# "NEGATIVE RISK-RETURN RELATIONSHIPS
# IN BUSINESS STRATEGY:
# PARADOX OR TRUISM ?"

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## N° 86 / 27

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October 1986

**ABSTRACT**

The present paper examines how the risk-return attributes of business strategy are related. First, a set of theoretical views and propositions is developed. These are based on the differences between real asset and financial asset investments, and on the impact of environmental events on strategic behavior. The developed hypotheses are tested in the context of the US pharmaceutical industry during the period 1963-1982. A first finding is that risk-return tradeoffs shift systematically from positive to negative over time. A disaggregated analysis for "Troubled" and "Auspicious" firms indicates that both classes of firms are characterized by positive risk-return relationships initially, and by negative relationships subsequently. This finding is related to the effects of environmental discontinuities on the strategic investment behavior of both classes of firms. A contingency framework relating types of risk-return relationships to states of the environment is proposed.

## NEGATIVE RISK-RETURN RELATIONSHIPS IN BUSINESS STRATEGY:
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INTRODUCTION

One of the most widely held beliefs about <u>investment</u> <u>behavior</u> is that
risk aversion governs the choice among risky alternatives.  Faced with a set
of investment opportunities, investors (or their agents) are postulated to
choose projects with the lowest risk for a given return.  It follows that
high-risk investments will be pursued only when equally high returns are
anticipated, and, <u>vice</u> <u>versa</u>, that higher returns can in general only be
achieved at the expense of higher risk exposure.

It seems plausible that risk aversion would also guide management in
evaluating a given set of strategic options; a positive risk-return trade-
off should also govern <u>strategic</u> <u>behavior</u>.  The proverbial "free lunch" of
higher returns and lower risk is not likely to be found in a strategic
management context.

Despite the logic of the previous arguments, a growing body of research
has advanced models and findings, suggesting that choice behavior may <u>not</u> be
universally risk averse, and that investment outcomes may evidence <u>negative</u>
risk-return trade-offs.  The work of Fishburn (1977), Kahnemann and Tversky
(1979), and Payne <u>et</u> <u>al</u>. (1984), for example, indicates that choice behavior
is fundamentally different in situations with negative pay-offs (losses)
than in situations with positive pay-offs (gains).  It is argued that the
predominant behavior is risk seeking when faced with below target returns or
losses, and risk averse when gains are anticipated.  Further, research of
Bowman (1980, 1982) and Figenbaum and Thomas (1986) on the association
between accounting determined risk and return provides evidence that many
investment outcomes show negative rather than positive risk-return trade-
offs.  Translated into a strategic management context, the previous findings
suggest 1) that risk seeking as well as risk aversion can characterize

strategic behavior, and 2) that strategies which yield high returns may involve relatively little risk.

Whether an extension of the previous theoretical work to a strategic management context is justified is not clear, however. The work of Fishburn, Kahnemann and Tversky, and Payne et al. is based on controlled experiments with individuals who do not have to implement the decisions of the experiments. Bowman and Figenbaum and Thomas do focus on risk-return outcomes of actual resource allocation decisions, but their work may suffer from aggregation problems. Risk and return observations were obtained for corporations as a whole. Given that the majority of firms are diversified (Christensen and Montgomery, 1981), these observations reflect an amalgam of business level events and actions. Corporate-level data may not reflect strategic risk-return relationships at the business level.

The present paper explores risk-return relationships at the level of individual businesses. The empirical context of the present work is the US pharmaceutical industry during the period 1963-1982. First, a set of propositions is developed, based on the differences between real asset and financial asset investment and on the impact of environmental events on strategic investment outcomes. Next, the research design is presented. In the empirical part of this paper, test results regarding the formulated hypotheses are presented. A section with implications for strategic management research on strategy-performance relationships concludes the paper.

## RISK-RETURN PROPERTIES OF STRATEGIC ACTIONS

If the risk-return outcomes of strategic behavior are to be understood, then insight must be gained into the determinants of risky choice behavior. In particular, the conditions under which positive or negative risk-return trade-offs may occur need to be studied. Capital Asset Pricing Theory (see, for example, Brealey and Myers, 1984), one of the cornerstones of current views on investment evaluation, is taken as the point of departure for the

following discussion.  How disequilibrium conditions in industries may affect strategic investment outcomes is considered subsequently.

## Risk-return relationships of real versus financial assets

Capital asset pricing.  Capital asset pricing theory has contributed substantially to the formulation of rational investment strategies in financial assets.  In its basic form, the theory states that each investor will hold the market portfolio which is blended with the risk-free asset (borrowing or lending) to obtain the particular risk-return characteristics which suit his individual preferences.  One of the most remarkable contributions of capital asset pricing theory is the derivation of a unique market-based benchmark for evaluating the trade-off between risk and expected return: beta.

Finance scholars have subsequently applied capital asset pricing theory to the valuation of real asset investments.  The basic argument here is that one should invest in a project only when the return more than compensates for the project's systematic risk.  However, as Brealey and Myers (1984) point out: "We know very little about how the great non-routine financial decisions are made [...].  Our ignorance is largest when it comes to major strategic decisions (p. 735).  [...] "capital asset pricing theory supplies no mechanical formula for measuring and adjusting for risk in capital budgeting. [...]  The best one can do is to combine an understanding of the theory with good judgement and a good nose for hidden clues" (p.166).  Clearly, strategic investments in real assets cannot be evaluated as unequivocally as investments in financial assets.  As argued below, the difficulties are related to the characteristics of real asset markets as opposed to financial markets.

Real asset pricing.  Some of the basic assumptions of capital asset pricing theory are that capital markets are competitive and that assets are freely tradeable.  Information about stocks is continually sought and quickly disseminated among investors.  If relevant new information is obtained, investors can easily adjust their holdings if they wish to.  These

two assumptions which largely hold for capital markets imply a high degree
of flexibility which indeed characterizes investment in financial assets.

Such is not the case, however, for strategic investments in real assets.
Typically, the twin assumptions of freely tradeable assets and competitive
input and output markets do not hold. If input markets were perfect, firms
could easily and quickly assemble the particular stock of assets (resources
and skills) necessary to pursue a given investment opportunity. Under the
assumption of perfect output markets, firms would be equally positioned to
obtain an expected return on the investment.

However, as Coase (1936), Williamson (1975), Nelson and Winter (1982) and
others have pointed out, both input and output markets are fraught with
numerous imperfections. Given imperfections in input markets, the pursuit
of a strategic investment opportunity typically requires a commitment
towards accumulating particular asset stocks (a reputation for reliability,
technological capabilities, etc.) over a considerable period of time.
Indeed, critical assets may be tied up; imitation of these assets may be
difficult if not impossible because knowledge to reproduce the resources and
skills may be "tacit" (Nelson and Winter, 1982; Lippman and Rumelt, 1983);
finding substitutes for required assets may not be possible without
significant costs, substantial lead times or uncertainty about the outcome
(McGee, 1982). In short, the particular stock of assets required to pursue
a given investment opportunity generally includes critical assets which are
non-imitable, non-substitutable or non-tradeable. This allows firms who
possess these critical assets to enjoy (at least temporary) advantages.
Therefore, in contrast to financial markets, a given investment opportunity
does not necessarily provide a similar return[1] to all investors.

Even if input markets were perfect, imperfections in output markets can
result in different returns to firms pursuing a similar investment
opportunity. If the degree of market power differs among firms competing in
the same market (segment), firms with more market power may be able to
realize higher returns than other market participants.

Many ambiguities are seen to enter the a priori evaluation of investments in real assets. Especially with strategic investments where past experience may be neither relevant nor reproducible, firms face formidable problems in evaluating investment opportunities. They hardly ever have the convenient benchmark which investors in financial markets have for evaluating investments. Given that many real assets (e.g., skills) are not freely traded, or less actively traded, asset betas may be impossible or difficult to estimate. Even if they can be estimated from observations of other firms, they may not be useful if a firm needs to deploy different kinds of assets and/or possesses a different degree of market power.

In summary, although capital asset pricing theory can in principle be applied to the valuation of real assets (Rubinstein, 1973; Boardman and Carruthers, 1985), at least four factors impede a straightforward application: 1) the return generating process for real assets is more complex than for financial assets; 2) input markets may be imperfect, impeding the procurement of required assets; 3) strategic investments often require irreversible investments in real assets and 4) different competitors in output markets may have varying degrees of market power. Although firms may be risk-averse by intention, risk-return trade-offs cannot be as easily implemented in real investments as in financial investments. Given these factors, it may not be surprising to find that, ex post, investments result in negative as well as to positive risk-return outcomes. Under what conditions positive or negative risk-return outcomes can be expected is discussed next. The framework is based on the relationship between past and current business strategy, and is linked to environmental events.

Positive and negative risk-return relationships in business strategy

It follows from the previous discussion that a key dimension of strategy formulation may be identified as the task of making appropriate choices about strategic expenditures (advertising spending, R&D outlays, etc.) with a view to accumulating required resources and skills (brand loyalty, technological expertise, etc.). In other words, appropriate time paths of relevant flow variables must be chosen to build required stocks of critical

assets. At any moment in time, the levels of the achieved asset stocks determine the potential for sustainable competitive advantage. Sustainability stems from the fact that while flow variables can often be adjusted instantaneously, stocks (in the absence of perfect input markets) cannot.

It can be argued that a necessary condition for effective business strategy is that current strategic actions build on accumulated assets to exploit a perceived market opportunity. Environmental changes may trigger adaptive responses by some firms which are incongruent with the accumulated "stock" of their assets. This lack of "fit" may result in low returns and increased risk exposure. In contrast, other firms may have at their disposal a pool of skills and resources that enables them to adapt more easily to changed environmental conditions. These firms would not only be better positioned to seize perceived market opportunities by reason of their superior asset positions, but in addition, they may be able to contain their risk exposure due to the asset inadequacy of their poorly endowed rivals. Thus, "well-endowed" firms would be able to realize high returns at disproportionally low risk. Under the previous scenario, negative risk-return relationships would describe investment outcomes in industries. What conditions may trigger such a situation is discussed next. Central in the argument is the concept of strategic groups and the reaction of strategic group members to environmental events.

Strategic group structures. To study the business strategies of firms[2] in an industry, the concept of strategic groups has been shown to be useful (see, for example, Porter, 1979; Cool and Schendel, 1985). Basically, strategic group theory states that stable strategy differences can be observed among groups of firms in a particular industry. The commonality of firms described by a given strategic group is their similarity in current scope and resource commitments for competing in the industry.

The idiosyncratic history of each firm prevents, however, complete asset base similarity. Inevitably, past actions produce heterogeneity in the stock of assets group members have accumulated. For example, a firm's

technological know-how (a "stock") depends not just on current R&D efforts (a "flow") but also on R&D budgets in previous years. As argued below, whether these "latent" differences are important for risk-return characteristics of strategic investments depends on environmental conditions.

Positive risk-return outcomes. Provided sufficient time is allowed to either adjust current strategy or the stock of assets necessary for efficient implementation of current strategy, firms may be expected to achieve a close "strategic fit". Thus, under conditions of environmental stability, discrepancies between a firm's "stock" of accumulated skills and resources and its current strategy will be minimized. In general, firms may still have different asset stocks and pursue different investment opportunities, depending on their risk-return preferences. However, in each case, asset stocks will be optimal to pursue the chosen investment opportunity. Thus, differences in asset stocks will not translate into differences in the effectiveness of current strategy implementation.

Note that the "stability" condition for real assets markets – characterized by resource immobility – has similar implications as the "flexibility" condition for financial markets: under both conditions, a positive risk-return relationship is expected. For low risk opportunities, substantial competition from other firms may be expected, leading to equally low returns. Higher returns will thus  ily come at the expense of higher risk exposure.

Negative risk-return investment out mes. As argued earlier, under stable conditions a tight "strategic fit" may be expected for all firms. This is not necessarily the case in a more turbulent environment. Environmental discontinuities may require adaptive responses which, in the case of some firms, create important imbalances with their existing stocks of skills and resources. These imbalances in turn translate into reduced effectiveness of current strategy implementation. In short, new environmental conditions require such "Troubled Firms" to take actions which entail high risk and disproportionally low returns.

The same events may provide other firms with opportunities that can be exploited at low risk. If these firms have at their disposal a "pool of resources" that permits strategy "adjustment" or that enables them to initiate major strategy "changes" (Snow and Hambrick, 1980), high return investments may be pursued at low risk. This low risk stems not only from superior assets and the protection of this position due to imperfections in input and output markets, but also from the inability of Troubled firms to effectively carry out their strategies in the market place. One can thus argue that in any strategic group, "Auspicious" members may exist alongside Troubled members. If the actions of Troubled and Auspicious group members in times of environmental turbulence are considered together, then one can see that negative risk-return relationships may describe strategic investment behavior in industries.

It should be noted that the previous argument does not require an a priori intention or propensity for risk seeking on the part of "Troubled" firms. However, the argument has been made (Bowman, 1982) that Troubled firms are indeed intentionally risk seeking (cf. also Fishburn (1977), Kahneman and Tversky (1979) and Payne et al. (1984)). Whether observed negative risk-return relationships result from intentional risk seeking or merely reflect (undesired) ex post outcomes resulting from the inadequacy of Troubled Firms' asset stocks can not be inferred from data.

Summary. The previous arguments suggest that the risk-return relationships of strategic investments may need to be analyzed from a contingency perspective. When industries are stable or changing slowly, investment opportunities should be governed by a positive risk-return relationship. When industry conditions change sufficiently to result in a state of (temporary) disequilibrium, negative risk-return trade-offs may be found.

HYPOTHESES

The previous arguments call for this analysis of at least four issues: 1) are the risk and return attributes of strategic investments positively or negatively related?; 2) does the risk-return relationship change over time?; 3) if risk and return are found to be positively and/or negatively related, are different environmental conditions associated with these different relationships?; and 4) do Auspicious and Troubled firms have different risk-return relationships? With respect to the last question, one would anticipate, based on the arguments developed above, that for a given state of the environment, the strategic investment behavior of firms would be governed by similar risk-return outcomes: either positive or negative, but not both.

This set of questions will be examined in the context of the US pharmaceutical industry during the period 1963-1982. In particular, the following hypotheses, stated in null-form, will be tested:

H1:     The risk and return attributes of business strategy actions are positively related

H2:     Risk-return relationships of business strategy actions are stable over time

H3:     The risk and return attributes are similarly related for Auspicious and Troubled firms.

RESEARCH DESIGN

To test the various hypotheses, a longitudinal research design is necessary. Two alternative research approaches may be followed. Given that firms adjust or change their strategies in reaction or anticipation to environmental events, a first approach would be to trace the patterns of changes in business strategy of industry participants. If over time periods with different configurations of business strategies (strategic group structures) were to be found, these periods could be used to evaluate the risk-return relationships of the set of observed business strategies. Alternatively, a second approach would be to study the changes in the

environment directly with the purpose of identifying periods with distinct environmental conditions.

The present study uses both complementary approaches in the context of the US pharmaceutical industry. In a first stage, the evolution of the strategic group structure of the industry is considered. On the basis of the procedure described in Appendix I, periods with distinct strategic group structures are determined. The set of observed business strategies for each period forms the basis for estimating risk-return relationships.

Given the importance attached in this study to environmental changes, the patterns of environmental changes in the US drug industry are also analyzed. This second stage of the analysis is designed as a control on the results obtained using the strategic grouping approach. If separate analyses of strategic groupings and environmental changes were to lead to similar results in terms of finding different phases of industry evolution, a solid basis would exist to analyse risk-return relationships.

Selection of business strategy and environmental variables

To allow accurate identification of strategic groups, the concept needs to be defined carefully. Building on previous work (e.g., Caves, 1984; Cool, 1985; McGee and Thomas, 1986), the strategic actions intended to realize a sustainable competitive advantage are taken as the dimensions which define strategic group membership. Integrating previous findings on business strategy research (e.g., Katz, 1970; Hofer and Schendel, 1978; Rumelt, 1979; Day, 1984), these dimensions are defined as business scope and resource commitments. Included in the scope commitments are those decisions involving: 1) the range of market segments that are targeted, 2) the types of products offered in the market segments selected, and 3) the geographic reach or scope of product-market strategy. Resource commitments are defined to include business level deployments of resources to those functional areas that are key to obtaining and maintaining a competitive advantage in target product-market segments.

Tracing changes in the environment poses formidable problems given the many factors that can potentially impinge on firm behavior. To guide the variable selection, the common distinction between economic, technological, political and social factors was made, following Hofer and Schendel (1978).

Actual variable selection was based on a study of the US drug industry (Cool, 1985) and discussions with industry executives and experts. The chosen strategy and environmental variables and their measures are given in Tables 1 and 2 respectively.

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Insert Tables 1 and 2 about here

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## Measurement of return and risk

Since most pharmaceutical firms are diversified, financial market measures are not suitable to gauge the performance of their pharmaceutical operations. Accounting measures therefore had to be used. To measure the return of each firm's pharmaceutical operations, an inflation-adjusted measure of Return on Sales (AROS) was derived[3]. This measure was subsequently averaged over each period with a relatively stable strategic group structure (see Appendix I): 1963-69; 1970-74; 1975-79 and 1980-82. A single return measure was hence obtained for each firm in each period.

Evaluating the risk of the business strategies of each firm raises many measurement issues. Three considerations led us to evaluate total risk rather than systematic risk: 1) the empirical difficulty to estimate beta at the business level; 2) the fact that theoretically and empirically[4], beta is related to total risk; and 3) management is responsible to a wider group of "stakeholders" than just shareholders, making total risk a prominent concern. Total risk for each firm (VAROS) was measured by the standard deviation of AROS about the temporal mean for each of the four periods referred to above.

## Data sources

The data bases of IMS America constituted the major source of information for the strategy variables. Other data bases used include the Paul de Haen International New Drug Analysis and New Product Survey, reports by Frost and Sullivan, Leading National Advertisers, Drug Topics, Advertising Age, Chemical Abstracts, the Merck Index, and FDA reports. For the variables on the environment of the drug industry, a variety of data from government agencies and industry associations was used. Finally, for the risk and return variables, the 10-K line of business reporting and annual reports were consulted. A full description of these data sources is given in Cool (1985: 299-337).

## EMPIRICAL RESULTS

To test the various hypotheses formulated above, regression analysis was performed to estimate the risk-return relationship of business strategy in the context of the US pharmaceutical industry during the period 1963-1982. A statistical comparison of estimated coefficients from the regressions for different time periods formed the basis for evaluating the stability of risk-return relationships. The following discussion first presents the estimated results for each of the four periods with a relatively stable strategic group structure. The results of a cluster analysis on the environmental variables are discussed next. Using the results from the previous two analyses, the risk-return properties of the business strategies of Auspicious and Troubled firms are studied thereafter in more detail.

## Risk-return relationships in each period of stable strategic group structure

A preliminary issue to consider is whether risk-return relationships for different time periods should be estimated independently. In principle, one might perform an ordinary regression analysis of average return (AROS) on risk (VAROS) for each period. Yet, since a regression of return on risk excludes other determinants of firm profitability, and given that all firms

operate in the same industry, excluded factors may produce correlations
between the disturbances of the risk-return relationships of the four
periods. Under these conditions, the relationships are not unrelated but
"seemingly unrelated" (Theil, 1971: p. 294-302). Zellner (1962) has shown
that a joint estimation of all equations using Generalized Least Squares
(GLS) will result in more efficient estimates than when Least Squares
estimation is applied to each equation separately. This estimation is known
as the "seemingly unrelated regressions" (SUR) model. This grouping of
equations to estimate the risk-return relationship for all periods was
applied here. The steps leading towards the estimation are described below.

First, Ordinary Least Squares (OLS) estimation was performed on the
relation of return (AROS) on risk (VAROS) for each period:

$$\overline{AROS}_i = \alpha_i + \beta_i\ VAROS_i + \varepsilon_i \qquad [1]$$

where $\qquad i = 1, \ldots, 4$ denotes the four time periods

$\overline{AROS}_i$ = an n x 1 vector representing the average
profitability of the n firms over period i

$VAROS_i$ = an n x 1 vector representing the variances of each
firm's profitability about its period mean $AROS_i$.

Results indicated that each of the four estimations was affected by
heteroskedasticity, a common problem with cross-sectional samples. To
alleviate this problem, each variable and the constant term in [1] was
divided by $VAROS_i$, a common correction (see, for example, Johnston, 1972:
214-221). If we denote $AROS_i$ / $VAROS_i$ by $y_i$, 1 / $VAROS_i$ by $x_i$, and
$\varepsilon_i$ / $VAROS_i$ by $u_i$, then each equation can be written as:

$$y_i = \alpha_i\ x_i + \beta_i + u_i \qquad [2]$$

or more general:

$$y_i = X_i\ b_i + u_i \qquad [3]$$

The set of equations to estimate then are:

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \end{bmatrix} = \begin{bmatrix} X_1 & 0 & 0 & 0 \\ 0 & X_2 & 0 & 0 \\ 0 & 0 & X_3 & 0 \\ 0 & 0 & 0 & X_4 \end{bmatrix} \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \end{bmatrix} \qquad [4]$$

GLS-estimation was applied to [4] in accordance with the "seemingly unrelated regressions" (SUR) model. The estimates are given in Table 3. Also given in this table is the adjusted $R^2$ for each of the equations [2] estimated separately, to give an approximation of the goodness of fit of the regressions. The results are discussed below.

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Insert Tables 3 and 4 about here

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Discussion. Inspection of the results in Table 3 indicates that the relationship of risk and return of business strategies is not stable over time. The $\hat{\beta}_i$-estimates which measure the realized trade-off between risk and return change in a systematic manner over time. In the first period (1963-69), a highly positive and significant relation is found. While this relation is still positive in the second period (1970-74), the coefficient is apparently quite a bit smaller. During the second decade studied, a negative relationship emerges. While the negative coefficient for the third period (1975-79) is not significant, the coefficient in the fourth period (1980-82) becomes more strongly negative and significant. A systematic change from highly positive to less significant to highly negative thus emerges.

Further insight into the temporal stability of the estimates is given in Table 4 where the statistical difference between the $\hat{\beta}_i$-estimates of the four time periods is evaluated. The results of this comparison show that the difference between the positive and negative coefficients is highly significant ($p < 0.05$). The observed change from positive to negative risk-return trade-offs is thus not likely to be due to chance. On the other hand, the results in Table 4 also indicate that it cannot be concluded with

the same confidence that the differences <u>among</u> the positive coefficients (first two periods) and <u>among</u> the negative coefficients (last two periods) are significant. A qualitatively similar risk-return relationship is thus observed for longer time periods than suggested by the results of Table 3. The duration of these periods is twelve years for the positive relationship (1963-74) and eight years for the negative relationship[5].

The previous results then suggest that the risk-return attributes of the observed business strategies may be evaluated over the two larger periods rather than over the initial four periods. If different relationships characterize strategic investment behavior over time, then also the analysis over two periods should indicate the transition from positive to negative risk-return relationships. The results of the analysis are discussed next.

## Risk-return relationships in the periods 1963-74 and 1974-82

To estimate the risk-return outcomes of the observed business strategies in the periods 1963-74 and 1975-82, the risk and return variables for each firm were first recalculated with the two periods as reference base. As above, SUR-estimation was performed on the risk-return relationship for the two periods. The estimates are given in Table 5.

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Insert Table 5 about here
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The results in Table 5 indicate that a significant positive relationship governs the risk-return outcomes of strategic investments in the 1963-74 period, while a significant negative relationship is observed for the 1975-82 period. These findings are clearly in agreement with the earlier reported results. Moreover, a comparison of the differences between the $\hat{\beta}_i$-estimates (t = 3.286) and between the $\hat{\alpha}_i$-estimates (t = 3.282) confirms that the differences in the relationships are not likely to be due to chance. This result lends further weight to the finding of changing risk-return relationships of strategic investment behavior over time.

A first conclusion that emerges from the previous analyses then is that
the first two hypotheses need to be rejected. Negative as well as positive
risk-return trade-offs are empirically found. Given the systematic pattern
of change of this trade-off over time, it can also be concluded that risk-
return relationships of business strategies are not stable over time. These
findings indicate that the strategic investment behavior of the sampled
firms has changed over time. Whether this shift can be explained in terms
of environmental discontinuity is explored below.

## Environmental conditions in the US pharmaceutical industry

It was suggested in the first part of this paper that different
environmental conditions would be at the basis of a possible shift in risk-
return outcomes. During periods of relative environmental stability,
positive risk-return trade-offs should govern strategic investments. During
periods of environmental turbulence, a negative risk-return relationship is
expected. As argued before, rivals may not be equally successful in adapting
to major changes in the industry's environment. Due to the inadequacy of
their asset base (stock of critical assets), Troubled firms may take actions
resulting in both higher risk exposure and lower returns. Auspicious firms
might be able to exploit not only their own advantageous asset positions,
but also the ineffectiveness of the actions taken by their Troubled rivals.
Whether environmental conditions are indeed at the basis of the observed
shift in risk-return relationships in the US drug industry, is examined in
the following sections.

Analysis of the pharmaceutical industry indicates that important
environmental changes have occurred in the period studied. For example, the
1962 Amendments to the 1938 Food, Drug and Cosmetics Act profoundly
influenced the conditions for research and development. Other important
events since this landmark legislation include: the increasing number of
patent expirations, the growing importance of generic drug prescribing and
competition from generic drug firms, the increasing FDA regulation of drug
development, production and marketing, the decline of new chemical entity
discoveries, the repeal of State-Anti Substitution laws, the growing impact

of the Maximum Allowable Cost Program, and the increasing entry of non-US firms into the US market. It is generally acknowledged by industry observers that the cumulative effects of these changes created a radically different competitive environment for the US drug industry.

In order to identify changes in environmental conditions more systematically, cluster analysis (Ward method) was performed. For each year during the period 1963-1982, the state of environmental conditions in the US drug industry was described by a set of variables, defined in Table 2. The dendrogram from the cluster analysis is shown in Figure 1.

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Insert Figure 1 about here
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While cluster analysis can not provide "the" optimal level of clustering, it minimally indicates what aggregations should not be made. It is clear from Figure 1 that the periods 1963-73 and 1974-82 should not be combined. The sharp increase in the criterion function indicates that these two periods are characterized by very different environmental conditions.

A detailed analysis of the differences between these two periods is beyond the scope of this paper. The interested reader can refer to Appendix II for a brief discussion of the most important differences. Given the focus in this paper on the changes in risk-return trade-offs as related to environmental conditions, of concern is whether a close correspondence exists between these two phenomena. The regression analysis indicated that structurally different risk-return trade-offs were present in the periods 1963-74 and 1975-82. The fact that the cluster analysis points to significantly different environmental conditions during the periods 1963-73 and 1974-82, suggests that the changes in risk-return trade-offs are indeed closely associated with dramatically different states of the environment.

It should be recalled that the identification of periods in which risk-return trade-offs were evaluated was based on an analysis of changes in the strategic behavior of firms. The convergence on the identification of

distinct periods, based on an analysis with different sets of variables, is quite remarkable. This convergence provides substantial circumstantial evidence of a close association between different states of the environment and changes in risk-return trade-offs of strategic investment behavior. A contingency perspective indeed appears to be necessary to understand the risk-return properties of business strategy actions.

To further analyze the working hypothesis of a contingency relationship between states of the environment and risk-return outcomes of strategic investments, the investment behavior of industry participants needs to be examined more closely. It was argued earlier that the aggregate industry-level findings in fact reflect the (different) investment behavior and outcomes of different types of firms. Whether a disaggregated analysis confirms this is examined next.

## Risk-return relationships of Auspicious and Troubled firms

In times of important environmental discontinuities, Auspicious firms may realize high returns at low risk while Troubled firms may need to settle for below-target returns and high ex post risk. On the other hand, during periods of relative stability when industry conditions are better understood, higher returns may only come at the expense of higher risk exposure for all firms.

The next analysis for the periods 1963-74 and 1975-82 evaluates whether the risk-return relationships are different for Auspicious and Troubled firms. Given all previous arguments one would expect the following results: 1) in any period, the strategic actions of both types of firms will either show a positive or a negative trade-off, but not both; and 2) the coefficient measuring the risk-return trade-offs is not different for both types of firms in the first period with an overall positive relationship, but will be different in the second period where an overall negative relationship was observed. This second expectation is based on the hypothesis that a different investment behavior characterizes Auspicious and

Troubled firms in periods with high environmental turbulence, but not in
more stable periods.

To identify the Auspicious and Troubled firms, those firms with the
largest and with the smallest returns were identified in each period.  The
middle six firms were deleted to obtain more homogenous subsamples of both
types of firms.  Next, GLS-estimation was applied to the risk-return
relationships of Auspicious and Troubled firms in each of the two periods.
In total, four equations were then jointly estimated.  The results are given
in Table 6.  The t-statistics from the comparison of the estimates are
presented in Table 7.

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A first observation relates to the sign of the coefficient measuring
the risk-return trade-offs of Auspicious and Troubled firms.  It can be seen
from Table 6 that in each period, both classes of firms show a similar type
of risk-return trade-off.  In line with expectations, the sign is positive
for the 1963-74 period and negative for the 1975-82 period.  This finding
already provides an important corroboration of the proposed theoretical
views.  In any one period, the strategic investment behavior of firms in
both classes is characterized by similar risk-return relationships.  The
present disaggregated analysis thus confirms the earlier results from the
analysis performed at the aggregate industry level: not only is a shift from
positive to negative risk-return trade-offs observed, this shift affects
Auspicious and Troubled firms alike.

The results from the comparison of the estimates reported in Table 7
permit us to make a more detailed assessment of the differences in the risk-
return relationships of both classes of firms, and of the shift in these
relationships over time.  A first conclusion is that for the first period,
the risk coefficient $\hat{\beta}_i$ does not differ statistically between both classes
of firms.  As was projected, similar risk-return trade-offs govern the

strategic investments of both Auspicious and Troubled firms. Higher (lower) risk investments are associated with equally higher (lower) returns.

The previous result however does not imply that all firms realize similar returns on their strategic investments. Given that the estimate of the intercept, $\hat{\alpha}_i$, is statistically <u>larger</u> for Auspicious firms than for Troubled firms, the latter firms still are at a disadvantage. For any level of risk exposure, Troubled firms realize a significantly lower return. While the present analysis does not permit us to provide an unequivocal explanation for this finding, some speculation about the reasons for this discrepancy can nevertheless be made.

It was found before (Cool and Schendel, 1985; 1986) that returns differ statistically among strategic group incumbents and not between strategic groups. In view of these findings, one cannot attribute the absolute performance differences between Auspicious and Troubled firms to current strategy. Initial conditions, beyond current business strategy, have to be responsible for the performance differences. On the basis of the arguments presented in the first part of this paper, one can speculate that initial <u>asset</u> <u>stock</u> <u>differences</u> contribute to the differences in returns. When input market imperfections are present, Troubled firms may not be able to acquire, imitate or substitute all the critical assets necessary to pursue their chosen strategic objectives.

If the previous argument holds, one would expect that membership in the class of Auspicious and Troubled firms would be quite stable. An inspection of membership over the two periods confirms this. Of the eight firms belonging to the class of Auspicious firms in the period 1963-74, six were still in the same class in the period 1975-82. Conversely, seven of the eight firms belonging to the class of Troubled firms in the 1963-74 period were still in the same class in the 1975-82 period. This high degree of stability adds further weight to the contention of sustained asset stock differences between firms.

In summary, it is observed for the first period that risk-return trade-offs are similar for Auspicious and Troubled firms. Yet, though no disadvantage is present in the _rate_ at which return is increased for each unit of risk addition, Troubled firms still face a significant disadvantage in terms of attained _level_ of return. The argument is made here that initial asset stock differences, compounded by input market imperfections, contribute to this sustained disadvantage.

The estimates of the risk-return relationships for the _second_ period point to an even more disadvantaged position for Troubled firms. Not only do they realize lower returns for any level of risk exposure (statistically lower intercept $\hat{\alpha}_i$), they are also penalized by a higher return reduction than would be the case for Auspicious firms (statistically lower slope coefficient $\hat{\beta}_i$ for Auspicious firms). These results are in line with the projections made earlier: Auspicious firms are able to increase their returns while lowering their risk exposure, partly because of the ineffective actions of Troubled firms in output markets, and partly because of the advantage protected by input market imperfections.

## DISCUSSION

The previous analyses were performed to test the formulated hypotheses. It was postulated that: 1) the risk and return properties of business strategy actions are positively related; 2) risk-return relationships are stable over time, and 3) Auspicious and Troubled firms have similar risk-return relationships. The various results suggest that "universal" statements about risk-return relationships of strategic investments do not withstand the test of empirical verification. Risk-return trade-offs can be both positive and negative, they are not stable over time, and different classes of firms may face different risk-return conditions on their strategic investments. A contingency framework relating different states of the environment to the different strategic investment outcomes of firms thus emerges as a more appropriate perspective for describing the risk-return properties of strategic investments.

Important changes in the economic, political, technological or social environment may disrupt the competitive posture of some firms while opening a "strategic window" for others. For "troubled" firms, the strategic responses required to adapt to the new set of environmental conditions entails important imbalances between pursued strategy and existing asset stocks. Alternatively, the propensity for risk-seeking in these situations (Fishburn, 1977; Kahneman and Tversky, 1979; Payne et al., 1984) may prompt these firms to initiate actions which are too far away from their competence base. Below-target returns and higher risk exposure are the results. Conversely, the same set of conditions may enable well-endowed firms to exploit both their asset advantages and their rivals' asset imbalances, leading to high returns and relatively low risk.

In the industry taken as an example, the US pharmaceutical industry, this evolution appears to have occurred. The 1962 Amendments constituted an important discontinuity in the environment of the drug industry. While this environmental change was an important discontinuity for all firms, it constituted a "strategic window" for firms with strong R&D capabilities, good FDA relationships and ample R&D resources, and a "threat" to firms with less developed or decreasing R&D resources and skills. The subsequent technological, political and economic changes described earlier, reinforced the imbalance between Auspicious and Troubled firms, and may have evoked different investment behavior, or genuine "changes" in strategic commitments. Given the long lead effects between actions and investment outcomes in the drug industry, the results of this diverging investment behavior became evident only much later. This accounts for the lag in the shift from positive to negative risk-return trade-offs. These long lead times however also imply that disequilibrium conditions can last for long periods of time. The long period with negative risk-return trade-offs illustrates this.

Although the present study does not allow us to generalize beyond the one industry studied, there is ample case evidence pointing to similar patterns for other industries going through prolonged restructuring phases (e.g., tire industry, paper machinery industry). Bowman's (1980) finding

that risk and return were negatively correlated in 56 out of 85 industries studied illustrates that the results for the drug industry may not be an exception but reflect <u>fundamental</u> phenomena in industries.

How firms can affect their risk exposure while committing resources thus becomes an important consideration. A few researchers have given attention to this topic. For example, Bettis and Hall (1982) found that risk affects return differently across different diversification strategies. Jemison (1985), in his study of the strategic behavior of a sample of US banks, showed that different organizational processes differentially affect the risk of strategic actions. These two studies provide evidence that different "asset procurement" and "asset combination" strategies are differentially related to risk exposure.

In light of this growing body of empirical evidence, as well as the theoretical and experimental research of Fishburn (1977), Kahnemann and Tversky (1979) and Payne <u>et</u> <u>al</u>. (1984), negative risk-return relationships for strategic investments no longer seem paradoxical. Indeed, to practitioners, the notion of negative risk-return relationships may have the familiar ring of a truism.

NOTES

1.  Accounting return, which includes Ricardian rents to the superior inputs as well as the economic return.

2.  Since strategic group analysis is concerned with rivalry within an industry, the term "firm" stands for "division" or "strategic business unit" in the case of diversified corporations, or for the firm itself if it is not diversified.

3.  Particularly when longitudinal research is conducted, the effects of inflation need to be considered. Following Winn (1975), a procedure was developed to adjust return on Sales (ROS) for inflation effects. Income statement elements were expressed in 1982 values, and depreciation changes were restated to alleviate their bias towards understatement. A ratio determined as "inflation-adjusted net income before interest and taxes of pharmaceutical operations", to "inflation-adjusted pharmaceutical sales", was thus computed. The full procedure is discussed in Cool (1985: 562-565). The help of Dr. Robert Eskew, Professor of Accounting at Purdue University is gratefully acknowledged.

4.  See, for example, Myers (1977) for an overview of some empirical evidence on the relationships between earnings volatility and systematic risk.

5.  A comparison of the $\alpha_i$-estimates, similar to the comparison performed in Table 4, indicated that the first two periods as well as the last two periods do not have statistically different $\alpha_i$-estimates. The t-statistics are 0.563 and 0.291 respectively. Combined with the results from Table 4, this suggests that the first two periods on the one hand, and the last two periods on the other hand, do not have statistically different risk-return relationships.

<u>Table 1</u>: Variables describing strategy in the US pharmaceutical industry

| STRATEGY DIMENSION | MEASURE |
|---|---|

**SCOPE COMMITMENTS**

<u>Range of Market Segments</u>:

| | |
|---|---|
| 1. Breadth of Scope (FOCUS) | 1. (Rx sales in 3 largest therapeutic categories) ÷ (Total domestic Rx Sales) |
| 2. Commitment to Ambulatory Care Market (DRUGST) | 2. % Drug store sales in total domestic drug sales |

<u>Types of Products</u>:

| | |
|---|---|
| 3. Commitment to the Ethical Drug Market (Rx) | 3. % Rx sales in total domestic drug sales |
| 4. Branded Generics (BRANGEN) | 4. % Branded generic Rx sales in total domestic Rx sales |
| 5. Commodity Generics (COMMGEN) | 5. % Commodity generic Rx sales in total domestic Rx sales |
| 6. Commitment to the maintenance drug market (MAINT) | 6. % Maintenance drug sales in total domestic Rx sales |

<u>Geographic Scope</u>:

| | |
|---|---|
| 7. Spatial Reach (FOREIGN) | 7. % total firm sales generated abroad |

**RESOURCE COMMITMENTS**

<u>Research & Development Commitments</u>:

| | |
|---|---|
| 8. Current R&D spending (RDINTEN) | 8. (Total firm R&D) ÷ (Worldwide health care sales) |
| 9. R&D Capital Stock (RDCAPIT) | 9. (Cumulative Number of NDAs submitted) ÷ (Cumulative Number of INDs submitted) |
| 10. R&D Orientation (RDORIENT) | 10. (Cumulative Number of NCEs approved) ÷ (Cumulative Number of NDAs submitted) |

<u>Marketing Commitment</u>:

| | |
|---|---|
| 11. Product Strategy (PRODSTR) | 11. (Cumulative Number of NCEs introduced) ÷ (Cumulative Number of all products introduced) |
| 12. Promotion to the medical profession (PROFPROM) | 12. (Total domestic professional promotion) ÷ (Total Rx sales) |
| 13. Advertizing to the consumer (CONSADV) | 13. (Total domestic PTY drug advertizing) ÷ (Total domestic Rx sales) |
| 14. Distribution Strategy (DISTR) | 14. % total domestic drug sales shipped directly to drugstores and hospitals |

<u>Size</u>:

| | |
|---|---|
| 15. Scale of drug operations (SIZE) | 15. Ln (Total domestic drug sales) |

Table 2: Variables describing the environment of the US pharmaceutical industry

| ENVIRONMENTAL DIMENSION | MEASURE |
|---|---|
| **Economic Environment** | |
| 1. Real Growth (RXGROWTH) | % annual change in real domestic RX shipments |
| 2. Inflation (PRCHANGE) | % annual change of drug producer prices |
| 3. Generic Prescriptions (GENPRESCR) | (N° prescriptions written generically)/ (total N° of prescriptions) |
| 4. Concentration (WSSCONC) | weighted average of the four-firm concentration ratios in all therapeutic categories |
| **Political Environment** | |
| 5. FDA Regulation (FDAREG) | (total FDA appropriations in constant dollars)/(total N° of full-time FDA employees) |
| 6. Effective Patent Life (PATLIFE) | mean effective patent life of NCEs introduced in each year |
| 7. New Drug Introductions (TOTNCE) | N° of NCEs introduced nationally |
| 8. Generic Drug Laws (STATES) | cumulative % of states repealing their anti-substitution laws |
| 9. R&D Spent Abroad (RDABRD) | % of global drug R&D spent outside the US by US firms |
| **Technological Environment** | |
| 10. Concentration in | |
|    (i) INDs submitted (INDCONC) | four-firm concentration ratio in N° of INDs submitted |
|    (ii) NCEs approved (NCECONC) | four-firm concentration ratio in N° of NCEs approved |
| 12. Technological Progress (NUMPAT) | five-year moving average of the N° of patents granted in the SIC 283 "Drugs & Medicines" |
| 13. Foreign Competition in Drugs (USPAT) | % of total patents granted to US corporations and individuals |
| **Social Environment** | |
| 14. Drug Consumption (DRUGPC) | real drug expenditures per capita (in constant 1982 values) |
| 15. Drug Spending in Total Health Care Expenditures (DRUGHC) | (real drug expenditures)/(real Health Care expenditures) |
| 16. Third Party Payments of Drugs | |
|    (i) government payments (DRUGGOV) | % of drug expenditures paid by government programs |
|    (ii) private insurance payments (DRUGINS) | % of drug expenditures paid by private insurance programs |
| 18. Aging of the Population (AGE65) | % of total population over age 65 |

Table 3: The relationship between risk and return
         (t-statistics in parenthesis)

| Period | SUR-Estimates | | OLS[1] |
|--------|---------------|---|-----|
| | $\hat{\alpha}_i$ | $\hat{\beta}_i$ | $R^2_a$ |
| 1963–1969 | 0.179* (17.230) | 8.559* (2.210) | 0.87 |
| 1970–1974 | 0.173* (129.83) | 2.581* (3.387) | 0.99 |
| 1975–1979 | 0.203* (17.433) | −0.809 (−0.435) | 0.92 |
| 1980–1982 | 0.212* (7.535) | −4.531* (−1.179) | 0.65 |

\* significant at p = 0.05 level

1) $R^2$-adjusted from the relations [2] estimated independently using OLS

Table 4: Difference between the risk coefficients $\hat{\beta}_i$ : t-statistics[1]

| | $\hat{\beta}_1$ | $\hat{\beta}_2$ | $\hat{\beta}_3$ |
|---|---|---|---|
| $\hat{\beta}_2$ | 1.532** | | |
| $\hat{\beta}_3$ | 2.970* | 1.803* | |
| $\hat{\beta}_4$ | 2.166* | 1.826* | 0.832 |

1) The t-statistics are computed as $(\hat{\beta}_i - \hat{\beta}_j) / s(\hat{\beta}_i - \hat{\beta}_j)$ for $i \neq j$, where

$$s(\hat{\beta}_i - \hat{\beta}_j) = [s^2(\hat{\beta}_i) + s^2(\hat{\beta}_j) - 2 \, \text{cov}(\hat{\beta}_i, \hat{\beta}_j)]^{1/2}$$

\* significant at p = 0.05 level
\*\* significant at p = 0.10 level

Table 5: Risk-return relationships: all firms
        (t-statistics in parentheses)

| Period | SUR-Estimates | | |
|---|---|---|---|
| | $\hat{\alpha}_i$ | $\hat{\beta}_i$ | $R^2_a$ 1) |
| 1963-74 | 0.180* (27.06) | 2.643* (3.125) | 0.96 |
| 1975-1982 | 0.241* (12.72) | -3.235* (-2.502) | 0.83 |

*   significant at p = 0.01
1)  $R^2$-adjusted from the relations [2] estimated independently using OLS

Table 6: Risk-return relationships of Auspicious and Troubled firms
        (t-statistics in parentheses)

| Period | SUR-Estimates | | |
|---|---|---|---|
| | $\hat{\alpha}_i$ | $\hat{\beta}_i$ | $R^2_a$ 1) |
| **Auspicious firms** | | | |
| 1963-1974 | 0.298* (14.39) | 1.400**** (1.302) | 0.93 |
| 1975-1982 | 0.268* (151.9) | -0.721*** (-1.937) | 0.99 |
| **Troubled firms** | | | |
| 1963-1974 | 0.177* (229.9) | 0.565** (2.231) | 0.99 |
| 1975-1982 | 0.166* (25.73) | -2.652* (-3.963) | 0.78 |

*    significant at p = 0.010
**   significant at p = 0.025
***  significant at p = 0.050
**** significant at p = 0.100
1)   $R^2$-adjusted from the relationships estimated independently

Table 7: Comparison of estimates of Troubled and Auspicious firms: t-statistics

|  | $\hat{\beta}_2$ | $\hat{\beta}_3$ | $\hat{\beta}_4$ |
|---|---|---|---|
| $\hat{\beta}_1$ | $2.195^{**}$ | $0.831_*$ | $3.697^*_*$ |
| $\hat{\beta}_2$ | | $5.041^*$ | $4.051^*_*$ |
| $\hat{\beta}_3$ | | | $5.684^*$ |

|  | $\hat{\alpha}_2$ | $\hat{\alpha}_3$ | $\hat{\alpha}_4$ |
|---|---|---|---|
| $\hat{\alpha}_1$ | $1.485^{****}$ | $5.828^*_*$ | $5.370^*_*$ |
| $\hat{\alpha}_2$ | | $-45.24^*$ | $14.34_{***}$ |
| $\hat{\alpha}_3$ | | | $1.822^{***}$ |

| * | significant at $p = 0.005$ |
|---|---|
| ** | significant at $p = 0.025$ |
| *** | significant at $p = 0.050$ |
| **** | significant at $p = 0.100$ |

Note: The sequence of the estimates given in this Table follows the sequence of the relationships reported in Table 6.

Figure 1: Identification of periods with different environmental conditions
(Cluster Analysis)

**Rescaled Distance Cluster Combine**

```
 C A S E          0         5        10        15        20        25

Label    Seq      +---------+---------+---------+---------+---------+

1979      17      -+-+
1980      18      -+ +---+
1981      19      ---+   +---+
1976      14      -+     |   |
1977      15      -+-----+   +-----+
1978      16      -+       +-----------------------------------+
1982      20      ---------+   |                               |
1974      12      ---+---------+                               |
1975      13      ---+                                         |
1965       3      -+---+                                       |
1967       5      -+   +-----------------+                     |
1963       1      -+-+ |                 |                     |
1964       2      -+ +-+                 |                     |
1966       4      ---+               +-----------------------+
1970       8      -----+-------+     |
1973      11      -----+       |     |
1971       9      -+         +-----------+
1972      10      -+-------+ |
1969       7      -+       +---+
1968       6      ---------+
```
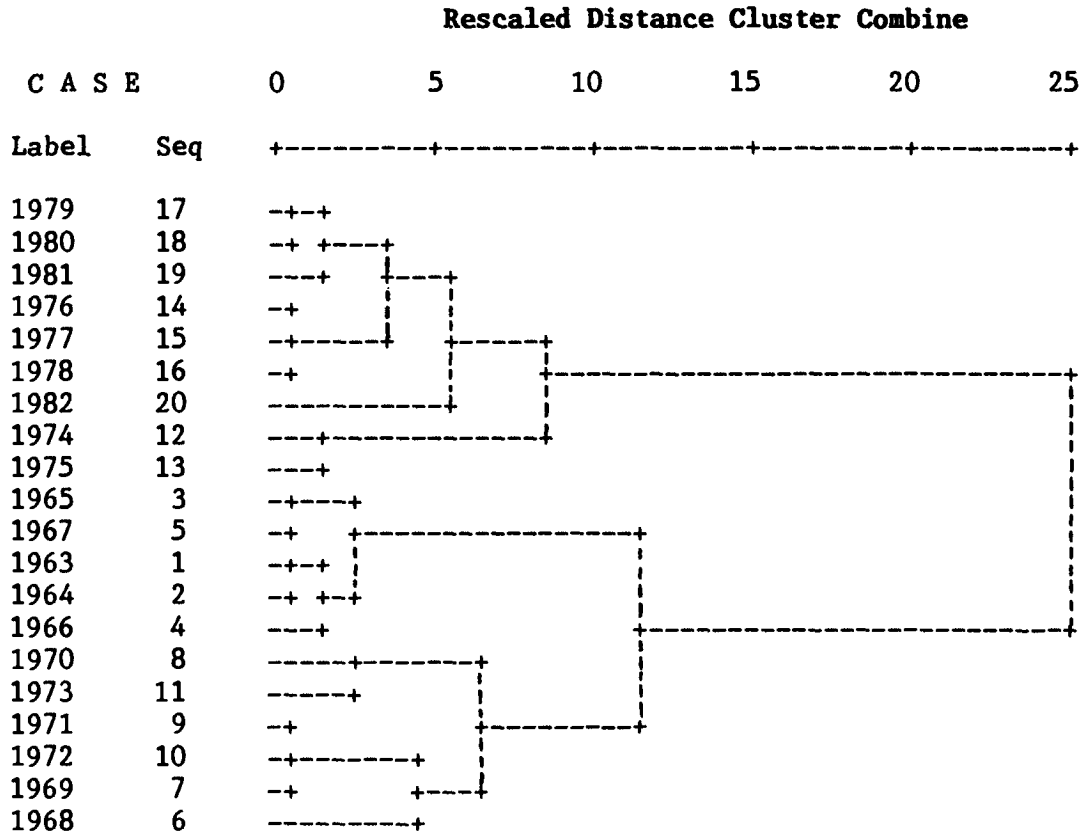
Dendrogram using Ward Method

## APPENDIX I

### Methodology for identifying strategic group structure and membership

Identifying strategic groups and tracing the evolution of an industry's strategic group structure over time call for the application of a procedure capable of exacting the differences in business strategies between industry participants at any point in time, and of gauging intertemporal changes in these strategies.

The following procedure was used to longitudinally determine an industry's strategic group structure. Let

$$x_{it} = [X_{i1t}, X_{i2t}, \ldots, X_{imt}]$$

denote the vector of observations at time t on the set of variables describing the strategic scope and resource commitments of firm i in the industry considered, where

i = 1, ..., n    the number of sampled firms
j = 1, ..., m    the number of variables describing business strategy
t = 1, ..., T    the number of time periods for which strategy observations are made.

Then, for any period t, an n by m matrix can be constructed describing the strategic position of the sampled firms. One way to determine whether firms change their relative position in the industry over time is to calculate from the matrix of observations the m by m variance-covariance matrix $S_t$ for each period t, and to test whether successive covariance matrices differ statistically. The rationale of this method is that when firms alter their commitments along the identified strategy variables, the covariances between these variables should reflect this repositioning. By determining at what point in time the covariance structure has changed from previous periods in a statistically significant way, it is possible to construct distinct periods of time within which the configuration of strategic positions of firms is more stable than between periods. In other words, the statistical pooling procedure makes it possible to identify transition points separating subperiods with distinct strategic group structures.

Empirically, the test procedure proceeds in the following way. When the stability of the strategic group structure is to be evaluated over T periods, then the procedure starts with testing the hypothesis of equality of the covariance matrices of the first two periods:

$$H_o : \Sigma_1 = \Sigma_2$$

against $H_1$ : both are not equal.

When, for a chosen significance level both matrices are statistically equal, the data on both periods is pooled and the test procedure is repeated for data over the first three periods. The following test is then performed:

$$H_o : \Sigma_{12} = \Sigma_3$$

against $H_1$ : both are not equal

where $\Sigma_{12}$ denotes the covariance matrix of the data pooled over the first two periods. Since the pooling of data over the first two periods might impede the detection of patterns of change occurring over the last two periods, an additional test needs to be performed, viz. $\Sigma_1 = \Sigma_{23}$. When both tests point to an acceptance of $H_o$, then the data over the first three periods is pooled and the test procedure is continued. In general, the following test procedure is performed for period t:

$$H_o : \Sigma_{12\ldots t-1} = \Sigma_t$$

$$H_o : \Sigma_{12\ldots t-2} = \Sigma_{t-1t}$$

$$:$$

$$H_o : \Sigma_1 = \Sigma_{23\ldots t}$$

against $H_1$ : not all $\Sigma$ are equal (for each $H_o$)

where $\Sigma_{12\ldots t-1}$ denotes the population covariance matrix for the period spanning subperiods 1 through t-1. The test statistic used for evaluating the equality of covariance matrices is a generalization of the Bartlett test for the homogeneity of m variances. For a description, see, for example, Timm (1975: 250-260) and Morrison (1967: 152-153).

Potentially, the determination of transition points is affected by the composition of the sample used in the pooling procedure. In order to verify the robustness of the results (sensitivity of pooling results to sample composition), a complementary analysis is needed. One approach, followed here, is to determine the transition points on the basis of a sample of q firms where q<n, and to repeat the analysis on samples where in each step one firm is added till the total sample of n is obtained.

The above procedure permits identification of subperiods with relatively stable strategic group structures. Within each period, cluster analysis can be applied to determine to what strategic group each firm belongs. For a given subperiod, the following sequence of steps was followed. If the subperiod spanned k years, then the strategy variables $X_{ijt}$ were averaged over the k years for each sampled firm. Upon standardization of the data, the "Error Sum of Squares" cluster algorithm (Anderberg, 1973: 142-149) was applied to uncover the strategic group structure. Large increases in the criterion value were postulated to signify inappropriate grouping, suggesting where to stop the aggregation of

firms into successive clusters. This heuristic decision rule was supplemented with a Multivariate Analysis of Variance (MANOVA) on the centroids defined over the averaged strategy variables for each strategic group. This was done to determine whether statistically different clusters were obtained. That cluster structure was selected where MANOVA-testing pointed to significant differences in the cluster centroids and where subsequent levels of aggregation resulted in non-significant differences between the cluster means.


Results from the procedure

| Periods with distinct strategic group structures | Number of firms in each strategic group | Inferred asymmetry between the groups |
| --- | --- | --- |
| 1963-69 | SG1(6), SG2(4), SG3(6) SG4(2), SG5(3), SG6(1) | high |
| 1970-74 | SG1(6), SG2(6), SG3(7), SG4(2), SG5(1) | medium |
| 1975-79 | SG1(5), SG2(7), SG3(7), SG4(3) | low |
| 1980-82 | SG1(6), SG2(3), SG3(4), SG4(2), SG5(6), SG6(1) | high |

The results are discussed in detail in Cool and Schendel (1985).

APPENDIX II

## Description of the two periods with different environmental conditions

To determine whether the identified periods (1963-73; 1974-82) from the cluster analysis represent genuinely different environmental states, the cluster analysis was supplemented with an Analysis of Variance and a Discriminant analysis over the two periods. The results are given below: the F-statistics from the ANOVA and the coefficients from the discriminant analysis.

| | F-Statistic (significance) | | Discriminant coefficients[1] |
|---|---|---|---|
| RXGROWTH | 4.58 | (0.05) | 4.146 |
| PRCHANGE | 46.5 | (0.00) | 3.344 |
| GENPRESCR | 47.9 | (0.00) | -35.837 |
| WSSCONC | 1.14 | (0.30) | 6.252 |
| FDAAPPR | 32.4 | (0.00) | 13.915 |
| PATLIFE | 31.1 | (0.00) | 7.951 |
| TOTNCE | 1.49 | (0.24) | -3.838 |
| STATES | 37.4 | (0.00) | 13.333 |
| RDABRD | 65.7 | (0.00) | 5.304 |
| INDCONC | 11.7 | (0.01) | -0.170 |
| NCECONC | 2.73 | (0.12) | 0.195 |
| NUMPAT | 59.7 | (0.00) | 5.018 |
| USPAT | 51.1 | (0.00) | -4.671 |
| DRUGPC | 58.6 | (0.00) | -1.646 |
| DRUGHC | 18.7 | (0.00) | 8.191 |
| DRUGGOV | 26.9 | (0.00) | -3.251 |
| DRUGINS | 43.1 | (0.00) | 2.145 |
| AGE65 | 75.4 | (0.00) | 8.664 |

1)   Standardized canonical discriminant function (Wilks $\Lambda$ = 0.006; $\chi^2$ = 53.23 (p = 0.000)

These ANOVA results indicate that the 1963-73 and 1974-82 periods are characterized by different environmental conditions.  The discriminant analysis suggests that these differences can be attributed in a large degree to regulation-related factors (generic prescribing, FDA expansion, decreases of effective patent life, generic drug substitution approval by states), technological factors (number of patents granted, US patents granted to non-US residents), and social factors (increasing importance of drug consumption, aging population).

# REFERENCES

Anderberg, M., <u>Cluster Analysis for Applications</u>, New York, N.Y.: Academic Press, 1973.

Bettis, R. and W. Hall, "Diversification Strategy, Accounting Determined Risk, and Accounting Determined Return", <u>Academy of Management Journal</u>, 1982, pp. 254-264.

Boardman, A. and N. Carruthers, "A Note on the Use of the CAPM as a Strategic Planning Tool", <u>Management Science</u>, December 1985, pp. 1589-1592.

Bowman, E., "A Risk-Return Paradox for Strategic Management", <u>Sloan Management Review</u>, Spring 1980, pp. 17-31.

Bowman, E., "Risk Seeking by Troubled Firms", <u>Sloan Management Review</u>, Summer 1982, pp. 33-42.

Brealey, R. and S. Meyers, <u>Principles of Corporate Finance</u>, New York: McGraw-Hill, 1984.

Caves, R., "Economic Analysis and the Quest for Competitive Advantage", <u>American Economic Review</u>, May 1984, pp. 127-132.

Christensen, H.K. and C. Montgomery, "Corporate Economic Performance: Diversification Strategy Versus Market Structure", <u>Strategic Management Journal</u>, 1981, pp. 327-344.

Coase, R., "The Nature of the Firm", <u>Economica</u>, November 1937, pp. 386-405.

Cool, K., <u>Strategic Group Formation and Strategic Group Shifts: A Longitudinal Analysis of the US Pharmaceutical Industry, 1963-1982</u>, Ph.D. dissertation, Purdue University, 1985.

Cool, K. and D. Schendel, "Strategic Group Formation and Performance: The Case of the US Pharmaceutical Industry, 1963-1982", INSEAD Working Paper, No. 85/26, November 1985.

Cool, K. and D. Schendel, "Performance Differences Among Strategic Group Incumbents", INSEAD Working Paper, May 1986.

Day, G., <u>Strategic Market Planning</u>, St. Paul: West Publishing, 1984.

Figenbaum, A. and H. Thomas, "Dynamic and Risk Measurement Perspectives on Bowman's Risk-Return Paradox for Strategic Management: An Empirical Study", <u>Strategic Management Journal</u>, Sept-Oct 1986, p. 395-408.

Fishburn, P.C., "Mean-Risk Analysis with Risk Associated with Below-Target Returns", <u>American Economic Review</u>, Vol. 67, 1977, pp. 116-126.

Hofer, C. and D. Schendel, <u>Strategy Formulation: Analytical Concepts</u>, St. Paul: West Publishing, 1978.

Jemison, D., "Risk and the Relationship among Strategy, Organizational Processes, and Performance", Working Paper, Stanford University, 1985.

Johnston, J., Econometric Methods, 2nd. ed., New York: McGraw-Hill, 1972, pp. 214-221 and 238-241 .

Kahnemann, D. and A. Tversky, "Prospect Theory: An Analysis of Decision Under Risk", Econometrica, March 1979, pp. 263-291.

Katz, R., Cases and Concepts in Corporate Strategy, Englewood Cliffs: Prentice Hall, 1970.

Lippman, S. and R. Rumelt, "Uncertain Imitability: An Analysis of Interfirm Differences in Efficiency Under Competition", Bell Journal of Economics and Management Science, August 1982, pp. 418-438.

McGee, J., "Strategic Groups: Review and Prospects", Working Paper, London Business School, 1982.

McGee, J. and H. Thomas, "Strategic Groups: Theory, Research and Taxonomy", Strategic Management Journal, March-April 1986, pp. 141-160.

Morrison, D., Multivariate Statistical Methods, New York: McGraw-Hill, 1967.

Myers, S., "The Relation Between Real and Financial Measures of Risk and Return", in Risk and Return in Finance, Part I, I. Friend and Bicksler (eds.), Boston: Ballinger, 1977, pp. 49-80.

Nelson, R. and S. Winter, An Evolutionary Theory of Economic Change, Cambridge, Mass.: Harvard University Press, 1982.

Porter, M., "The Structure Within Industries and Companies' Performance", Review of Economics and Statistics, May 1979, pp. 214-227.

Payne, J., D. Laughhunn and R. Crum, "Multiattribute risky choice behavior: the editing of complex prospects", Management Science, November 1984, pp. 1350-1361.

Rubinstein, M., "A Mean-Variance Synthesis of Corporate Financial Theory", Journal of Finance, March 1973, pp. 167-181.

Rumelt, R., "Evaluation of Strategy: Theory and Models", in Strategic Management: A New View of Business Policy and Planning, D. Schendel and C. Hofer (eds.), Boston: Little, Brown, 1979, pp. 196-212.

Snow, C. and D. Hambrick, "Measuring Organizational Strategies: Some Theoretical and Methodological Problems", Academy of Management Review, 1980, pp. 527-538.

Theil, H., Principles of Econometrics, New York: John Wiley & Sons, Inc., 1971, pp. 294-302.

Timm, N., Multivariate Analysis, Monterey, Ca.: Brooks/Cole, 1975.

Williamson, O., Markets and Hierarchies, New York: The Free Press, 1975.

Winn, D., Industrial Market Structure and Performance, Ann Arbor: Graduate School of Business, The University of Michigan, 1975.

Zellner, A., "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias", Journal of the American Statistical Society, 1962, pp. 348-368.

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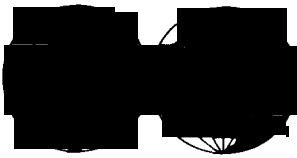
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