 (0.754)	.0101 (1.041)	.0066 (0.593)
Bank Loans/Total Debt (BL/DT)		.0317 (1.214)	.0274 (1.248)	.0175 (0.703)	.0273 (1.269)	.0093 (0.359)
Variability of Profit ( $\delta_{\Pi}^2/\bar{\Pi}$ )		-.0001 (-1.321)	-.0001 (-1.548)	-.0001 (-1.543)	-.0001 (-1.640)	-.0000 (-1.701)
Growth (G)		-.0127 (-1.040)	-.0110 (-1.124)	-.0072 (-0.646)	-.0111 (-1.177)	.0058 (0.522)
Size (S)		-.0001 (-0.598)	-.0001 (-0.433)	-.0001 (-0.429)	-.0001 (-0.741)	
STRUCTURE:						
Functional/Holding (F/H)		.0069 (0.338)				
Holding (H)		.0009 (0.030)	.0016 (0.104)			
Multidivisional (MD)		-.0394 (-1.656)	-.0411*** (4.024)	-.0343** (-2.993)		-.0416*** (-4.801)
STRATEGY:						
Dominant Business (D)		.0067 (0.364)				
Related Business (R)		.0187 (0.826)				
Unrelated Business (U)		.0185 (0.800)	.0106 (1.176)	.0147 (1.432)	.0109 (1.278)	
Foreign Owned (X)		.0052 (0.386)				
Public Ownership (P)		.0093 (0.557)				
$R^2$		.656	.625	.489	.625	.320
F		1.99	2.69	1.69	2.94	1.11

Notes: (1) (Eight) industry dummies not reported  
(2) (t values)

TABLE 3 OLS Estimates : Interaction Terms (Dependent variable  $\Pi/K$ )

	Const.	HI	V <sub>K</sub>	R <sub>K</sub>	BL/DT	$\delta^2_{\Pi}/\Pi$	G	S	S <sup>2</sup>	MD	R/U	(MD.S)	(MD.R/U)	R <sup>2</sup>	F
3.1	.0489* (1.873)	.0466** (3.565)	.0355** (1.979)	.0149 (1.059)	.0009 (0.037)	-.0001 (-1.547)	-.0113 (-1.245)	-.0003 (-0.986)		-.0335** (-3.184)	-.0025 (-0.239)	.0002 (0.522)		.677	3.08
3.2	.0250 (0.802)	.0451** (3.210)	.0429 (2.306)	.0116 (1.128)	.0305 (1.341)	-.0001 (-1.528)	-.0087 (-0.814)	-.0001 (-0.518)		-.0352** (-2.253)	.0167 (1.141)		-.0095 (-0.491)	.628	2.72
3.3	.0334 (1.244)	.0471 (3.422)	.0102 (2.582)	.0274 (1.032)	-.0001 (1.250)	-.0113 (-1.620)	-.0013 (-1.168)	-.0002 (-0.367)	1.0x10 <sup>-6</sup> (0.157)	-.0415** (-4.684)	.0105 (1.149)			.625	2.69

Notes: (i) (Eight) industry dummies not reported.  
(ii) (t values)

TABLE 4 OLS Estimates : MD vs Others (Dependent Variable  $\Pi/K$ )

	Const.	MD	HI	R/U	V <sub>K</sub>	R <sub>K</sub>	R <sup>2</sup>	F
4.1 ALL (n=48)	-.0188** (2.143)	-.0319** (3.944)	.0307** (2.480)	.0160** (2.149)	.0003* (1.716)	.0105 (1.332)	.405	3.90
4.2 MD (n=27)	.0011 (0.060)		.0161 (0.940)	.0085 (0.911)	.0001 (0.549)	.0153 (1.487)	.213	0.90
4.3 Other (n=21)	.0181 (1.379)		.0351 (1.584)	.0212 (1.475)	.0004 (1.167)	.0030 (0.210)	.547	2.82

Notes: (i) TWO industry dummies not reported; both highly significant in equation 3, insignificant in 2.  
(ii) (t values)

The resulting Goldfeld-Quandt statistics -  $G = 1.73$  in the case of the herfindahl and  $G = 2.10$  in the case of size - were well below the critical value of  $F_{10,10}^{0.05} = 2.98$  in both cases.

Two very strong, opposing influences on corporate profitability emerge from our results in Tables 2 - 5 (alongside comparatively mild but in some cases highly significant industry effects captured in certain of the unreported dummy coefficients). First, we obtain a very strong impact of owner control. This is shared between the private ownership and bank voting-rights variables. Both attract positive, significant coefficients when included simultaneously, but in unreported regressions each lost significance when the other was omitted, as might be expected from the way private- and bank-control of voting rights were seen to complement each other in our institutional analysis. Evaluated at sample means, the estimated coefficients imply increases in the rate of return of six per cent and four per cent for a ten per cent increase in the values of  $HI$  and  $V_k$  respectively.

Secondly, and central to our main concern, we observe a very large negative M-form effect, with estimated coefficient values approximately equal to the mean rate of return across the sample. In the presence of the full range of structure and strategy variables, and the foreign- and publicly-owned dummies, the MD coefficient just fails to achieve significance at 10 per cent (equation 2.1). However, this improves to better than one per cent as the least significant of these variables are progressively suppressed (equations 2.2 - 2.4). Best results are obtained when only the MD variable is retained, together with a single

dummy for the merged 'related-' and 'unrelated-business' category (equations 2.4 and 4.1). Application of an F-test to equation 2.4 confirms no significant increase in the residual sum of squares compared with the unrestricted, full model,<sup>(9)</sup> justifying this truncation procedure, while as previously explained, the specification in equation 4.1 was itself arrived at via a stepwise regression and the F-test procedure. By contrast, omission of the MD variable causes all reported coefficients and the equation as a whole to lose significance (equation 2.5).

No evidence was found that the negative M-form effect may have been produced by neglect of a non-linearity in the size variable or an important interaction between strategy and structure. Thus inclusion of a quadratic relation in size and the interaction term (MD. R/U) has virtually no effect on the results (equations 3.3 and 3.2). The interaction term (MD.S) is similarly insignificant in equation 3.1 and also leaves the results otherwise unaltered. The latter experiment is important in relation to Thanheiser's observation, cited earlier, that 'genuine' M-form tended to be found only among the largest firms. The fact that we observe no statistical evidence of a differential multidivisional effect with size may suggest that the performance impact of the three variants on multidivisional organization is in fact similar.

A further potentially important interaction between M-form and owner/bank control is examined in equations 4.1 - 4.3.

Several variables are involved and the use of specific interaction terms for each encounters multicollinearity. We therefore partition the sample and estimate separate regressions for the multidivisional and 'other' subsets of observations. To economise on degrees of freedom



we employ the minimal specification yielded by the stepwise procedure. In effect we estimate a variable coefficients model, the parameter estimates becoming a function of MD, albeit dichotomously. The approach is analogous to the switching model with a continuous discriminating variable.<sup>(10)</sup> The hypothesis is that MD and owner/bank-control are substitutes : alternative models of control. It predicts a significant relationship between profit and owner/bank-control among the 'other' group but not for multidivisionals, where external control is ex hypothesi redundant. At first sight the results support the hypothesis; equation 4.3 is significant overall whereas 4.2 is not. However, a Chow test rejects the hypothesis that the estimates are significantly different,<sup>(11)</sup> and the apparent difference in fact stems not from the control variables, which are insignificant in both equations, but from the two unreported industry dummies which are highly significant in 4.3 but not in 4.2 . Thus the overall result is inconclusive.

Finally we consider whether the negative M-form effect may have been spuriously generated by a combination of simultaneity and specification bias, bearing in mind the point at which our observations are taken. According to Chandler and others, multidivisional reorganization often follows a crisis. Where this is so, recent adopters are likely to have been experiencing low profits or losses. If reorganization itself is costly or if the benefits merely take a substantial period to materialise, low profitability will continue for a period. We were unable to include a variable capturing the time elapsed since the adoption of M-form in our analysis. But we know from Thanheiser that the late 1960's was a period of intensive reorganization. Our dependent

variable is calculated over the period 1968 to 1972 and if the foregoing chain of argument is valid we clearly may not be observing the true equilibrium effect. While previous US and UK studies offer little evidence of significant transactions costs and time lags, it could be argued that adaption will be more costly and take longer in Germany on account of the very institutional and cultural factors we have emphasised.

Table 5 : Alternative Dependent Variables : Key Coefficients

	Dependent Variable	HI	$V_k$	MD	$R^2$	F
5.1	$\left(\frac{\Pi}{K}\right)$ 68 - 72	.0468** (3.485)	.0458** (2.628)	-.0416** (-4.801)	.625	2.94
5.2	$\left(\frac{\Pi}{K}\right)$ 70-72	.0504** (3.838)	.0499** (2.933)	-.0372** (-4.388)	.619	2.87
5.3	$\left(\frac{\Pi}{K}\right)$ 71 - 72	.0508** (3.960)	.0443** (2.600)	-.0295** (-3.052)	.648	2.97

To mitigate this problem we rerun equation 2.4 using profits averaged over the period 1970/72 and 1971/72 only to see if the negative MD effect disappears or decays over time. Table 5 reports the key coefficient values. While the owner- and bank-control variables remain as strong as ever; the MD coefficient does drop substantially though remaining negative and significant at around a 2-3 per cent confidence level. We are inclined to conclude that our estimates exaggerate the long run negative M-form effect in Germany for the reasons given. But there is clearly a long way to go before the effect reduces to zero, let alone becomes positive.

Apart from certain of the industry dummies which have already been mentioned, the remaining variables (which were included purely to normalise for other possible extraneous effects) attract consistently insignificant coefficients.

## VI Conclusions

Analysis of the source of M-form gains and of German economic structure suggested attenuated benefits from multidivisional organisation in the German setting. The theoretical arguments did not rule out a negative impact on firm performance, but the very large, significant, negative effect obtained lies at the extreme of the expected range of possible outcomes. The result is statistically robust, surviving extensive respecifications in the models reported here and elsewhere. While the estimated coefficients may exaggerate the magnitude of the long-run impact due to the intrusion of transitional factors, a complete reversion to significant positive effects does not seem likely at this point.

The German result is out of line with the general run of previous findings, and contrasts strikingly with the methodologically-most-comparable study for Britain, where a significant positive effect equivalent to approximately half the mean rate of return across the sample was observed (Steer and Cable, 1978). However the German result in no way casts doubt on the earlier findings or refutes the M-form-hypothesis in general. For the essence of the argument is that there are institutional and cultural peculiarities in Germany, not present in America, Britain and possibly elsewhere, affecting the hypothesis.

Our findings do confirm that international differences in structure and culture may be important to technology transfer even amongst

developed countries, certainly in the adaptation process and probably beyond it. This is not altogether surprising in the case of managerial innovations, where human relations loom large. As yet, it appears, the day of the culture-free hypothesis is some way off. Meanwhile there are strong grounds for caution in carrying theories about economic institutions and their effects across national and cultural borders.

Footnotes

- 1/ Dyas and Thanheiser (1976) report the following figures for 1970: Britain 70%; France 43%; Germany 40%; Italy 26%.
- 2/ Isolated instances may have occurred elsewhere. Kocka (1980) claims that Siemens had adopted the main features of divisionalisation before 1914, but the initial major developments do appear to have been in the US from the 1920's onwards (Chandler, 1966).
- 3/ See also Caves (1980).
- 4/ Fama (1980) however has recently denied the existence of corporate ownership in any meaningful sense.
- 5/ See also Poensgen (1974) Rumelt (1974) Channon (1979).
- 6/ Dispersed ownership is defined as where no shareholding exceeds 20%.
- 7/ Considerations affecting the choice between return to capital and profit margin are discussed in Steer and Cable (1978).
- 8/ In what appears to be the only published German study, Thonet and Poensgen (1979) found that firms with higher  $\beta$ -risk on average show higher total returns on their shares, as is required by the efficient capital market hypothesis. In the present case, of course, we are concerned with return on assets rather than returns per share.
- 9/ Equations 2.1 - 2.4 are nested hypotheses. Testing 2.4 against 2.1 yields  $F = 0.36 < 2.51 = F_{6,24}^{0.05}$
- 10/ For a relevant application see Encaoua and Jacquemin (1981).
- 11/  $F = 0.29 < 2.21 = F_{9,30}^{0.05}$ .

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