© Academy of Management Journal
1990, Vol. 33, No. 3, 520–533.

WHY DO FIRMS REDUCE BUSINESS RISK?

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Two empirical tests designed to disentangle firms' motives for reducing business risk were performed. Results suggest that low business risk allows firms to acquire factors of production at lower costs, to operate more efficiently, or both. These findings are consistent with theories assuming both value maximization and efficient capital markets.

Strategy researchers have paid considerable attention to the risk-return trade-off when assessing corporate strategy (Bowman, 1980) and have used numerous accounting measures of risk and return to evaluate that trade-off. For example, Bettis and Mahajan (1985) showed that a trade-off existed between profitability and risk; in their findings, firms that diversified into unrelated businesses usually had lower returns on assets (ROA) than firms that did not do so. However, the ROAs of the unrelated diversifiers also had lower standard deviations of ROA, representing lower risk.

Although many have used accounting measures of return and risk, other authors have questioned the measures' applicability to strategy evaluation because they reflect past investment decisions and do not appropriately capture the expected future cash flows a firm's stock of assets could generate. Furthermore, differences in tax laws across industries and in accounting conventions regarding R&D and advertising expenses may distort accounting-based measures (Fisher & McGowan, 1983).

Recognition of these shortcomings has led to the use of market measures in a growing number of strategy studies (Amit & Livnat, 1988, 1989; Wernerfelt & Montgomery, 1988). Bettis (1983) and Aaker and Jacobson (1987) investigated the role various types of market risk play in explaining profitability differences among business units. They observed that the Capital Asset Pricing Model (CAPM), which is commonly used to assess the risk-adjusted return on a particular stock (Lintner, 1965), separates risk into two components: (1) market, or systematic, risk, which captures the variation in

We thank Robert Korajczyk for helpful discussions and Stephen Ross, Cynthia Montgomery, and Trinet, Inc., for providing parts of the data used in this study. We are grateful to Robert Hoskisson and to two anonymous reviewers for their helpful suggestions and constructive comments.

a stock's return ascribable to market-wide forces, and (2) business, or unsystematic, risk, which reflects the variation in a stock's return ascribable to firm-specific forces (e.g., an organization's R&D intensity). According to the CAPM, since investors can diversify away business risk, they only worry about the market risk of a stock, which is called its beta. Thus, under the assumptions of the CAPM, corporate managers should not be concerned with reducing their firm-specific business risk since it should have no effect on their firms' stock returns.

Thus, business-risk management is unnecessary from the perspective of the CAPM. However, Bettis (1983) suggested that managing business risk lies at the heart of competitive strategy. Moreover, theorists have depicted the management of business risk as central to organizational evolution, a determinant of which organizations survive and grow and which decline and die (Child, 1972; Summer, 1980). These observations, along with ample anecdotal evidence from corporate annual reports and the business press (e.g., Ross, 1987), suggest that management researchers and practitioners generally feel that business risk does—or should—matter in strategy making.

The controversy, which has been primarily interdisciplinary, has focused on two issues. The first is the issue of the efficiency of capital markets[1]: Some strategy studies (e.g., Naylor & Tapon, 1982) have focused on total risk, namely the sum of systematic and business risk, whereas in an efficient capital market business risk should not matter (Wernerfelt, 1985). Second is the issue of value maximization: Financial theory suggests that the maximization of value for shareholders should be the only objective of managers. However, the desire (or need) of managers to satisfy multiple stakeholders—such as employees, suppliers, and surrounding communities—and not just shareholders is inconsistent with financial theory (Freeman, 1984). These conflicts remain unresolved.

In this study, we offer a possible resolution of the controversy. We provide empirical evidence consistent with a theory that assumes efficient capital markets and value maximization but also depicts reduction of business risk as beneficial to stockholders. To build our argument, we briefly review some theories about business-risk reduction and then describe empirical tests conducted to discriminate among them. Among other things, our findings suggest that reducing business risk allows a firm to reap higher average cash flows.

MOTIVES FOR REDUCING BUSINESS RISK

Previous research has advanced three motives for business-risk reduction that are not mutually exclusive. The first concerns the conflict between managers and shareholders surrounding the formers' role as the shareholders' agents. Two versions of this motive for business-risk reduction have

[1] Readers unfamiliar with exact definitions of this and other concepts drawn from financial theory are referred to Brealey and Myers (1984).

been offered. In one, managers seek to reduce the probability of bankruptcy in order to enhance their job security and preserve their investment in firm-specific human capital. They may thus take actions to reduce business risk that could be to the detriment of shareholders (Amihud & Lev, 1981). The other version of the agency motive for business-risk reduction maintains that if risk-averse managers are compensated on the basis of their firm's earnings, they prefer a stable earnings stream. They may thus take a variety of risk reducing actions at the expense of shareholders (Holmstrom, 1979). In both versions, the agency problem arises because managers care about total risk (market risk as well as business risk). Shareholders, however, care only about the systematic component of total risk, since they can diversify their portfolios to compensate for business risk. Thus, according to this motive for business-risk reduction, a positive relation should exist between business risk and firm value: Relatively low firm value should be associated with relatively low business risk. We refer to this motive as the *agency motive* for business-risk reduction.

The second motive for business-risk reduction derives from the effect of uncertainty about the operations of a firm on its cash flows. In stable environments, corporations' operations should be efficient and the volatility of their earnings should be low. Conversely, in unstable environments, firms' operations might be less efficient and their earnings more volatile. Production planning provides a simple example. In a stable environment with little uncertainty about the demand for firms' products, they can efficiently manage production scheduling, finished-goods inventory management, and the timing and amounts of supplies of raw materials and labor. Firms can thus realize numerous cost savings. A special case of this argument is a situation in which a risk-averse manager who is compensated on the basis of cash flows is willing to work for less compensation if cash flows are stable. In such a setting, it is in the interest of shareholders to reduce business risk (Amihud, Dodd, & Weinstein, 1986; Aron, 1988; Marshall, Yawitz, & Greenberg, 1984). This class of arguments suggests in effect that low business risk allows firms to acquire inputs cheaply or to operate efficiently.[2] In industries that are less than perfectly competitive, reduced business risk will enhance a firm's market value.[3] Thus, according to this motive for business-risk reduction, a negative relation should exist between cash flows and business risk; that is, associated with lower business risk are higher cash flows. We refer to this motive as the *cash-flow motive.*

The third motive for business-risk reduction stems from transaction costs, such as brokerage fees and time costs, that prevent stockholders from diversifying away business risk completely (Constantinides, 1986). They thus reduce the overall riskiness of their portfolios by holding stocks with

[2] Recent research in organizational theory may also support this motive for business-risk reduction (Keats & Hitt, 1988).

[3] Under perfect competition, firms would lose any gains in value through competing.

low total risk, which means that they are willing to accept lower returns on stocks with lower business risk. Assuming capital market equilibrium, this observation translates into a lower market return on the stocks of firms with lower business risk. Business-risk reduction in this case is also in the interest of stockholders. Thus, we postulate that a positive relation exists between rates of return and business risk; that is, associated with lower business risk are lower rates of return. We refer to this motive as the *rate-of-return motive*.

STUDY DESIGN AND HYPOTHESES

The purpose of this research was to discriminate among the agency, cash-flow, and rate-of-return motives. All three motives are consistent with assumed capital market equilibrium, and only the agency hypothesis suggests that risk reduction is against stockholders' interests.

The market value of a firm is the expected net present value of future cash flows. Thus, a reduction in business risk may affect the market value of a firm through either cash flows or through the discount rate. In discriminating between these two factors, we note that future cash flows are discounted by a firm's cost of capital which, for an equity financed firm, is given by the return on its stock as specified by the CAPM.

A positive cross-sectional relationship between business risk and market value would thus support the agency motive and reject the other two. Conversely, a negative relationship would point toward either the cash-flow motive or the rate-of-return motive. The first empirical test we performed directly examined the relationship between business risk and value.

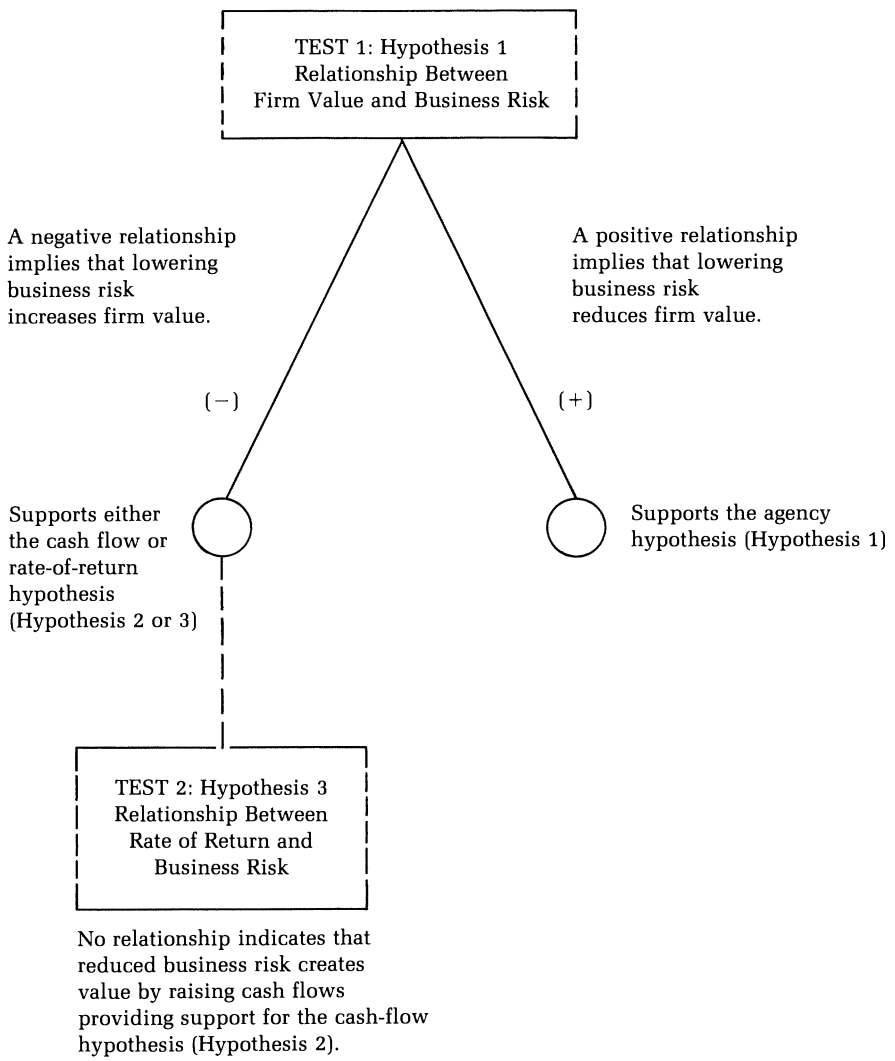
If low business risk yields higher firm value, either the level of cash flows or the rate at which they are discounted must be responsible. Our rate-of-return argument suggested that low business risk benefits stockholders through low discount rates, and the cash-flow argument suggested that stockholders benefit from high cash flows. Because of data limitations, we pursued a process of elimination by looking at the cross-sectional relationship between business risk and rate of return. The existence of a positive relationship would support the rate-of-return argument, while lack of such an effect would indicate that the cash-flow argument was the only one consistent with the tests.

Figure 1 summarizes the methodology we used, which pointed to the testing of the following specific hypotheses:

> *Hypothesis 1: Agency. There is a positive relationship between business risk and firm value.*
>
> *Hypothesis 2: Cash flow. There is a negative relationship between business risk and the level of cash flow.*
>
> *Hypothesis 3: Rate of return. There is a positive relationship between business risk and rate of return.*

As stated, data limitations prevented us from testing Hypothesis 2 directly. However, as the preceding discussion suggests, we were able to test Hypothesis 2 indirectly by eliminating Hypotheses 1 and 3.

FIGURE 1
The Logical Structure of the Empirical Tests



METHODS

Value and Business Risk

Our measure of firm value was Tobin's *q*, defined as the ratio of the market value of a firm's equity and debt to the replacement cost of the firm's assets (Lindenberg & Ross, 1981). Formally, let

$$\text{Tobin's } q_i = \frac{V_i}{K_i}, \qquad 1$$

where

V_i = the market value of firm i

and

K_i = the replacement value of firm i's assets as reported on its 10-K form.[4]

Market value, the numerator of the ratio, is the expected discounted net present value of future cash flows. It reflects the market's expectation of the cash flows that a firm's asset base can generate. In the absence of any market or measurement imperfections, the value of a dollar invested in the firm should equal just one dollar, and the ratio should equal unity. Higher values reflect higher average cash flows or lower discount rates. Tobin's q, which captures the value created per invested dollar, provides a measure of the premium (or discount) that the market is willing to pay above (or below) the economic replacement costs of a firm's assets. Tobin's q will thus capture any above normal or subnormal returns expected from a collection of assets. Theoretically, q is a much more appealing measure than accounting returns. By incorporating a capital market measure of firm rents, q implicitly uses the correct risk-adjusted discount rate, imputes equilibrium returns, and minimizes distortions due to tax laws and accounting conventions.

Business risk is the component of total risk about which stockholders are indifferent because it is diversifiable. We measured business risk as the standard deviation of the residual term e_i in the so-called market model, which is depicted by:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it},\ e_{it} \sim N(0,\sigma_i^2), \qquad 2$$

where

R_{it} = the return of security i on day t,
R_{mt} = the corresponding return of an equally weighted market portfolio,

and

α_i, β_i, and σ_i = firm-specific parameters.

The most immediate way to proceed would have been to examine the correlation between a firm's value, q_i, and its business risk, σ_i. Such a procedure, however, ignores the other factors influencing firm value. Two classes of factors are important. First, in practical calculations of q_i, the denominator does not account for intangible assets, so q is overstated for firms with high levels of intangible assets. To correct for this overstatement, we followed Salinger (1984) and controlled for estimated advertising and R&D costs divided by the replacement value of physical capital. Second, it is

[4] Form 10-K is an annual report submitted by publicly held corporations to the Security and Exchange Commission. It contains complete, audited financial statements.

necessary to control for sources of value creation other than business risk that affect the numerator of Tobin's q. To do so, we borrowed a specification from Montgomery and Wernerfelt (1988) and controlled for market growth and concentration as well as for market share, foreign sales, and diversification. Using the ordinary-least-squares (OLS) procedure, we estimated the following equation:

$$q = \alpha + \beta_1\left(\frac{advertising}{K}\right) + \beta_2\left(\frac{R\&D}{K}\right) + \beta_3(market\ growth) + \beta_4(market\ concentration) + \beta_5(market\ share) + \beta_6(diversification) + \beta_7(foreign\ sales) + \beta_8(business\ risk) + \epsilon. \quad 3$$

In this equation, the firm i index is suppressed and the error term ϵ is assumed to be normally distributed, with a zero mean. The Appendix defines the variables used in the equation. Our logic was that if estimation revealed a negative and significant coefficient (β_8) for the business-risk variable in this equation, we could conclude that low business risk augments firm value and reject Hypothesis 1.

Returns and Business Risk

As discussed above, the relationship between firm value and business risk can have two sources: business risk may affect the equilibrium rate of return, the expected level of cash flows, or both. The test we have outlined did not allow us to discriminate between these two effects. We therefore conducted a second test to see if equilibrium stock returns were related to business risk.[5]

To estimate rate of return, we used Jensen's (1969) performance evaluation model, which is depicted by:[6]

$$R_{it} - R_{ft} = \alpha_i' + \beta_i'(R_{mt} - R_{ft}) + e_{it}',\ e_{it}' \sim N(0, \sigma_i'^2), \quad 4$$

where

R_{ft} = the return on a portfolio of treasury bills on day t.

The estimates of α_i' (Jensen's alpha) capture returns in excess of those predicted by the CAPM. Thus, if stockholders only value systematic risk and the capital market satisfies the assumptions of the CAPM, the expected value of α_i' is zero. To test whether returns are related to business risk, we corre-

[5] Lintner (1965), Douglas (1969), Miller and Scholes (1972), and Lehmann (1986) have tested this relationship.

[6] Roll (1978), Admati and Ross (1985), and Connor and Korajczyk (1986) have pointed to conceptual problems underlying the CAPM.

lated α_i' with business risk, σ_i'. To perform the test, we needed to get independent estimates of those parameters. Since efficiency in capital markets implies day-to-day independence of stock prices, estimates of α_i' and σ_i' can be obtained by estimating their values on alternate days. Thus, we estimated α_i' in Equation 4 on the even dates and obtained independent measures of business risk, σ_i', by estimating the equation on odd dates. For comparison, we also estimated Equation 2. A positive and statistically significant correlation between α_i' and business risk, σ_i', would suggest that investors accept lower levels of return on stocks with lower business risk. If no such relation is observed, then the increase in firm value associated with a reduction in business risk may indeed be due to higher cash flows.

Variables and Data

Computations of the market model in Equation 2 were performed using daily data for 1976 from the Center for Research on Security Prices (CRSP). Stephen Ross, of Yale University, prepared estimates for 1976 of Tobin's q, the dependent variable in Equation 3, using data from an initially random sample of 246 firms. Missing data reduced the sample size to 151 observations for the regression analysis and 154 for the correlational analysis. (The method of calculating q is described in Lindenberg & Ross, 1981.) We obtained our estimates of firms' sales and market shares from the Economic Information Service (EIS) data base provided by Trinet, Inc., and obtained foreign sales figures from the *EIS Directory of Top 1500 Companies*. Finally, we took data on replacement costs from firms' 10-K reports and industry data from the Federal Trade Commission's (FTC) *Line of Business Report* of 1976.

Table 1 gives summary statistics for the variables used in the regression equation (Equation 3). The low correlations between the explanatory variables are interesting to note. Further, the mean value of Tobin's q is close to unity, as theory suggests.

RESULTS

The agency hypothesis was tested by observing the sign and significance of the business risk coefficient in Equation 3. Table 2 shows the results of the OLS estimation of that equation. The relationship between q_i, the dependent variable, and σ_i, firm business risk, is negative and statistically significant. Two caveats are in order. First, since both q_i and σ_i were estimated, measurement error is obviously involved, which should bias the estimated regression coefficient toward zero. Second, since q_i is positive by definition, the error term cannot be strictly normal. Examination of the residuals, however, did not reveal that any problems resulted.

On the basis of the results presented in Table 2, we tentatively ruled out the agency hypothesis and turned to a test designed to discriminate between the cash-flow and rate-of-return hypotheses.

To test the rate-of-return hypothesis, we estimated the CAPM model in

TABLE 1
Summary Statistics[a]

Variables	Means	s.d.	Minimum	Maximum	Pearson Correlations							
					1	2	3	4	5	6	7	8
1. Tobin's *q*	0.986	0.463	0.410	2.840								
2. *Advertising/K*	0.063	0.060	0.000	0.298	.46*							
3. *R&D/K*	0.014	0.013	0.000	0.063	.34*	.33*						
4. *Market growth*	0.894	0.381	0.283	2.420	−.10	−.21*	−.08					
5. *Market concentration*	42.000	15.000	2.000	91.000	−.03	.01	.11	−.11				
6. *Market share*	0.080	0.091	0.001	0.582	.20*	.17*	−.02	−.12	−.57*			
7. *Diversification*	0.759	0.419	0.000	1.740	−.21*	.00	−.02	−.10	−.17*	−.26*		
8. *Foreign sales*	0.192	0.138	0.049	0.569	.17*	.08	.09	.10	−.01	.12	−.02	
9. *Business risk*	0.015	0.005	0.007	0.040	−.21*	.11	.08	−.16*	−.02	−.28*	.02	−.11

[a] $N = 151$.

* $p < .05$, two tailed test

TABLE 2
Results of the Ordinary-Least-Squares Regression Analysis[a]

Independent Variables	*b*	Standard Errors
$\frac{Advertising}{K}$	2.907***	0.57
$\frac{R\&D}{K}$	8.589**	2.60
Market growth	.090	0.08
Market concentration	−.004	0.00
Market share	.383	0.47
Diversification	−.234**	0.08
Foreign sales	.286	0.22
Business risk	−22.578***	6.70
$\bar{R}^2$	.3534	
F	9.998***	

[a] $N = 151$. The dependent variable is Tobin's q.
* $p < .05$
** $p < .01$
*** $p < .001$

Equation 4. The estimation procedure yielded estimates of α_i' (market rates of return) and σ_i' (business risk). We then computed the correlation coefficient. Table 3 shows the results of this test.

The small and insignificant correlation coefficient does not support the rate-of-return hypothesis, which posits a statistically significant positive relationship between business risk and market return. The caveats attached to the statistics in Table 2 are also relevant here, however: Measurement error biases our results towards zero, and the distributional assumptions cannot strictly hold.

By elimination, the empirical results therefore suggest that the negative effect of business risk on Tobin's *q* is through improved cash flows rather than through lower discount rates.

CONCLUSIONS

The results of this study support the thesis that lowering business risk is valuable because, ceteris paribus, it allows firms to increase cash flows.

TABLE 3
Correlations of Business Risk with Jensen's Alpha[a]

Business Risk	*r*	*F*	Sign
Computed from			
Market model	.063	.600	.439
CAPM	.063	.598	.440

[a] $N = 154$. *r* denotes the correlation coefficient between business risk and Jensen's alpha. The business risk was computed from the market model (Equation 2) and from the CAPM (Equation 4).

This finding suggests that not all risk reduction is counter to stockholders' interests and that enhanced operational efficiency is the main reason it is not. We cannot dismiss the agency explanation for risk reduction and thereby conclude that all risk reduction benefits stockholders; neither can we dismiss any number of other alternative explanations. However, our results are consistent with assumptions of value maximization and efficient capital markets. The results shown in Table 2 underestimate the magnitude of the efficiency effect because Tobin's q only reflects the fraction of gains appropriated by the stockholders. To the extent that firms operate in competitive markets, there will be no effect on q, even though all industry participants will have lower costs because prices will be driven down to reflect the lower costs.

It is our hope that this study will contribute to strategy researchers' perspectives on managerial risk reduction. The findings of this study also have important implications for managers. We suggest that some managerial actions aimed at business-risk reduction are indeed desirable from the perspectives of both managers and shareholders and therefore should not be condemned. This study also points to a need for further research into the mechanisms through which reduced risk enhances efficiency. The compensation effects highlighted in the literature may be one such mechanism, but smooth production and low input costs should matter more. It is tempting to cite Bettis, who observed that "unsystematic risks obviously are associated with firm-specific resources and competencies and with the relationship of the environment to the firm" (1983: 408). Going further along those lines, it may be possible to relate this gain in efficiency to the organization theory literature whereby managers create structures to reduce uncertainty produced by environmental volatility (e.g., Burns & Stalker, 1961; Dess & Beard, 1984; Thompson, 1967).

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APPENDIX
Definitions of Variables Used in Equation 3

$$\left(\frac{Advertising}{K}\right)_i = \frac{\sum_{j=1}^{n} A_j M_{ij}}{K_i},$$

where

K = the replacement value of a firm i's assets,

M_{ij} = firm i's sales in industry j as defined by the Federal Trade Commission,[a]

A_j = the ratio of marketing expenditures to sales in industry j.[b]

$$\left(\frac{R\&D}{K}\right)_i = \frac{\sum_{j=1}^{n} R_j M_{ij}}{K_i},$$

where

R_j = the ratio of R&D expenditures to sales in industry j.[b]

$$Market\ share_i = \frac{\sum_{j=1}^{n} M_{ij} S_{ij}}{\sum_{j=1}^{n} M_{ij}},$$

where

S_{ij} = firm i's market share in industry j.[a]

$$Market\ growth_i = \frac{\sum_{j=1}^{n} M_{ij} G_j}{\sum_{j=1}^{n} M_{ij}},$$

[a] Data came from the EIS data base.

[b] Data came from the *FTC Line of Business* data base.

where

G_j = the growth rate of industry j in the 1972–77 period.[a]

$$\textit{Market concentration}_i = \frac{\sum_{j=1}^{n} M_{ij}C_j}{\sum_{j=1}^{n} M_{ij}},$$

where

C_j = the four-firm concentration ratio of industry j [b] (in percent).

$\textit{Foreign sales}_i$ = the percentage of firm i's sales going to exports.[c]

$\textit{Business risk}_i$ = the standard deviation of residuals in the market model as given by Equation 2.[d]

$$\textit{Diversification}_i = \sum_{j=1}^{n} M_{ij} \sum_{\ell=1}^{n} M_{i\ell} d_{j\ell},$$

where

d_{ji} = 0 if j and i have the same three-digit code,

d_{ji} = 1 if j and i have different three-digit codes but the same two-digit code,

and

d_{ji} = 2 if j and i have different two-digit codes.[e]

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[c] Data came from *EIS Directory of Top 1500 Companies*.

[d] Data were estimated from CRSP tapes.

[e] We based this measure on the concentric index proposed by Caves, Porter, Spence, and Scott (1980).

Raphael Amit is an associate professor of policy analysis on the Faculty of Commerce and Business Administration at the University of British Columbia. He received his Ph.D. degree from Northwestern University. His current research centers on a range of corporate strategy issues and on the formation and growth of new enterprises.

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[Footnotes]

[2] **A Causal Model of Linkages among Environmental Dimensions, Macro Organizational Characteristics, and Performance**
Barbara W. Keats; Michael A. Hitt
The Academy of Management Journal, Vol. 31, No. 3. (Sep., 1988), pp. 570-598.
Stable URL:
http://links.jstor.org/sici?sici=0001-4273%28198809%2931%3A3%3C570%3AACMOLA%3E2.0.CO%3B2-4

[5] **Security Prices, Risk, and Maximal Gains From Diversification**
John Lintner
The Journal of Finance, Vol. 20, No. 4. (Dec., 1965), pp. 587-615.
Stable URL:
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[6] **Ambiguity when Performance is Measured by the Securities Market Line**
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