

The Effects of Business Environment and Strategy on a Firm's Rate of Return on Assets

Microeconomic and business strategy concepts are useful in understanding the behavior of rate of return on assets (ROA) over time and across firms and industries. ROA variability differs across industries, for example, according to their levels of operating leverage. ROA also differs across industries and through time as products pass through different stages in their life cycles.

A firm's business environment and the strategies it uses to deal with that environment affect its ability to increase ROA. The extent to which a firm is subject to capacity or competitive constraints, for instance, may determine whether it can pursue a higher ROA by increasing profit margin via product differentiation strategies or by increasing asset turnover via cost leadership strategies.

Examination of the ROAs, profit margins and asset turnovers of some 22 industries over the 1977–86 period indicates that industries with significant operating leverage and high entry barriers tended to have the lowest asset turnovers and the highest profit margins, while industries with low capital intensity and commodity-like products tended to have the highest asset turnovers and the lowest profit margins. The concept of marginal rate of substitution—the ability to trade off profit margin and asset turnover—can be used to generate highly credible interpretations of trends in and differences across firms' and industries' ROAs.

TEXTBOOKS ON FINANCIAL statement analysis espouse the importance of rate of return on assets as a useful measure for evaluating the operating and investing performance of a firm.¹ Extensive space is usually devoted to the issues involved in calculating this measure of return from accounting data—whether, for example, discontinued operations

should be included or excluded, or assets be reported gross or net of accumulated depreciation. Little attention is given, however, to interpreting rates of return across firms, industries or time. This article synthesizes relevant microeconomic and business strategy concepts and demonstrates their usefulness for interpreting the behavior of this important measure of profitability.

1. Footnotes appear at end of article.

Thomas Selling and Clyde Stickney are Professors of Accounting at the Amos Tuck School of Business of Dartmouth College.

The authors thank Dot Bower for data processing assistance and Joe Fisher, Vijay Govindarajan and John Shank for their helpful comments.

An Overview of the Issues

The rate of return on assets (ROA) is a measure of the success of a firm in using assets to generate earnings independent of the financing (debt versus equity) of those assets. ROA is calculated as follows:

$$\text{ROA} = \frac{\text{net income} + (1 - \text{tax rate})(\text{interest expense})}{\text{average total assets}}$$

Because interest expense is subtracted in calculating net income, it must be added back if the numerator is to exclude the effect of debt financing. The amount added back, however, must reflect the deductibility of interest expense in computing taxable income. Because the numerator of ROA measures operating income for a period of time, the denominator uses a measure of average assets in use over that same period.

Most textbooks disaggregate ROA into profit margin and asset turnover components:

$$\text{ROA} = \text{profit margin} \times \text{asset turnover}$$

where

$$\text{profit margin} = \frac{\text{Net Income} + (1 - \text{TR})(\text{Interest Expense})}{\text{Revenues}}$$

and asset turnover equals revenues divided by average total assets. While profit margin indicates the ability of a firm to generate operating profit from a given level of revenues, asset turnover indicates its ability to manage the level of investment in assets for a given level of revenues.

Figure A depicts graphically the relation between ROA, profit margin and asset turnover at

Figure A ROA, Profit Margin and Asset Turnover

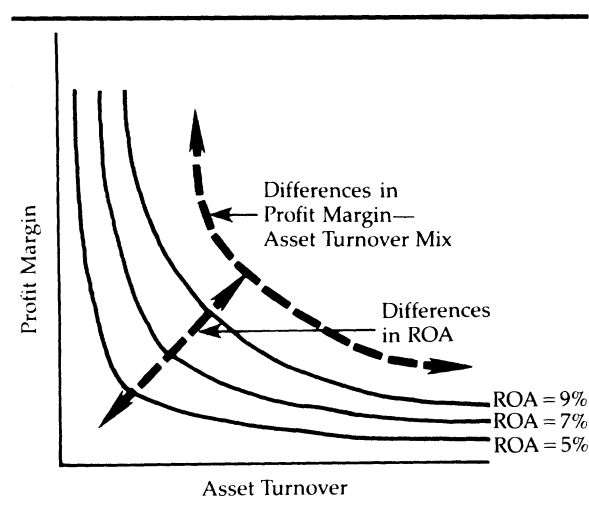


Table I Operating Leverage

Industry	Fixed Assets/ Total Assets	St. Dev. of ROA
Oil Exploration	0.700	0.104
Glass	0.550	0.063
Steel	0.460	0.066
Food Processors	0.384	0.044
Publishers	0.354	0.039
Department Stores	0.352	0.033

three constant ROA levels. The mean ROA for the years 1977 to 1986 for a large sample of firms examined in this study is approximately 7 per cent, with the vast majority of firms having ROAs between 5 and 9 per cent. Note that any particular level of ROA (e.g., 7 per cent) could be achieved with various combinations of profit margin and asset turnover.

Previous research has examined differences or changes in ROA (i.e., differences in the distribution of ROAs in a southwesterly/northeasterly direction in Figure A) and differences or changes in the profit margin-asset turnover mix (i.e., differences in the distribution of firms and industries in a northwesterly/southeasterly direction). Some of the findings are discussed below.

Changes in ROA

The behavior of ROA is affected by both operating leverage and product-life-cycle phenomena.

Operating leverage: Firms operate with different mixtures of fixed and variable costs in their cost structures. Steel, glass and oil exploration are capital-intensive industries. Depreciation and many operating costs for these industries are more or less fixed for any given period. Most retailers and wholesalers, by contrast, have high proportions of variable costs. Firms with a high proportion of fixed costs will experience significant increases in operating income as sales increase. This occurs because fixed costs are being spread over a larger number of units sold, resulting in a decrease in average unit cost. Of course, when sales decrease, these firms experience sharp decreases in operating income. The process of operating with a high proportion of fixed costs is referred to as operating leverage. Firms with high levels of operating leverage usually experience greater variability in their ROAs than firms with lower levels of operating leverage.

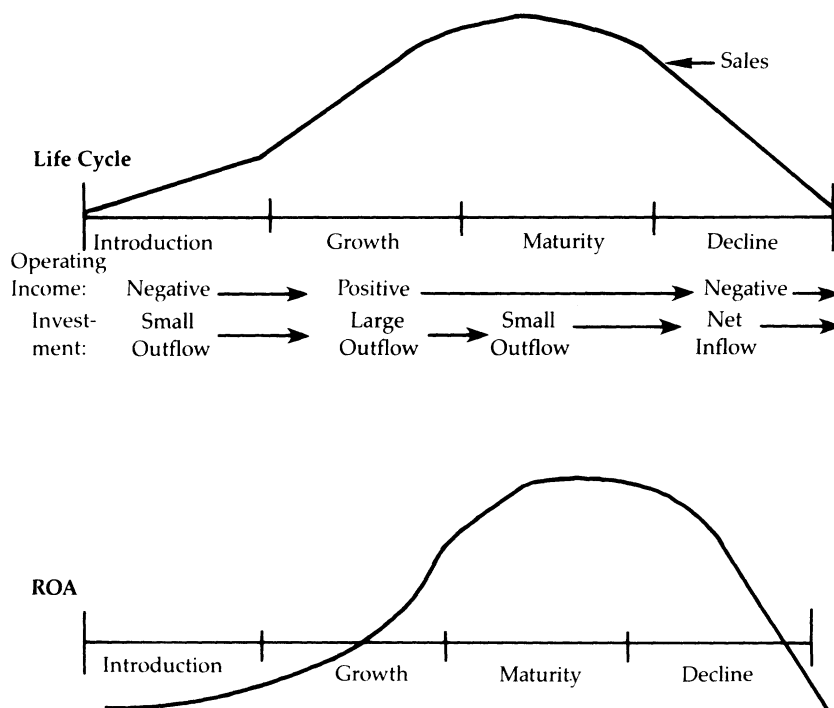
The proportion of total assets made up of fixed, or plant, assets might be used as a rough measure of the degree of operating leverage; Table I presents this ratio for a number of industries over the 1977-86 period. Note that oil exploration, glass and steel have the highest proportions of fixed assets and also the most variable ROAs. For these industries, subject to both business cycles and foreign competition, high levels of operating leverage have led to substantial changes in ROAs. While fluctuations in consumer spending over the business cycle also affect food processors, publishers and department stores, these industries carry less operating leverage, hence their ROAs do not fluctuate as much.

Product life cycle: A second explanation for changes in ROA is based on product life cycle.² Products move through four identifiable phases—introduction, growth, maturity and decline. During the introduction and growth phases, a firm's focus is on product development (product R&D spending), market development (advertising and other promotion spending) and capacity enlargement (capital spending). The ob-

jective is to gain market acceptance and market share. During the maturity phase, as competition becomes more intense, the emphasis shifts to reducing costs through improved capacity utilization (economies of scale) and more efficient production (process R&D spending). During the decline phase, firms exit the industry as sales decline and profit opportunities diminish.

Figure B illustrates the behavior of revenues, operating income, investment and ROA through these four phases. During the introduction and early growth phases, expenditures on product development and marketing, coupled with relatively low sales levels, lead to negative ROAs. As sales accelerate during the high-growth phase, operating income and ROAs turn positive. The rate of growth in ROAs will be dampened during this phase, however, as extensive product development, marketing and depreciation expenses moderate operating income, while heavy capital expenditures to build capacity for higher future sales increase the denominator of ROA. ROA will increase significantly during the maturity phase because of the benefits of economies of scale and learning

Figure B ROA and Product Life Cycle



curve phenomena and the curtailment of capital expenditures. ROA will deteriorate during the decline phase as operating income decreases, but it may remain positive or even increase for some time into this phase. Thus, as products move through their life cycles, their ROAs should move in a northeasterly direction in Figure A, peak during the maturity phase, and then move in a southwesterly direction as the decline phase sets in.

Numerous studies support empirically the explanatory power of the product-life-cycle concept.³ These studies used data at a strategic-business-unit (SBU) level from the PIMS (Profit Impact of Marketing Strategies) database. The concept can be extended, however, to a firm or industry level by examining the average stage in the product life cycle of all products within that firm or industry. For example, the computer industry comprises products that range from their introduction to their decline phases, but the overall industry is probably in the later part of the high-growth phase. The food-processing industry is fully mature, although new products are continually introduced. The steel industry, at least in the U.S., might be viewed as being in the decline phase, although some companies have modernized production sufficiently to stave off decline.

Thus differences between firms and industries in their ROAs might be related to economies and diseconomies of scale from operating leverage and to movements through product life cycles.

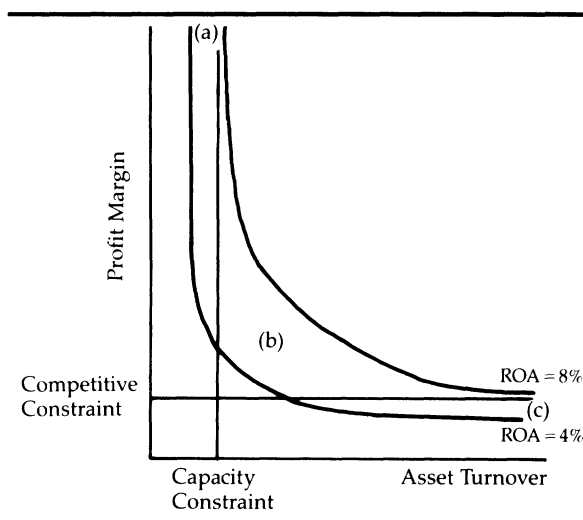
Differences in Profit Margin-Asset Turnover Mix

Possible explanations for differences in profit margin-asset turnover mix come from both microeconomic and business strategy literatures.

Capacity and competitive constraints: Figure C sets out important economic factors that constrain certain firms and industries to operate in particular segments of the profit margin-asset turnover space.

Firms and industries that have heavy fixed capacity costs and require lengthy periods to add new capacity operate under a capacity constraint. There is an upper limit on the size of asset turnover they can achieve. In order to attract sufficient capital, these firms must generate a relatively high profit margin. Such firms will therefore operate in section (a) of Figure C. The high profit margin will usually be achieved

Figure C ROA and Profit Margin-Asset Turnover Mix



through some form of entry barrier (large capital requirements, high risk, regulation) and attainment of economies of scale (i.e., spreading the fixed capacity costs over a large number of units sold). As discussed later, telecommunications, real estate and oil exploration firms operate in section (a).

Firms whose products are commodity-like in nature, where there are few entry barriers and where competition is intense, operate under a competitive constraint. There is an upper limit on the level of profit margin they can achieve. In order to attract sufficient capital, these firms must strive for high asset turnover. Such firms will therefore operate in section (c) of Figure C. High asset turnover might be achieved by minimizing fixed costs, purchasing in sufficient quantities to realize discounts, or integrating vertically or horizontally to obtain cost savings. Such actions to control costs are matched with aggressively low prices to gain market share and drive out marginal firms. Most retailers and wholesalers operate in this section.

Firms that operate in the section of Figure C marked (b) are not as subject to either capacity or competitive constraints as those that operate in the tails of the curves. They thus have more latitude to take actions that will increase profit margin, asset turnover or both in order to achieve a higher ROA.

Product differentiation versus cost leadership: Firms pursue alternative strategies for any particular product—product differentiation or cost leadership.⁴

The thrust of the product-differentiation strategy is to differentiate one's product in such a way as to obtain market power over revenues and therefore profit margins. The differentiation could relate to product capabilities, product quality, service, channels of distribution or some other factor. The thrust of the cost-leadership strategy is to become the lowest-cost producer so as to be able to charge the lowest prices and achieve the highest volume. The low-cost position can be achieved through economies of scale, production efficiencies, outsourcing or similar factors or by asset parsimony (maintaining strict controls on investments in receivables, inventories and capital expenditures). The product-differentiation strategy may be viewed as profit-margin focused, while the cost-leadership strategy is primarily asset-turnover focused.

Studies that classified firms in selected industries into a product differentiation/cost leadership scheme found that:

- (1) firms with the highest ROAs in their industry clearly followed either a product-differentiation or a cost-leadership strategy, whereas firms with the lowest ROAs could not be easily classified into either category; and
- (2) firms operating in industries whose products were more tailored to customer needs tended to follow product-differentiation strategies, whereas firms operating in industries whose products were more commodity-like tended to follow cost-leadership strategies.⁵

Note that movements in the direction of point (a) from any point along the ROA curves are product-differentiation oriented. Movements in the direction of point (c) from any point along the ROA curves are cost-leadership oriented. Thus, while grocery stores will likely cluster around point (c), some grocery stores will place heavy emphasis on specialty products (bakery,

delicatessen, fresh flowers, VCR rentals) that have higher profit margins than most grocery products.

Marginal rate of substitution: The notion of flexibility in trading off profit margin and asset turnover is important when a firm considers strategic alternatives (product differentiation versus cost leadership). The underlying economic concept is the marginal rate of substitution. Consider first a firm with a profit margin-asset turnover mix marked as (a) in Figure C. This firm will have to give up significant profit margin to obtain a meaningful increase in asset turnover. To increase ROA, it should therefore emphasize actions that increase profit margin. Firms in area (c) in Figure C will have to give up considerable asset turnover to obtain much of an increase in profit margin. To increase ROA, these firms should emphasize actions that increase asset turnover.

For firms operating in the tails of the ROA curves, the poor marginal rates of substitution do not favor trading off one variable for the other. For firms operating in area (b), however, marginal rates of substitution of profit margin for asset turnover are more equal. Such firms would seem to have more flexibility to design strategies that promote profit margin or asset turnover, or some combination, when striving to increase ROA. Table II summarizes the economic and strategic concepts underlying the profit margin-asset turnover mix.

The foregoing discussion leads to the following questions, which are addressed below.

- (1) Have changes in ROA (movements in a southwesterly/northeasterly direction in Figure A) or changes in the profit margin-asset turnover mix (movements in a northwesterly/southeasterly direction) dominated the behavior of ROA, profit margin and asset turnover in recent years? Although these two directional movements are not independent, the former tends to be influenced by factors

Table II Strategy Alternatives

<i>Location in Figure C</i>	<i>Capital Intensity</i>	<i>Competition</i>	<i>Likely Strategic Focus</i>
(a)	High	Monopoly	Profit Margin
(b)	Medium	Oligopolistic or Monopolistic Competition	Profit Margin, Asset Turnover or Some Combination
(c)	Low	Pure Competition	Asset Turnover

external to the business (e.g., general economic conditions, inflation, industry competition), while the latter is affected by a firm's particular business strategy.

- (2) How well does the concept of the marginal rate of substitution of profit margin for asset turnover explain the range of strategic choices made by firms within industries?

Empirical Analysis of ROAs

Virtually all the empirical work surveyed in the previous section has used the PIMS database. This database includes various financial and strategic information for approximately 2,000 SBUs of 200 corporations. The data are supplied by the companies on the promise of confidentiality. Extensive efforts are aimed at ensuring accuracy and consistency across companies and time.

The data in PIMS are collected at an SBU level and are therefore more appropriate than firm-wide data for studying product-level theories. The database has some deficiencies, however.⁶ Firms in the database tend to be more sophisticated and perform better than the average of all firms. Also, there is no effort to measure the impact of synergies across SBUs (i.e., SBU data are not aggregated to obtain firm-wide measures of performance).

To study the behavior of ROAs, we extracted data from the Compustat tapes for each of the years 1977 to 1986. To be included in the sample for study, firms had to (1) have a calendar year-end reporting period and (2) be a member of a two-digit SIC industry in which there were at least 10 firms for any particular year. The first criterion ensured that the ROAs for any year covered the same period of time for all firms. This was particularly important for firms in cyclical industries. The second criterion was included to reduce the impact of one or a few outlier firms on the average ROA for its industry.

The number of industries and the number of firms in each industry varied over the 10-year period as a result of the second criterion and because of mergers, bankruptcies and similar factors. Twenty-two two-digit industries were studied in most years, with the number of firms ranging from 477 to 570.

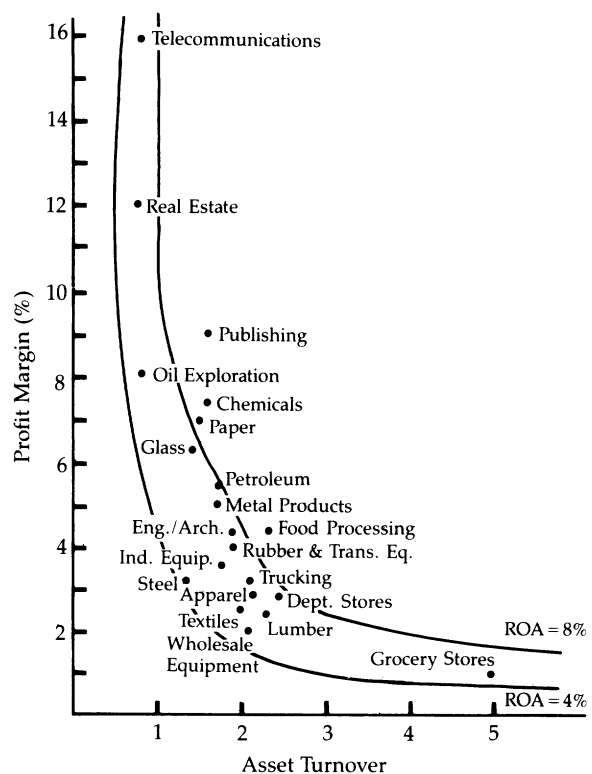
Calculations of ROA, profit margin and asset turnover were based on the following assumptions:

- (1) net income is income from continuing operations before discontinued operations, extraordinary items and adjustments for changes in accounting principles;
- (2) the marginal income tax rate for adjusting interest expense is 46 per cent;
- (3) average total assets are beginning plus end-of-year assets divided by two;
- (4) revenues include sales, interest and other income, and equity in earnings of affiliates and unconsolidated subsidiaries.

ROAs for 10 Years Combined

Figure D presents graphically the average ROAs, profit margins and asset turnovers for each of the 22 industries for all 10 years combined. Relating the data plotted in Figure D to the concepts from the microeconomic and strategy literatures surveyed earlier must be done cautiously because (1) the strategy models are product-level, not corporate-level, oriented, while the data reflect the results for all products and lines of business for each firm; (2) the data are aggregated across time so that changes in

Figure D ROAs of Sample Firms (1977-1986)



ROA due to life-cycle phenomena, economic cyclicality and other factors cannot be observed; and (3) all the 22 industries are probably in the maturity phase or later. The aggregate results nevertheless permit several general observations.

- Industries with the highest ROAs (publishing, chemicals, food processors) are all mature and have a wide range of profit margin-asset turnover combinations.
- Industries with the lowest ROAs (steel, oil exploration, lumber products) are either in the decline phase or highly cyclical. They also display a wide array of profit margin-asset turnover combinations.
- Industries with the lowest asset turnovers (oil exploration, telecommunications, real estate) are heavily capital-intensive (average fixed assets/total assets = 62 per cent) and carry significant operating leverage. Industries with the highest asset turnovers (grocery stores, department stores, food processors) have relatively low levels of capital intensity (average fixed assets/total assets = 39 per cent).

- Industries with the highest profit margins (telecommunications, real estate, publishing, oil exploration) tend to have high barriers to entry. The barriers may be regulatory (licenses, copyrights, patents) or high capital requirements. Industries with the lowest profit margins (grocery stores, wholesalers of equipment, apparel, textiles, lumber, steel) have products that are highly commodity-like, with few opportunities for product differentiation.
- Differences in profit margin between industries appear to be proportionately larger than differences in asset turnover.

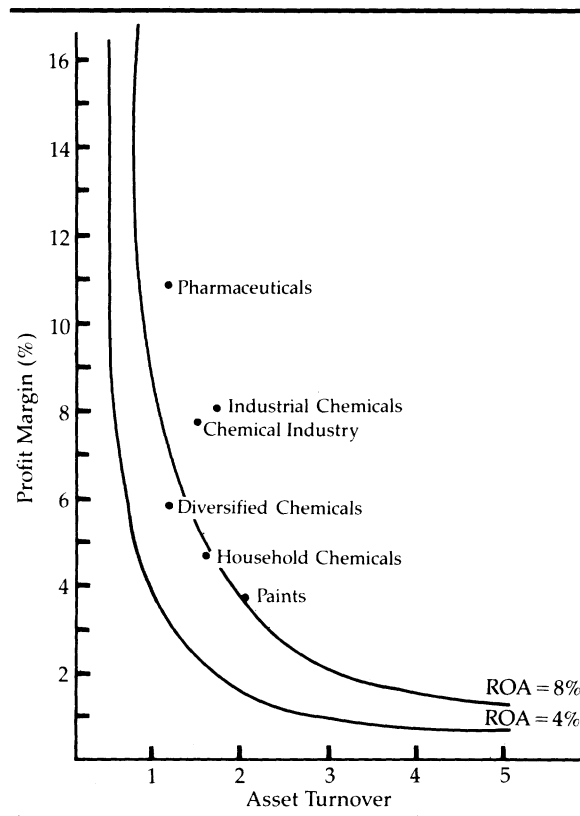
Subindustry Cross-Sectional Analysis

Although the data in Figure D provide support for the product-differentiation/cost-leadership strategy alternatives suggested by the literature, even stronger support is provided by data at the level of three-digit SIC industry codes. Figure E plots the relevant data for the chemical industry, the industry with the most firms in our study. This industry was classified in Figure D as having high profit margin and moderate asset turnover. The segments of the industry, however, span the margin/turnover space.

The pharmaceuticals generate high profit margins because of patent protection (large market share in their selected markets) and benefits of economies of scale in manufacturing. Their asset turnover is constrained by their highly capital-intensive plants. The industrial chemicals segment is composed of small, niche companies that have large market shares in their selected markets, permitting them to achieve profit margins higher than the industry average. Household chemicals and paints have products that are more commodity-like than either pharmaceuticals or industrial chemicals and thus command lower profit margins. The household chemicals segment contains products that, through advertising and other promotion, have gained brand recognition; this probably accounts for its high profit margin relative to the paints segment. Both these segments rely more heavily on asset turnover to generate their ROAs than is the case for pharmaceuticals or industrial chemicals.

The diversified chemicals segment includes firms with products ranging from specialty chemicals to those with commodity characteristics. As would be expected, its profit margin

Figure E Average ROAs for Chemical Industry Segments (1977-1986)



falls amid those of the other four segments. Its asset turnover and ROA are lower those of the other segments of the industry, however, reflecting the problems diversified chemical firms have faced during the last decade in trying to compete in a wide range of markets with smaller, niche players. The diversified chemical companies have recently been eliminating chemical products for which they do not have a competitive advantage and emphasizing their specialty chemical lines.

The data for the segments of the chemical industry support the product-differentiation versus cost-leadership strategy alternatives. The data also illustrate, at least for one industry, the results of diversified strategies of large companies versus more focused niche strategies of smaller companies.

Time-Series Behavior of ROA

Have changes in ROA or changes in profit margin-asset turnover mix dominated the behavior of ROA over the 1977-86 period? If ROAs were reasonably stable and firms altered their profit margin-asset turnover mixes in response to such forces as competition and new products, then we would expect negative correlation between profit margin and asset turnover (i.e., the data would plot in a northwesterly/southeasterly direction in Figure A). If changes in ROA due to economic cycles, foreign competition, movements through product life cycles and similar

factors were more dominant, then we would expect positive correlation between profit margin and asset turnover (i.e., the data would plot in a southwesterly/northeasterly direction in Figure A).

Table III presents the relevant correlation coefficients by year, aggregated across all 22 industries.⁷ The correlations fall into two distinct patterns. From 1977 to 1981, they were negative and stable, suggesting that profit margin/asset turnover strategic tradeoffs dominated during this period, although the levels of correlation suggest some dispersion in ROAs across industries. Over the 1982-86 period, however, correlations decreased, even turning positive in 1986. This period is characterized by high economic cyclicity and increased foreign competition. The ROAs of several industries changed dramatically, as evidenced by the increased standard deviation of ROA.

This unexpected result can be explored further by studying the correlations by industry in Table III. Although 15 of the 22 industries showed negative correlations, seven industries showed positive correlations. All seven experienced deterioration of their ROAs, particularly during the 1982-86 period, because of a combination of foreign competition, diseconomies of scale, economic cyclicity and deregulation. It would appear that external, environmental factors, rather than internal strategic factors, dominated the performance of these firms over the period.

Table III Correlation between Profit Margin and Asset Turnover

All Firms by Year (standard deviation of ROA in parentheses)		
1977	-0.39	(.047)
1978	-0.39	(.046)
1979	-0.47	(.054)
1980	-0.40	(.056)
1981	-0.39	(.052)
1982	-0.15	(.061)
1983	-0.28	(.057)
1984	-0.20	(.056)
1985	-0.04	(.074)
1986	0.17	(.084)
Each Industry for All Years		
Apparel	0.20	(.060)
Chemical	-0.25	(.053)
Engineering/Arch.	-0.38	(.053)
Food Processors	-0.54	(.044)
Glass Products	0.03	(.063)
Industrial Equip.	0.22	(.066)
Lumber	-0.32	(.071)
Metal Products	-0.23	(.059)
Oil Exploration	0.09	(.104)
Paper Products	-0.40	(.043)
Petroleum	-0.38	(.042)
Publishing	-0.45	(.039)
Retailers-Dept. Stores	-0.46	(.033)
Retailers-Grocery	-0.47	(.047)
Real Estate	-0.21	(.046)
Rubber Products	0.00	(.062)
Steel	-0.05	(.066)
Telecommunications	0.68	(.018)
Textiles	0.15	(.063)
Transportation Eq.	-0.13	(.060)
Trucking	-0.34	(.042)
Wholesalers-Equip.	0.23	(.067)

Table IV Marginal Rates of Substitution (MRS) and Related Data (22 industries)

	<i>Mean MRS</i>	<i>Mean ROA</i>	<i>Variance ROA</i>	<i>Mean Profit Margin</i>	<i>Variance Profit Margin</i>	<i>Mean Asset Turnover</i>	<i>Variance Asset Turnover</i>
Telecommunications	.326	.070	.000	.161	.008	0.494	0.029
Oil Exploration	.171	.051	.011	.081	.217	0.471	0.109
Real Estate	.163	.063	.002	.121	.075	0.746	0.244
Publishing	.062	.115	.002	.087	.001	1.410	0.207
Glass	.058	.068	.004	.063	.004	1.069	0.139
Paper	.054	.083	.002	.069	.001	1.287	0.138
Chemicals	.050	.090	.003	.070	.003	1.400	0.329
Petroleum	.036	.069	.002	.053	.001	1.471	0.407
Metal Products	.035	.078	.004	.053	.002	1.529	0.120
Industrial Equipment	.027	.056	.004	.038	.003	1.378	0.134
Steel	.027	.040	.004	.033	.005	1.248	0.198
Rubber	.024	.066	.004	.040	.002	1.655	0.176
Transportation Equip.	.024	.064	.004	.040	.002	1.691	0.280
Engrg./Architecture	.022	.064	.003	.041	.002	1.892	0.747
Trucking	.020	.056	.002	.035	.001	1.797	0.481
Textiles	.019	.053	.004	.031	.002	1.643	0.157
Food Processors	.019	.085	.002	.043	.001	2.277	0.766
Apparel	.019	.063	.004	.034	.001	1.797	0.121
Department Stores	.016	.077	.001	.036	.000	2.272	0.393
Lumber	.015	.051	.005	.031	.002	2.104	1.179
Wholesalers-Equip.	.014	.064	.004	.028	.005	1.937	0.351
Grocery Stores	.003	.066	.002	.015	.000	5.004	2.268

Flexibility for Profit Margin-Asset Turnover Tradeoff

As noted, firms or industries that operate in the tails of the ROA curves have less flexibility to trade off profit margin (product differentiation) for asset turnover (cost leadership) than those in the middle of the curves. The marginal rates of substitution (MRS) of profit margin and asset turnover are not as attractive in these tails.

The MRS is measured as the negative of the slope of the ROA curve at a particular profit margin-asset turnover combination. Table IV presents the MRSs of profit margin for asset turnover for the 22 industries studied.⁸ One would expect the MRS to be greater than 1.0 for high-profit-margin, low-asset-turnover industries, less than 1.0 for low-profit-margin, high-asset-turnover industries, and approximately 1.0 for industries in the middle of the ROA curves. The MRSs of the industries shown in Table IV are all less than 1.0 merely because of scale differences between profit margin (which are generally in the range of 0.03 to 0.08) and asset turnover (which are generally in the range of 1.0 to 2.3). Of prime importance is the ordering of MRSs. Note that industries with the highest MRSs have the highest profit margins and lowest asset turnovers, and vice versa.

Figure F plots ROA, profit margin and asset turnover for firms in three industries, along with assumed MRSs. To the extent that firms in an industry have similar products, the shape and size of the cluster says something about the variability of ROA within the industry and something about the ability of firms in that industry to trade off profit margin for asset

Figure F Clusters of Profit Margin and Asset Turnover for Firms in Three Industries

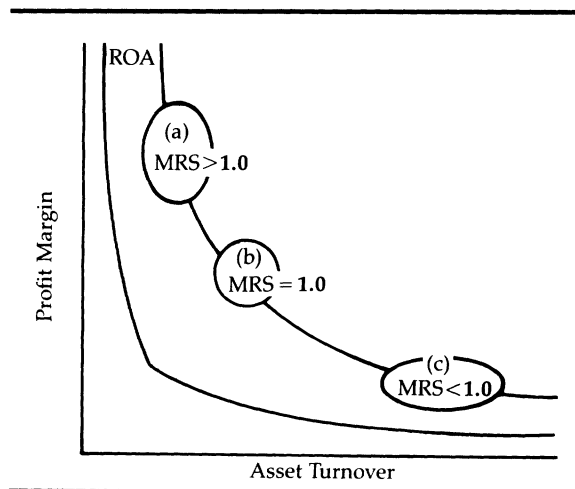


Table V Marginal Rate of Substitution (MRS) Regression

Regression	Independent Variable	Coefficient	Prob. > T	R ²	Prof. > F
1	Var (log margin)	0.041	0.0001	0.87	0.0001
	Var (log ROA)	-0.077	0.0001		
2	Var (log turnover)	-0.044	0.0023	0.52	0.0010
	Var (log ROA)	-0.040	0.0316		

turnover. To examine the second of these two factors, we regressed the MRS of profit margin for asset turnover against two sets of independent variables— $f(\log$ of variance of profit margin, \log of variance of ROA) and $f(\log$ of variance of asset turnover, \log of variance of ROA). Including variance of ROA in each regression filters out its effect so that we can focus on the variances of profit margin and asset turnover. We used log transformations of the independent variables because the underlying relationship is non-linear and because it permits a more effective filtering of the variance of ROA.

As noted, firms in area (a) should generally pursue profit-margin strategies to increase their ROAs. This is partly because they are in an unfavorable position to trade off profit margin for asset turnover and partly because their capital-intensive nature constrains them to low levels of asset turnover. We would thus expect the variance of their profit margins to be relatively large and the variance of their asset turnovers to be relatively small. This will lead to the oblong shape depicted in Figure F for industry (a). As we observed earlier that firms with high profit margins and low asset turnovers had the highest MRSs, we would expect a positive correlation between MRS and the variance of profit margin and a negative correlation between MRS and the variance of asset turnover.

Firms in industry (c) are likely to pursue asset turnover strategies to increase their ROAs. This is explainable by the attractive MRSs of profit margin for asset turnover and the competitive constraint imposed on substantial increases in profit margin. We would expect the variance of profit margin for firms in industry (c) to be relatively small and the variance of asset turnover to be relatively large. This will lead to the oblong shape depicted for industry (c) in Figure F. As we observed earlier that firms with low profit margins and high asset turnovers had the lowest MRSs, we would again expect a positive correlation between MRS and variance of profit margin and a negative correlation between MRS and variance of asset turnover.

Industry (b) falls between the other two. Its firms' MRSs make for attractive profit margin-asset turnover tradeoffs. We would expect the variances of their profit margins and asset turnovers to fall between those of the firms in the other two industries.

We ran the regressions of MRS on variance of profit margin and on variance of asset turnover. Table V gives the results. The coefficients are in the predicted direction and statistically significant. The R-squared values are 0.870 for the first regression and 0.520 for the second regression. These results support the notions that firms and industries have varying flexibility to trade off profit margin and asset turnover and that the strategic emphasis (profit margin, asset turnover or both) appears to be that prescribed by the MRS concept. ■

Footnotes

1. See, for example, L.A. Bernstein, *Financial Statement Analysis: Theory, Application and Interpretation* (Homewood, IL: Richard D. Irwin, 1983) and G. Foster, *Financial Statement Analysis* (Englewood Cliffs, NJ: Prentice-Hall, 1986).
2. C.W. Hofer, "Towards a Contingency Theory of Business Strategy," *Academy of Management Journal*, December 1975, pp. 784-810.
3. See, for example, D.C. Hambrick, I.C. MacMillan and D.L. Day, "Strategic Attributes and Performance in the BCG Matrix: A PIMS-based Analysis of Industrial Product Businesses," *Academy of Management Journal*, September 1982, pp. 510-531 and C.P. Zeithaml and L.W. Fry, "Contextual and Strategic Differences Among Mature Businesses in Four Dynamic Performance Situations," *Academy of Management Journal*, December 1984, pp. 841-860.
4. W.K. Hall, "Survival Strategies in a Hostile Environment," *Harvard Business Review*, September-October 1980, pp. 78-85 and M.E. Porter, *Competitive Strategy* (New York: Free Press, 1980).
5. Hall, "Survival Strategies," *op. cit.* and D.C. Ham-

Footnotes concluded on page 68.

Minimum Balance Sheet Liability

While the funded status footnote explains the differences between balance sheet disclosures and the economic status of the plan, it does not introduce any amounts into the balance sheet itself. The FASB believed that a footnote disclosure alone was inadequate for seriously underfunded plans. Accordingly, the Board mandated the inclusion of a *minimum balance sheet liability* for seriously underfunded plans beginning in 1989.⁷

A seriously underfunded plan was defined as one where the liability *without* considering future pay raises (termed the "accumulated benefit obligation") exceeds the fair value of plan assets. The inclusion of the underfunded amount is designed to be a "red flag" for the benefit of those who do not read footnotes.

When triggered, the minimum balance sheet liability results in the inclusion of both a pension asset and a pension liability in the financial statements. However, neither the asset nor the liability is to be amortized over future years. Instead, the entry for each year is to be reversed at the end of the year and the computation redone for the ensuing year. Plans with continuing serious underfunding would therefore again display asset and liability amounts based on the ensuing year's computations.

The rationale for not carrying the minimum asset forward for amortization relates to why seriously underfunded plans exist. The two primary reasons are (1) cumulative unrecorded losses and (2) unamortized prior service cost. Cumulative unrecorded losses are already being amortized under Component (4b), while unamortized prior service cost is being amortized

under either Component (4c) or Component (4d), depending on when the "sweetener" was adopted. To amortize the asset that arises as an offset to the minimum balance sheet liability would thus result in double-counting. ■

Footnotes

1. Entitled "Employers' Accounting for Pensions," FAS 87 replaced Accounting Principles Board Opinion No. 8 ("Accounting for the Cost of Pension Plans," 1966), and FAS 36 ("Disclosure of Pension Information," 1980).
2. This example is adapted from a pre-FAS 87 illustration prepared by Norman Bartczak.
3. FAS 87 says that "assumed discount rates shall reflect the rates at which the pension benefits could be effectively settled" (para. 44). This is referred to as the "settlement rate." However, discretion remains because, in selecting a discount rate, "employers may also look to rates of return on high-quality fixed-income investments currently available."
4. In FAS 87, "market-related value" of pension plan assets is a technical term. It can be either (1) the fair market value of the assets or (2) some moving-average-type smoothed value that recognizes changes in value more slowly, over not more than five years.
5. However, if the average remaining service period is less than 15 years, the firm may still elect to use a 15-year amortization period.
6. This liability should be computed using projected future compensation levels; i.e., this is the "projected benefit obligation" discussed in conjunction with Component (4b) above.
7. More precisely, for companies whose fiscal years begin after December 15, 1988.

Selling and Stickney footnotes concluded from page 52.

- brick, "High Profit Strategies in Mature Capital Goods Industries: A Contingency Approach," *Academy of Management Journal*, December 1983, pp. 687-707.
6. See S. Schoeffler, "Cross-Sectional Study of Strategy, Structure, and Performance: Aspects of the PIMS Program," in H. Thorelli, ed., *Strategy and Structure Performance* (Bloomington, IN: Indiana University Press, 1977), pp. 108-121 and C.R. Anderson and F.I. Paine, "PIMS: A Reexamination," *Academy of Management Review*, 1978, pp. 603-612.
 7. The relation between profit margin and asset turnover is not linear. If log transformations of the data were made, a substantial number of firms would be eliminated because of negative profit margins. We ran correlations using log and non-log data on the reduced sample set and the results were similar. We report results using non-log data for the full sample.
 8. Marginal rates of substitution could be measured in terms of the substitution of asset turnover for profit margin, with the relative ordering just the opposite of that in Table IV.