Division of Research
School of Business Administration
The University of Michigan

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PORTFOLIO ANALYSIS WITH A MARKET SHARE OBJECTIVE: THE NUMBER OF COMPETITORS - COMPETITIVE POSITION MATRIX

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William T. Robinson
University of Michigan

William T. Robinson is Associate Professor of Marketing in the School of Business Administration, University of Michigan, Ann Arbor, MI 48109-1234.
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ABSTRACT

Portfolio Analysis with a Market Share Objective:
The Number of Competitors - Competitive Position Matrix

Business portfolio models typically have a financial objective, such as cash flow or return on investment, and rely on qualitative measures of market attractiveness and competitive position. This paper develops a portfolio model with a market share objective and quantitative measures of both market attractiveness and competitive position. Market attractiveness is measured by the number of competitors. Competitive position covers five categories proposed by Arthur D. Little. Validating the market share portfolio across 593 consumer goods businesses yields results that are generally consistent with Arthur D. Little's strategic guidelines. Even so, additional descriptive insights, qualifications, and strategic options arise.

Introduction

Portfolio models help managers of large diversified firms deal with strategic diversity. These models place multiple business units in a matrix and generate strategic guidelines for each business. The matrix dimensions typically assess market attractiveness and competitive position. Aaker (1988) says these dimensions provide, "a compact summary of the two most important assessments of any business" (p. 178).

Well known portfolio models include the Boston Consulting Group's growth - share matrix that highlights cash flow and the GE/McKinsey matrix that highlights return on investment. Hamermesh (1986) estimates, "roughly three-fourths of the 'Fortune 500' and many smaller companies with multiple product lines or services practice some form of portfolio planning" (p. 115).

Portfolio models typically have a financial performance objective, such as maximizing cash flow or return on investment. Most businesses though have multiple objectives that cover both financial and market performance. Market performance objectives include customer satisfaction, sales, and market share. Because portfolio models emphasize a single objective, multiple objectives require multiple portfolios.

This paper develops and tests a portfolio model with a market share objective. Assuming firms attempt to maximize profits, why is market share important? Market share has a strong and positive empirical association with various profitability measures, such as return on investment (Buzzell and Gale 1987). While controversy surrounds the degree to which this association is spurious versus causal (Jacobson and Aaker 1985), high share businesses tend to be more profitable.

In fact, many firms regard profitability and market share objectives as complements. For example, 89% of the firms in Shetty's (1979) survey report setting profitability objectives and 66% report setting market share objectives. Why do most firms set both profitability and market share objectives?

First, with just a profitability objective, incentives arise to prematurely harvest a business. For example, slashing advertising and new product expenditures increases short-term profits, but market position deteriorates prematurely. Second, market share proxies sustainable competitive advantages such as scale economies, experience advantages, and brand loyalty. Third, market share provides insights into a business's share of potential profits. This occurs when average prices and costs are roughly constant across competitors.

While market share can be important, it is not always the best market performance measure. When a firm's actions in a young and evolving market generate sales from new customers rather than from competitors' customers, a more appropriate objective is sales. Also, setting market share objectives across multiple businesses with strong synergies is not appropriate. This is because synergies tend to drive business performance. Thus, when it is not appropriate to set a market share objective, applying the market share portfolio model is not appropriate.

When a diversified firm correctly sets market share objectives, the market share portfolio model can be applied. Model operationalization is relatively easy and objective. This is not necessarily true for standardized portfolio models. For example, Wind, Mahajan, and Swire (1983) report that classifying 14 out of 15 businesses using standardized portfolio models is, "quite sensitive to the specific definitions, cut-off points, weights or models used" (p. 98).

To operationalize the market share portfolio, market attractiveness reduces to a single variable: the number of competitors. Using Arthur D. Little's

definitions, competitive position is either dominant, strong, favorable, tenable, or weak. As discussed below, available data can usually measure both matrix dimensions.

The portfolio model is tested using the PIMS (Profit Impact of Market Strategies) data. The sample covers 593 mature consumer goods businesses. The portfolio matrix describes how the frequency of competitive positions differs as the number of competitors differs. These results and other research results help evaluate Arthur D. Little's strategic guidelines for each competitive position. While Arthur D. Little's strategic guidelines are generally supported, additional descriptive insights, qualifications, and strategic options arise.

Market Share Portfolio Model

Two assumptions provide the foundation for the market share portfolio model. Assumption 1 is that in the absence of competitive advantages, competitive disadvantages, and luck, an established business's expected market share equals the industry average. The industry average, or average industry market share (AVEMS), equals 100 divided by the number of competitors. As AVEMS increases, market attractiveness increases. Thus, for a market share objective, the only market characteristic that directly influences market share is the number of competitors.

For example, if a market has 4 competitors, then the expected market share for each business is 25%. For market share to deviate from 25%, a business must have a competitive advantage, competitive disadvantage, or luck.

Even so, how can a single variable capture market attractiveness? For example, does not an increase in market size generally increase market

attractiveness? While sales potential usually increases as market size increases, the same conclusion does not hold true for market share.

In fact, just the opposite occurs. This is because increasing market size tends to increase the number of competitors (see Curry and George's 1983 survey), which reduces average market share. This indirect influence works through the number of competitors. Assumption 1 though specifies a direct influence. Thus, regardless of whether annual sales are $1000 or $1 billion, in a market with 4 competitors, each business's expected market share equals 25%.

Consider market growth. Aaker and Day (1986) discuss the controversial proposition that it is easier to gain market share in growing markets. If so, doesn't market growth influence market attractiveness?

While growing markets are usually more attractive in terms of short-term profit and sales growth, market share should not be influenced. Thus, with 4 competitors, the expected market share for each business is 25%. This is true regardless of whether the annual growth rate is 5% or 50%.

Finally, consider scale economies. Is not a market more attractive for incumbents when scale economies provide sustainable cost savings? When scale economies influence costs, they are important for a financial objective such as return on investment. This differs though from a market share objective. Again, with 4 competitors in a market, each competitor's expected market share is 25%. This is not influenced by the relationship between the scale of operations and average costs.

To summarize, market characteristics other than the number of competitors are important. They are important to consider though for objectives such as sales or return on investment. Other market characteristics influence the number of competitors, which has an indirect market share influence. Assumption 1 though says the number of competitors is the only market

characteristic that directly influences market share. Thus, market attractiveness is evaluated by the number of competitors.

In the portfolio matrix, the number of competitors is classified as either few, average, or many. By placing roughly one-third of the businesses in each category, the category ranges are empirically determined below.

Assumption 2 is that a business's competitive position is determined by competitive advantages, competitive disadvantages, and luck. These forces move a business's market share away from the industry average. Competitive advantages arise largely from the marketing mix and from established distributor and customer relationships. Luck also influences competitive position. Clearly, competitive position is determined by multiple measures.

Equation 1 models these two assumptions.

$$MS_{i,j} = \beta_1 AVEMS_j + \beta_2 X_{2,i,j} + ... + \beta_k X_{k,i,j} + \varepsilon_{i,j} \quad (1)$$

where MS is the market share for firm i in industry j, β_1 to β_k are the response parameters, and AVEMS is average industry market share. The competitive advantage variables, X_2 to X_k, take on a positive value for a competitive advantage and a negative value for a competitive disadvantage. Luck is modeled by the random error term $\varepsilon_{i,j}$, which has mean zero and variance $\sigma^2_{i,j}$.

What does Assumption 1 imply about β_1? Assumption 1 says that in the absence of competitive advantages, competitive disadvantages, and luck, an established business's market share is the industry average. Setting competitive advantages, competitive disadvantages, and luck all equal to zero yields:

$$MS_{i,j} = \beta_1 AVEMS_j \quad (2)$$

Because Assumption 1 says that an established business's market share ($MS_{i,j}$) equals the industry average ($AVEMS_j$), β_1 must equal 1.0. A regression model tests this prediction below.

The regression results also examine whether one axis should be devoted to the number of competitors and the second to competitive position. This is because if one axis dominates in explaining market share, the model should be further simplified to a single axis.

Measuring Competitive Position

If β_1 equals 1.0 and the regression model supports using two axes, this yields key information for plotting current and historical positions. This is because a business usually knows both its market share and the number of competitors. Thus, while competitive position involves numerous variables that are difficult to measure, equation 3 shows it equals $MS_{i,j}$ less $AVEMS_j$.

$$MS_{i,j} - AVEMS_j = \beta_2 X_{2,i,j} + ... + \beta_k X_{k,i,j} + \varepsilon_{i,j} \quad (3)$$

$MS_{i,j}$ less $AVEMS_j$ is easy to calculate because a business usually knows its own market share and the number of competitors. This difference helps quantify Arthur D. Little's subjective definitions. See Hax and Mujluf (1984) and Kerin, Mahajan, and Varadarajan (1990). In Table 1, Arthur D. Little classifies competitive position as either dominant, strong, favorable, tenable, or weak.

Equation 3's difference between market share and average industry market share can objectively distinguish between a favorable and a tenable market position. This is because favorable implies an above average position, while tenable implies a below average position. Thus, market share exceeding AVEMS

yields at least a favorable position. Market share less than AVEMS yields either a tenable or weak position.

How can we objectively distinguish between a tenable and a weak position? For a tenable position, it is proposed that market share be at least equal to 50% of AVEMS. While selecting 50% is subjective, it yields an equal market share range for tenable and weak positions.

To illustrate, consider a market with 10 competitors. Since AVEMS equals 10%, market share greater than or equal to 10% yields at least a favorable position. Market share at least 5%, but less than 10% is a tenable position. Market share less than 5% yields a weak position.

How can we objectively distinguish between a favorable and a strong position? Hax and Mujluf (1984, p. 192) say that a strong business is the market share leader whose relative market share is at least 1.5. (Relative market share equals market share divided by the leading competitor's market share.) For example, when the second highest market share equals 20%, the leader must have at least a 30% market share to be considered strong.

How can we objectively distinguish between a strong and a dominant position? White (1983) summarizes various empirical definitions of dominance from the economics literature. Minimum market share levels range from 40% to 60%. Because the PIMS data used below have relatively narrow market boundaries (Buzzell 1981), this study uses 60%. To avoid a duopoly, White (1983, p. 16) recommends the leader have at least twice the market share of the next largest firm. Her recommendation is followed. For example, if the leader's market share equals 64%, dominance requires the number two market share to be less than or equal to 32%.

Hypotheses

Where are the best opportunities to establish dominant or strong competitive positions? Favorable positions? Where do tenable or weak positions cause the most problems? The hypotheses address these questions by examining how the distribution of competitive positions changes as the number of competitors changes.

Table 2's portfolio matrix has 15 cells. For relatively few competitors, π_1 to π_5 are the percentages of businesses that fall in each cell. Thus, the sum of π_1 to π_5 equals 100%. The hypotheses are based on these percentages. Since portfolio models tend to be used by large diversified firms, the hypotheses apply to businesses similar to those located in Fortune 500 firms.

Opportunities to Establish Dominant or Strong Positions

H_1: The percentage of dominant market positions tends to decrease as the number of competitors increases. ($\pi_1 > \pi_6 > \pi_{11}$)

H_2: The percentage of strong market positions tends to decrease as the number of competitors increases. ($\pi_2 > \pi_7 > \pi_{12}$)

Why should the frequency of dominant competitors be inversely related to the number of competitors? First, dominance requires a leading market share. As the number of competitors in a market increases, the frequency of leading competitors decreases. i. e. In a market with three competitors, 33% have a leading position. In a market with 20 competitors, only 5% have a leading position.

Aside from this definitional issue, entry barriers can 1) limit the number of competitors (Curry and George 1983) and 2) provide sustainable competitive advantages for early entrants (Robinson and Fornell 1985). This makes it more likely that in a market with few competitors, the market leader can achieve and maintain a dominant market position. Thus, from a market structure standpoint, the opportunity to develop a dominant position should be inversely related to the number of competitors[1].

These same factors also apply to strong market positions. A major point distinguishing H_2 from H_1 is that a single market can not have both a dominant and a strong competitor. This is because each requires market leadership. Thus, slicing dominant positions off the top of the competitive position distribution limits the number of strong positions. Even so, since Arthur D. Little describes dominant positions as rare, this should not offset H_2's declining relationship.

Key Problems with Tenable or Weak Positions

H_3: The percentage of tenable market positions tends to decrease as the number of competitors increases. ($\pi_4 > \pi_9 > \pi_{14}$)

H_4: The percentage of weak market positions tends to decrease as the number of competitors increases. ($\pi_5 > \pi_{10} > \pi_{15}$)

As market attractiveness decreases, standard portfolio recommendations view investments by large diversified firms in business units as less attractive .

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[1] From a strategic standpoint, a dominant firm can drive less efficient rivals from the market. This is also consistent with H_1. Thus, while H_1 emphasizes the impact of structure on strategy, this possibility emphasizes the impact of strategy on structure.

While smaller firms can thrive by staking out niche positions in relatively fragmented markets, this is generally not recommended for large diversified firms. Thus, holding competitive position constant, business investment attractiveness should decrease as the number of competitors increases. Reduced investment attractiveness should reduce the percentage of businesses in the portfolio matrix.

Establishing Favorable Positions

H_5: The percentage of favorable competitive positions tends to increase as the number of competitors increases. ($\pi_3 < \pi_8 < \pi_{13}$)

If H_1 to H_4 are correct, then the competitive position distribution becomes more compact as the number of competitors increases. In other words, as the number of competitors increases, a market is less likely to have the structural entry barriers that help maintain a dominant or strong market position. This limits the upper tail of the competitive position distribution. Also, large diversified firms should avoid investing in tenable or weak businesses as the number of competitors increases. This limits the distribution's lower tail. Compressing both tails of the competitive position distribution leads to a greater percentage of favorable positions.

Data

Data are necessary to estimate equation 1's regression model and to test the five market share portfolio hypotheses. The PIMS (Profit Impact of Market

Strategies) data are used for both tasks. The sample covers 593 mature consumer goods businesses. (Similar results occur for mature industrial businesses.)

Why are the data limited to mature markets? When estimating the market share regression equation, this improves sample heterogeneity. Also, market share objectives are more popular in mature markets. As mentioned above, when actions in young and growing markets increase sales by bringing new customers into the market, a more appropriate objective is sales.

Certain data limitations should be recognized. First, it is well known that the PIMS businesses are self-selected. Most belong to large diversified Fortune 500 firms. Even so, Haspeslagh (1982) observes, "Diversified companies, particularly the large ones, widely practice the art of portfolio planning" (p. 63). Thus, testing a portfolio model on PIMS businesses seems reasonable.

Second, because AVEMS equals 100 divided by the number of competitors, it is determined solely by the number of competitors. The only exception is that very small scale competitors are excluded. This is because they are often entering the market or are about to exit. The PIMS data exclude competitors with a market share less than 1%.

Variables and Definitions

Table 3 summarizes the variables and definitions. Market share is the business unit's dollar share of sales in the served or target market. AVEMS equals 100 divided by the estimated number of competitors. Since the number of competitors is categorical, the true number is estimated by the category range mean. For example, 6 - 10 competitors is estimated as 8 competitors.

The only exception is for markets with 5 or fewer competitors. Based on the market share levels of the 3 leading competitors, the category with 5 or fewer

competitors is divided into 2, 3, and 4 or 5 competitors[2]. (In the regression analysis, these categories provide key variation in AVEMS.)

The regression model's competitive advantage variables follow Robinson and Fornell (1985). They are relative product quality, relative product line breadth, relative marketing expenditures, relative price, and order of market entry. Note, the regression equation's competitive advantage variables should be measured relative to the entire market. These PIMS variables though are measured versus the 3 leading competitors. (The business plus the 3 leading competitors have an average total market share of roughly 70%.) The regression results below indicate this is not a major problem.

Order of market entry is measured by the market pioneer, early follower, and late entrant categories. Based on Robinson and Fornell (1985) and Urban et al. (1986), market pioneers should have competitive advantages and late entrants competitive disadvantages. Each variable is coded so that a competitive advantage is positive and a competitive disadvantage is negative[3]. Various regression model specification and estimation issues are discussed in the Appendix.

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[2] PIMS includes market share levels for each of the 3 leading competitors and sets a minimum value for each variable. The minimum value for the largest competitor is 5 share points. For the second and third largest competitors it is 1 share point. Because monopolies in mature markets are unusual, each market is assumed to have at least 2 competitors. When 1 share point is reported for the second or third leading competitor, they are <u>not</u> counted as competitors. Otherwise, they are counted as competitors. Based on these assumptions, the first PIMS category of 5 or fewer competitors is expanded to 2, 3, and 4 or 5 competitors.

[3] An exception is the relative price coding because, from a market share perspective, a high price is a competitive disadvantage.

Regression Results

The regression results address two questions. First, should one portfolio axis be devoted to the number of competitors and the second to competitive position? Second, does the impact of AVEMS on market share equal Assumption 1's predicted value of 1.0?

Table 4 provides the results. The first two sets of OLS results compare the explanatory power of AVEMS alone versus the competitive advantage variables alone. In explaining market share, AVEMS alone is roughly comparable to the competitive advantage variables alone. (The R^2 values are .26 and .30.) This supports devoting one portfolio axis to the number of competitors and a second to competitive position.

Is the estimated impact of AVEMS on market share statistically different from 1.0? Statistical significance is conservatively based on two-tail tests. The full model OLS estimate is .85 and the GLS estimate is .91. While the OLS estimate is statistically different from 1.0 ($z = -2.27$), the GLS estimate is not significantly different ($z = -1.50$). Also, recall AVEMS is measured with error. Since random measurement error biases the least squares estimator towards zero, it is not surprising that both estimates are less than 1.0.

While these results seem strong enough to support Assumption 1, is the estimated impact causal? Because both variables measure market share, the relationship could be true by definition. While both variables measure market share, an individual business's market share is <u>not</u> defined as a function of the number of competitors in the market. Also, because AVEMS equals 100 divided by the number of competitors, it is <u>not</u> defined as a function of the individual

market share levels. Thus, since the business and industry market share definitions are independent, the estimated relationship is not true by definition.

Is the estimated relationship spurious in the sense that a third factor drives the joint variation between AVEMS and market share? While this possibility can never be completely eliminated, the author can not identify a feasible third factor. Also, increasing the number of competitors should tend to decrease market share. From this perspective, AVEMS is the functional form that estimates the impact of the number of competitors on market share.

Market Share Portfolio Results

Descriptive Statistics

For this sample of mature consumer goods businesses, the number of competitors is divided into 3 categories of roughly equal size. The categories are 1 to 5 competitors, 6 to 10, and 11 or more. The distribution of competitive positions is bell-shaped. This is because 5% are dominant, 18% strong, 50% favorable, 17% tenable, and 10% weak.

Table 5 provides the market share portfolio results. Note that a clear majority of the businesses have at least a favorable position. For example, in markets with 1 - 5 competitors, 69% have at least a favorable position. This is true despite the fact that markets tend to have a few high market share businesses and many low share businesses (Buzzell 1981). Given this skewed market share distribution, the majority of businesses have a market share below the mean. Thus, in a representative sample of businesses, the majority would either have a tenable or weak position. The reason the majority have a favorable

position or stronger is because the sample covers businesses in Fortune 500 firms. These firms prefer large and leading market positions.

Hypothesis Testing Results

How do dominant positions change as the number of competitors increases? For H_1, as the number of competitors increases from 1 - 5 to 6 - 10, the percent of dominant firms significantly declines from 16% to 2%. (Table 6 provides the statistical significance.) In this sense, H_1's declining relationship is supported. As the number of competitors increases from 6 - 10 to 11 or more, the percent of dominant positions only declines from 2% to 1%. In this sense, H_1 is not supported. Thus, when dominant positions arise, they tend to arise in markets with 1 - 5 competitors[4].

How do strong positions change as the number of competitors increases? H_2 predicts the percentage of strong positions also declines as the number of competitors increases. Instead, when the number of competitors increases from 1 - 5 to 6 - 10, the percentage of strong positions increases. Since markets with 1 - 5 competitors have 16% of their businesses reporting dominant positions, slicing these businesses off the top limits the percentage of strong market positions. (Recall both dominant and strong positions require a leading market share.) Thus, while the sum of dominant plus strong positions decreases from 33% to 28%, the percentage of strong positions increases.

As the number of competitors increases to 11 or more, the percentage of strong positions decreases significantly from 26% to 12%. (The sum of dominant

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[4] Recall Arthur D. Little describes dominant positions as rare. Dominant competitive positions at roughly 5% of the sample could be considered "rare". At 16%, they are not rare in markets with 1 - 5 competitors.

plus strong positions also decreases significantly from 28% to 13%.) These results highlight the problems associated with achieving and maintaining either a dominant or a strong market position in a relatively fragmented market.

How do tenable positions change as the number of competitors increases? Because of reduced market attractiveness, H_3 predicts a decline. When the number of competitors increases from 6 - 10 to 11 or more, a significant decline occurs from 19% to 10%. The other decline from 23% to 19% is not statistically significant. This suggests the main investment concern with a tenable position arises in markets with 11 or more competitors.

How do weak positions change as the number of competitors increases? H_4 predicts that weak positions tend to decrease as the number of competitors increases. H_4 is not supported. Also, the range for average market share in Table 5 is from 2% to 7%. Thus, regardless of whether a market has 3 or 30 competitors, it appears that weak positions spell trouble.

How do favorable positions change as the number of competitors increases? H_5 predicts the percentage of favorable market positions tends to increase as the number of competitors increases. As the number of competitors increases, favorable positions increase from 36% to 41% to 68%. In Table 6, only the second difference is statistically significant. Thus, similar to the dominant and tenable results, the estimated differences are not smooth.

In summary, businesses in markets with 11 or more competitors face the most trouble. Since only 13% developed a dominant or strong position, the upside potential is limited. The downside is dangerous because the results suggest that a tenable or weak position is often scaled back or divested. Thus, a clear majority end up with a favorable position. Even so, the average consumer goods market share for their favorable position is only 12% versus the sample average of 23%.

Strategic Guidelines

A major portfolio analysis benefit is providing strategic guidelines. For example, Aaker (1988, p. 178) says, "baseline recommendations can serve to introduce strategic options that might not otherwise be considered." The phased withdrawal/divestiture recommendation is especially important. Hamermesh (1986) concludes, "Portfolio planning has had its greatest impact at the corporate level, particularly in helping companies make divestiture decisions. The process of categorizing and ranking business units often throws light on likely disposal candidates - those units whose poor performance is rooted in weak market and competitive conditions" (p. 116).

Arthur D. Little's mature market strategic guidelines are described in Kerin, Mahajan, and Varadarajan (1990, p. 79). Dominant and strong businesses should hold their position. Favorable positions should be maintained at the industry level through custodial or maintenance strategies or else scaled back to a market niche. Tenable positions lead to either a niche or an exit decision. Weak positions force either an up or out decision. Overall, strategic commitment decreases as competitive position decreases.

Arthur D. Little's strategic guidelines are described and evaluated in the context of the market share portfolio matrix. Since industrywide versus niching strategies are central to these guidelines, how can this distinction be made using the PIMS data?

From a product-market perspective, niching arises in terms of either products or markets (Kotler 1988). In PIMS, a business's product line is either broader, the same breadth, or less broad than the leading competitors. When the line is less broad, a business is classified as following a product niche strategy. Three served market breadth measures assess customer type, number, and size.

When two or three of the served market breadth measures are less than the the leading competitors, the business is classified as following a market niche strategy. For either a product or a market niche strategy, the business is classified as niching. Otherwise, the business follows an industrywide strategy.

Arthur D. Little's strategic are evaluated by a) Table 5's distribution of competitive positions, b) Table 7's niching versus industrywide strategies, and c) other literature. As shown above, dominant positions mainly arise in markets with 1 - 5 competitors. Strong positions are the most difficult to achieve in markets with 11 or more competitors. Consistent with Arthur D. Little's recommendations, more than 90% of these dominant and strong businesses follow industrywide strategies.

Should dominant and strong businesses follow Arthur D. Little's recommendation to hold their position? Economic research indicates this strategic decision hinges on whether the firm has an appreciable and sustainable competitive advantage (Scherer 1980, Ch. 9). Without this type of advantage, profits increase when share slowly declines over time. For example, United States Steel's market share slowly declined from 65% in 1901 to 24% in 1967. Over the last decade, General Motor's market share has slowly declined.

With an appreciable and sustainable competitive advantage, it typically pays to hold on to market share. Thus, the Arthur D. Little recommendations to hold market share are supported when a strong or dominant business has an appreciable and sustainable competitive advantage. If not, it usually pays to slowly sell off the customer base.

Regardless of the number of competitors, the highest percentage of businesses in these large, diversified firms have favorable positions. This ranges from 36% to 68%. Consistent with Arthur D. Little's recommendations, as competitive positions decline from strong to favorable, businesses move away

from industrywide strategies to follow a mix of industrywide and niching strategies.

As mentioned above, tenable positions account for roughly 20% of the businesses in markets with 10 or fewer competitors. With 11 or more competitors, only 10% have a tenable position. The sharp decline associated with 11 or more competitors suggests this cell has the greatest phased withdrawal.

In addition, since roughly 40% to 60% of the survivors with tenable positions continue to follow industrywide strategies, this indicates that industrywide custodial or maintenance strategies are also feasible. This goes beyond Arthur D. Little's recommendation to either niche or exit.

Regardless of the number of competitors, roughly 10% of the businesses are classified as weak. 69% to 76% of these weak businesses serve market niches. Frequent niching in conjunction with market shares that average only 2% to 7% suggests that most of these survivors have been scaled back.

Even so, because roughly 10% of the total sample has a weak position, some may just be "hanging on". Hanging on differs from the Arthur D. Little recommendation of either up or out. It is consistent though with the Dexter Corporation's strategy. Dexter's president says, "The secret with dealing with so-called harvest businesses is never to really harvest them but in a sense to put them in idle. That way, you are ready to put the business back in gear whenever an opportunity arises" (Hamermesh 1986, p. 118).

Plotting Time Trends

Plotting time trends in a portfolio matrix is often insightful. The historical to the present position is the trend's first segment. The present to the

forecasted position is the second segment. Each segment spans a strategic planning time horizon, which often ranges from 5 to 10 years (Aaker 1978). Because of the limited data requirements, most managers can plot the historical segment. Unfortunately, the cross-sectional nature of the PIMS data cannot plot historical changes[5].

Forecasting positional change requires forecasting changes in the number of competitors as well as changes in competitive position[6]. While forecasting these variables involves a great deal of uncertainty, the task can not be avoided.

How will competitive position change over the next 5 to 10 years? Competitive position changes are driven by changes in competitive advantages, competitive disadvantages, and luck. Assume luck can not be forecast. While competitive advantage are clearly influenced by strategic decisions, certain advantages are more sustainable than others.

A well known brand name advantage is often sustainable. After 60 years, nineteen of the top twenty five consumer brand names remained market leaders (Advertising Age 1983). When prices are influenced by costs, cost savings based on scale economies tend to be more sustainable than those based on greater

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[5] The Strategic Planning Institute also has an annual data base (SPIYR). Because the number of competitors is only measured once, time trends can not be plotted.

[6] This market share forecast is competition centered in the sense that it is determined by competitive advantages and the number of competitors. This breaks with conventional wisdom that emphasizes customer based forecasting. For example, Kotler (1988) says, "All (sales) forecasts are built on one of three information bases: *what people say, what people do,* or *what people have done*" (p. 270). Thus, it may prove useful to supplement traditional customer based forecasts with a competition based forecast.

experience (Porter 1980). For market pioneers, product line breadth advantages are typically more sustainable than product quality advantages (Robinson 1988 and Robinson and Fornell 1985).

How will the number of competitors change? This issue is addressed in the product life cycle/industry evolution literature. For example, Porter's (1980) industry evolution survey describes few competitors in the introductory stage, many in the growth stage, a shakeout in the transition to maturity, and additional exit in the decline stage.

The economics literature provides additional insights. Strategic behavior clearly influences entry. Kreps and Wilson (1982) and Milgrom and Roberts (1982) both show that aggressive reactions which yield a reputation for "toughness" can deter entry. Entry can also be deterred by using preemptive investments, which are at least partly justified by limiting or delaying competition. (See Salop 1979 and Spence 1977).

While these strategic actions reduce entry, Mansfield (1962) provides evidence that high profitability motivates entry. His results suggest, "the entry rate would increase by at least 60 per cent if an industry's profitability doubled" (p. 1043). Curry and George's (1983) survey indicates growing markets as well as markets with relatively few competitors tend to attract entry.

While plotting historical, present, and forecasted positions is useful, a limitation occurs in markets without any entry or exit. Because the number of competitors is fixed, time trends are reduced to vertical moves. Thus, the number of competitors dimension is not used. How often does this arise?

37% of this sample reports at least one major competitor (5% or greater market share) entered over the last 5 years. 35% report at least one major competitor exited. Dunne, Roberts, and Samuelson (1988) describe market entry and exit rates across the 1963, 1967, 1972, 1977, and 1982 Censuses of

Manufactures. They report, "By averaging across industries, we find that entering and exiting firms each account for approximately . . . 40% of the firms in each census year" (p. 505). Thus, over a typical 5 to 10 year planning horizon, many markets experience frequent entry and exit.

Summary & Conclusions

A portfolio matrix is developed with a market share objective. Market attractiveness is measured by a single variable: the number of competitors. As the number of competitors increases, market attractiveness decreases. Other market characteristics influence objectives such as profits, interact with competitive advantages, or influence the number of competitors. The model though assumes the only market characteristic that directly influences market share is the number of competitors.

In the portfolio matrix, the number of competitors is classified as either few, average, or many. Competitive position covers the Arthur D. Little categories of dominant, strong, favorable, tenable, and weak. Objective measures are proposed to determine each competitive position. Multiplying the five competitive position categories by the three categories for the number of competitor yields a fifteen cell matrix.

Is this portfolio matrix potentially useful? Because businesses often have a market share objective and many diversified firms use portfolio approaches, a portfolio model with a market share objective should be useful. Also, this portfolio approach is easy to operationalize. This is because most managers know the number of competitors, their own market share, and the leading competitor's market share.

What descriptive and strategic insights arise from this matrix? Based on 593 mature consumer goods businesses, dominant positions almost always arise in markets with 1 - 5 competitors. Dominant or strong positions arise more often in markets with 1 -10 competitors. This suggests that entry barriers which limit the number of competitors also provide opportunities to develop sustainable competitive advantages. In relatively fragmented markets, the reverse holds true because opportunities to develop sustainable competitive advantages are more limited.

Tenable competitive positions decline sharply when the number of competitors increases from 6 - 10 to 11 or more. This is consistent with standard portfolio recommendations that view an investment as less attractive as market attractiveness decreases. Standard portfolio recommendations though point to a smooth decline in investment attractiveness as market attractiveness declines. When the number of competitors increases from 1 - 5 to 6 - 10, a smooth decline is not supported.

Also, weak positions do not appear to be less attractive as market attractiveness decreases. Thus, regardless of the number of competitors, weak positions appear to be troublesome for these large diversified firms.

The market share portfolio matrix along with other literature examines Arthur D. Little's mature market strategic recommendations. When a dominant or strong business has an appreciable and strong competitive advantage, the recommendation to hold their position is reasonable. When they do not have an appreciable and sustainable competitive advantage, it usually pays to let market share slowly decline over time.

Favorable competitive positions yield the predicted mix between industrywide and niching strategies. Tenable positions tend to support the niche or exit recommendation. Exit seems especially likely in markets with 11 or more

competitors. Even so, roughly, 40% to 60% of the tenable positions follow industrywide strategies. This goes beyond Arthur D. Little's niche or exit recommendation.

For weak positions, Arthur D. Little recommends either up or out. Regardless of the number of competitors, weak positions appear troublesome for these large diversified firms. Roughly 10% of these mature businesses though are classified as weak. In contrast to Arthur D. Little's recommendation, it seems likely that some are just "hanging on".

Future Research

By their very nature, portfolio matrices are two-dimensional. Thus, the relationships examined above between competitive position and the number of competitors are suggestive rather than conclusive. Explaining competitive position using more variables than just the number of competitors would provide additional insights into these strategic relationships. In addition, case studies could provide greater detailed insights into factors influencing competitive position, strategic decisions, and the associated resource allocation decisions.

Conclusion

Portfolio approaches are used by many large diversified firms. Because most businesses have multiple objectives, multiple portfolios are required. While portfolio models typically have financial performance objectives, such as cash flow or return on investment, this portfolio model has a market share objective. Operationalizing the market share portfolio model is relatively easy and objective. Thus, the market share portfolio model may provide a useful complement to financially oriented portfolios.

Appendix
Regression Model Specification & Estimation

Should the model be specified as a single or multiple equation system? Equation 1 above is a single equation model. If AVEMS influences competitive advantages, a multiple equation system is required. For example, when competitors in concentrated markets de-emphasize price versus nonprice competition (Scherer 1980, p. 388), the number of competitors influences business strategy. Thus, is a multiple equation system required?

Keep in mind though competitive advantages are measured relative to competition. Because an industry characteristic such as the number of competitors should be independent of business characteristics measured relative to competition, a multiple equation system does not seem necessary.

Why was a linear rather than a multiplicative functional form selected? (Cooper and Nakanishi 1988 describe multiplicative models.) While it would be valuable to compare these two specifications, the numerous PIMS categorical are not ideal for multiplicative models. Thus, following other PIMS market share models, such as Phillips, Chang, and Buzzell (1983) and Robinson and Fornell (1985), the linear specification is used.

In cross-sectional estimation, one often encounters a heteroskedastic random error term (ε_i). White's (1980) test supports heteroskedasticity, which should be positively related to expected market share. This is because the difference between actual and expected market share should increase as expected market share increases. Thus, generalized least squares (GLS) estimation specifies

$$\sigma^2_{i,j} = \sigma 2\ [E(MS_{i,j})], \qquad (4)$$

where market share predicted by OLS is a consistent estimator of $E(MS_{i,j})$7. See Kmenta (1986, p. 287). While GLS reduces the heteroskedasticity, it is not eliminated.

White's standard errors are reported for both the OLS and GLS results, which are consistent in the face of heteroskedasticity. Since consistency is a large sample property and the sample size equals 593, testing the prediction that β_1 equals 1.0 should be reasonable.

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7 The GLS estimation procedure is not effective when the predicted market share is less than 1.0. The square root can not be taken for a negative market share forecast and share predictions between 0.0 and 1.0 receive an inflated weight. Because this only applies to 2% of the sample, they are deleted from GLS estimation.

TABLE 1
Classifying and Defining Competitive Position

Competitive Position[a]	Arthur D. Little Definition	Proposed Empirical Definition
Dominant	Dominant competitors are very rare. Dominance often results from a quasi monopoly or from a strongly protected technological leadership.	Market share must be at least 60%. Also, to avoid a duopoly, market share must be at least twice that of the leading competitor.
Strong	Not all industries have dominant or strong competitors. Strong competitors can usually follow strategies of their choice, irrespective of their competitors' moves.	Not dominant, but the leaders market share must be at least 1.5 times that of the leading competitor.
Favorable	When industries are fragmented with no competitor clearly standing out, the leaders tend to be in a favorable position.	Not dominant or strong, but market share at least equals the industry average.
Tenable	A tenable position can usually be maintained profitable through specialization in a narrow or protected market niche. This can be a geographic specialization or a product specialization.	Market share below the industry average, but at least equal to 50% of the industry average.
Weak	Weak competitors can be intrinsically too small to survive independently and profitable in the long term, given the competitive economics of their industry, or they can be larger and potentially stronger competitors, but suffering from costly past mistakes or from a critical weakness.	Market share less than 50% of the industry average.

[a]The Arthur D. Little competitive positions and definitions are from Hax and Mujluf (1984, p. 192).

TABLE 2

Number of Competitors - Competitive Position Matrix

Competitive Position	Number of Competitors: Few[a]	Average	Many
Dominant	Π_1	Π_6	Π_{11}
Strong	Π_2	Π_7	Π_{12}
Favorable	Π_3	Π_8	Π_{13}
Tenable	Π_4	Π_9	Π_{14}
Weak	Π_5	Π_{10}	Π_{15}
Column Total	100%	100%	100%

[a]For a given number of competitors, the Π values represent the true percentage of observations that fall in each cell. For example, the sum of Π_1 to Π_5 equals 100%.

TABLE 3
Variable Definitions

Variable	Definition[a]
Market Share	The entrant's dollar sales divided by total served market dollar sales.
Average Industry Market Share	100 divided by the estimated number of competitors. Competitors with less than 1% of the served market are excluded. 50 = 2 competitors, 33 = 3 competitors, 22 = 4 or 5 competitors, 13 = 6 - 10 competitors, 6 = 11 - 20 competitors, 3 = 21 - 50 competitors, and 1 = 51 or more competitors.
Relative Product Quality	Estimate the percentage of this business's sales volume accounted for by products and services that, *from the perspective of the customer*, are assessed as "superior," "equivalent," and "inferior" to those available from the three leading competitors. Relative product quality is the percentage superior less the percentage inferior.
Relative Product Line Breadth	Relative to the weighted average of the product lines of the three largest competitors, estimate the breadth of the product line of this business. +1: Broader 0: Same -1: Narrower
Relative Marketing Expenditures	Relative marketing expenditures is the mean of relative salesforce, relative advertising, and relative sales promotion expenditures as a % of sales. 2 = Much more 1 = Somewhat more 0 = About the same -1 = Somewhat less -2 = Much less

TABLE 3 (Cont.)

Variable	Definition
Relative Price	The percentage above or below the average level of selling prices of this business's products and services, relative to the average level of the three largest competitors.
Market Pioneer	At the time this business first entered the market, was it: 1 = one of the pioneers in first developing such products or services, 0 = otherwise.
Early Follower	Same as above, except an early follower of the pioneer(s) in a still-growing, dynamic market. (The regression analysis excludes the early follower category.)
Late Entrant	Same as above, except a late entrant in a more established market situation.

a) Variable definitions are from the PIMS Data Manual (1978).

TABLE 4

Ordinary and Generalized Least Squares Results

Variable and Expected Sign	Market Share			
	OLS	OLS	OLS	GLS
Constant (+/-)	9.94[a] (9.80)***	16.59 (12.96)***	6.55 (5.44)***	5.55 (3.72)***
Market Attractiveness				
Average Industry Market Share (+)	.96 (12.52)***		.85 (12.88)***	.91 (15.20)***
Competitive Advantage Variables				
Relative Product Quality (+)		.13 (4.88)***	.11 (4.96)***	.12 (6.45)***
Relative Product Line Breadth (+)		6.19 (7.16)***	5.89 (8.25)***	5.12 (8.55)***
Relative Marketing Expenditures (+)		1.88 (2.54)**	2.05 (3.34)***	2.30 (5.15)***
Relative Price (-)		.11 (1.45)	.10 (1.65)	.04 (.78)
Market Pioneer (+)		7.17 (4.77)***	5.38 (4.26)***	5.12 (5.24)***
Late Entrant (-)		-2.52 (-1.58)	-2.72** (-1.98)	-1.91 (-1.79)*
R^2	.26	.30	.50	.49[b]

a) The values in parentheses are z-statistics. All tests are two-tailed with * = 10%, ** = 5%, and *** = 1% significance.

b) The GLS R^2 variables are calculated from the GLS estimates and the raw variables. Multiplying and summing these values predicts market share. R^2 equals the squared correlation between actual and predicted market share.

TABLE 5

Descriptive Results for the Number of Competitors - Competitive Position Matrix

Competitive Position	Number of Competitors: 1 - 5[a]	6 - 10	11 or More
Dominant	16% (67)	2% (65)	1% (68)
Strong	17% (48)	26% (39)	12% (31)
Favorable	36% (33)	41% (25)	68% (12)
Tenable	23% (16)	19% (10)	10% (4)
Weak	8% (7)	12% (4)	9% (2)

[a]The first value in each cell is the percentage, for a given number of competitors, that has the competitive position. For example, 16% of the businesses in markets with 1 - 5 competitors have a dominant position. The second value in parentheses is the average market share expressed in points.

TABLE 6
Hypothesis Testing Results

	%	Standard Error	Z[a]
H_1: Dominant Position			
6 - 10 Competitors	2	1.02	
1 - 5 Competitors	16	2.93	
Difference	-14	3.10	-4.29*
11 or More Competitors	1	.78	
6 - 10 Competitors	2	1.02	
Difference	-1	1.28	.74
H_2: Strong Position			
6 - 10 Competitors	26	2.99	
1 - 5 Competitors	17	3.03	
Difference	9	4.26	2.21*
11 or More Competitors	12	2.16	
6 - 10 Competitors	26	2.99	
Difference	-14	3.69	-3.96*
H_3: Tenable Position			
6 - 10 Competitors	19	2.66	
1 - 5 Competitors	23	3.39	
Difference	-4	4.31	-.88
11 or More Competitors	10	2.01	
6 - 10 Competitors	19	2.66	
Difference	-9	3.33	-2.70*
H_4: Weak Position			
6 - 10 Competitors	12	2.17	
1 - 5 Competitors	8	2.25	
Difference	4	3.13	.98
11 or More Competitors	9	1.97	
6 - 10 Competitors	12	2.17	
Difference	-3	2.93	-.70
H_5: Favorable Position			
6 - 10 Competitors	41	3.35	
1 - 5 Competitors	36	3.89	
Difference	5	5.13	-.90
11 or More Competitors	68	3.15	
6 - 10 Competitors	41	3.35	
Differences	27	4.60	5.78*

[a] The Z values are based on three significant digits for both the percentages and standard errors. * is significant at the 5% level or better with a conservative two-tailed test.

TABLE 7

Niching Strategy Percentages

Competitive Position	Number of Competitors: 1 - 5[a]	6 - 10	11 or More
Dominant	4%	0%	0%
Strong	4%	5%	12%
Favorable	36%	28%	43%
Tenable	37%	61%	50%
Weak	69%	76%	76%
Average	29%	33%	42%

[a] The value in each cell is the percentage of businesses that follow either a product or a market niche strategy.

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