MARKET SHARE AND ROI: 
OBSERVING THE EFFECT OF UNOBSERVED VARIABLES

by

Kusum L. Ailawadi*
Dartmouth College

Paul W. Farris
University of Virginia

and

Mark E. Parry
University of Virginia

Abstract

Unobserved variables correlated with market share are largely responsible for the high profitability of market share leaders; yet, very little is known about these unobserved variables. The objective of this paper is to empirically determine the cost/sales ratios through which unobserved variables affect profitability, and to use this information to identify specific unobserved variables. We find that firm-specific unobserved variables, generally called "management skill" in the literature, decrease the purchase costs/sales ratio much more than they do any other costs/sales ratio. This finding allows us to identify three specific "skills" utilized by market share leaders -- (i) exploiting product/process efficiencies; (ii) negotiating better supplier discounts; and (iii) vertically integrating or developing strategic partnerships with key suppliers.

Keywords: Market Share, Profitability, Unobserved Variables, Purchase Costs, Vertical Integration.

* 100 Tuck Hall
Hanover, NH 03755
Tel: (603) 646-2845; Fax: (603) 646-1308
e-mail: kusum.lailawadi@dartmouth.edu
MARKET SHARE AND ROI: OBSERVING THE EFFECT OF UNOBSERVED VARIABLES

1. INTRODUCTION

During the seventies and the early eighties, "bigger is better" was a widely held view in marketing strategy. An oft-cited study of the PIMS database by Buzzell, Gale, and Sultan (1975) reported a strongly positive relationship between profitability, as measured by return on investment (ROI), and market share. In the last ten years, however, this relationship has been the subject of increased debate in the marketing and strategy literature. Researchers have now established that the relationship is due largely to two types of unobserved variables that are correlated with both profitability and market share: temporary shocks and firm-specific factors that persist over time (e.g., Rumelt and Wensley 1980, Jacobson and Aaker 1985, Boulding and Staelin 1990, 1993). After econometrically removing the effect of unobserved variables, these researchers obtain a consistent estimate of the much smaller causal effect of market share on profitability (see Szymanski, Bharadwaj, and Varadarajan 1993 for a meta analysis). This work has an important message: market share leadership by itself does not cause significantly higher returns.

However, this work also reveals the need to understand the unobserved variables that play such an important role in the financial success of market share leaders. These unobserved variables are generally called "luck" and "management skill" in the marketing literature. Unfortunately, neither of these labels is particularly helpful for managers. Do lucky events benefit certain areas of a business's operation more than they do others? What kind of skill allows market share leaders to enjoy higher profitability? Answers to these questions are needed to determine what managers can do to successfully translate their market share leadership into profitability. We address these questions in this paper, thus shifting the focus of research attention from the small, causal effect of market share on profitability to the unobserved variables that make the observed relationship...
between market share and profitability large and therefore more interesting.

Our objectives are (i) to empirically determine which components of profitability are most influenced by each type of unobserved variable; and (ii) to use this information to identify specific unobserved variables that increase the profitability of market share leaders. Jacobson (1990) and Boulding (1990) compare the estimated effect of market share on profitability before and after econometrically removing the effects of unobserved variables. They find a significant reduction in the market share effect and conclude that unobserved variables correlated with market share have a major influence on profitability. We follow the same logic, but with a key difference. We first decompose profitability into its definitional components (purchase costs/sales ratio, manufacturing costs/sales ratio, marketing costs/sales ratio, etc.). Then, we compare the estimated effect of market share on each component of profitability before and after econometrically removing the effects of unobserved variables. Since the difference between the two sets of estimates can be attributed to the impact of unobserved variables, we are able to determine the effect of unobserved variables on each component of profitability. Finding out which components of profitability are affected by unobserved variables and which ones are not, allows us to generate hypotheses about what these unobserved variables really are.

The paper is organized as follows. In the next section, we present our structural model of profitability and describe the methodology and data used to address our research objective. Sections 3 and 4 summarize the empirical analysis used to determine which components of profitability are most affected by the unobserved variables. In section 5, we generate hypotheses about specific unobserved variables whose impact on the components of profitability is consistent with our empirical findings, and provide support for one of these variables. Section 6 concludes the paper
with a summary of our findings and implications of our work for academics and managers.

2. METHODOLOGY

2.1 Component Level Analysis and Unobserved Factors

Many marketing constructs can be decomposed into definitional components and are termed "composite variables" in the literature (e.g., Farris, Parry and Ailawadi 1992). For instance, a linear identity relating a composite variable $Z$ to two definitional components, $z_1$ and $z_2$, can be written as:

$$Z = az_1 + bz_2$$

(1)

The coefficients of this error-free definitional identity, $a$ and $b$, are known a priori and need not be empirically estimated. Since there is no error in the relationship of the composite variable with its components, the effect of any variable, $X$, on the composite variable, $Z$, is simply an algebraic combination of its effects on the definitional components. For the additive identity in (1), this is simply equal to $a$ times the effect of $X$ on $z_1$ plus $b$ times the effect of $X$ on $z_2$. Estimating the effect of an independent variable on each of the components provides the researcher with valuable insights into the mechanism through which the independent variable affects the composite dependent variable.

We use this decomposition approach to understand the effect of unobserved variables on profitability, as measured by ROI. First, ROI is decomposed into its multiplicative components, return on sales (ROS), and the sales/investment ratio (S/I):

$$ROI = \text{ROS} \times \text{S/I}$$

(2)

Second, ROS is further decomposed into its additive components:

$$\text{ROS} = 1 - \text{Purchase Costs/Sales} - \text{Manufacturing Costs/Sales} - \text{R&D Costs/Sales} - \text{Marketing Costs/Sales} - \text{Depreciation/Sales} - \text{Other Costs/Sales}$$

(3)
The effect of each of these components on ROS is known a priori -- ROS decreases by exactly one percentage point for every percentage point increase in any of the components. Further, the total effect of any variable on ROS is exactly equal to minus the sum of its effects on the six components of ROS. To determine whether an observed variable such as market share affects some components of profitability more than it does others, we can simply estimate its effect on each component:

\[ \text{Component}_{jit} = \gamma_{j0} + \gamma_{j1} \text{Share}_{it} + \varepsilon_{jit} \]  

(4)

where:

\( \text{Component}_{jit} \) = The j'th component of profitability, for business i at time t;

\( \text{Share}_{it} \) = Market share for business i at time t;

\( \varepsilon_{jit} \) = Error term for j'th component of business i at time t.

It is not as straightforward to determine whether an unobserved variable affects some components more than others. By definition, there is no data on unobserved variables, so one cannot include them in model (4) to directly estimate their effect on each component. However, these unobserved variables bias the estimated effect of market share on each component since they are correlated with market share. By observing the extent to which the unobserved variables bias the estimated effect of market share on each component, we can "observe" their effect on the components themselves. Note that the expected value of the market share coefficient estimate for the j'th component is the sum of the causal effect of share and of the bias in the estimate:

\[ E(\hat{\gamma}_{ji}) = \gamma_{ji} + \text{Bias}_{ji} \]  

(5)

Just as the causal effect of market share on ROS is minus the sum of its causal effects on the six
components, the total bias in the market share estimate for ROS is also minus the sum of the biases in the market share estimates for each component. We will determine whether the bias in the market share estimate due to unobserved variables is larger for some components than for others.

First, however, we fully specify the model relating market share to the components of profitability and describe the econometric methodology by which we isolate the influence of each type of unobserved variable on each component of profitability.

2.2 The Model

The presence of unobserved variables is incorporated in assumptions about the structure of the error term in the model for each component of profitability. Temporary shocks are represented by a contemporaneous correlation between the random error term and market share (e.g., Jacobson and Aaker 1985, Boulding and Staelin 1990 and 1993). This correlation also incorporates possible reverse causality (e.g., Day and Wensley 1988).

Persisting unobserved variables are represented by a serially correlated and/or firm-specific fixed error component (e.g., Jacobson 1990, Erickson, Jacobson and Johansson 1992, Boulding and Staelin 1993). We initially included both in our model but dropped the dynamic error component since a specification test (Hausman 1978) did not support the existence of serial correlation once temporary shocks and fixed effects were incorporated in the model.¹

Finally, there may be random measurement error in market share (e.g., Phillips, Chang, and

¹ Boulding and Staelin (1993) report a similar finding for their model of average costs. Details of our test are available from the first author upon request.
Following standard practice (e.g., Johnston 1984), this measurement error is assumed to be uncorrelated with true market share as well as with the other error elements in the model. Thus, the complete model is:

\[
\text{Component}_{jit} = \gamma_{j0} + \gamma_{ji} \text{Share}_{it} + (\alpha_{ji} + \eta_{jit} - \tilde{\delta}_i)
\]

where

\[
\text{Share}_{it} = \text{True Share}_{it} + \delta_{it}
\]

\[
\tilde{\delta}_i = \gamma_{ji} \delta_i
\]

\[
E(\text{True Share}'\eta_j) \neq 0; E(\text{True Share}'\alpha_j) \neq 0
\]

and

\[
E(\delta'\alpha_j) = E(\delta'\eta_j) = E(\alpha_j'\eta_j) = 0
\]

\[
\text{Share}_{it} = \text{Reported market share of } i^{th} \text{ business at time } t;
\]

\[
\text{True Share}_{it} = \text{True market share of } i^{th} \text{ business at time } t;
\]

\[
\delta_{it} = \text{Measurement error in reported market share of } i^{th} \text{ business at time } t;
\]

\[
\alpha_{ji} = \text{Firm-specific fixed portion of error for } j^{th} \text{ profit component of } i^{th} \text{ business, including persisting unobserved variables;}
\]

\[
\eta_{jit} = \text{Random error for } j^{th} \text{ component of } i^{th} \text{ business at time } t, \text{ including unobserved temporary shocks;}
\]

### 2.3 Outline of Methodology

Our methodology consists of an econometric "experiment", in which we compare the estimated effect of market share on each component of profitability before and after econometrically removing the effects of temporary and persistent unobserved variables, one type at a time. If there is no difference between the "before" and "after" estimates of the market share coefficient for a given component, we must conclude that the unobserved variables, whose effects we have removed in the "after" estimates, do not affect that component. On the other hand, if there is a difference between
the "before" and "after" estimates, we can unambiguously attribute that difference to the particular unobserved variables whose effects we have removed in the "after" estimates. This logic is similar to that used by other researchers to establish the existence of unobserved variables (see, for example, Jacobson 1990 and Boulding 1990). Our analysis differs in that we separately evaluate the effect of temporary and persistent unobserved variables on each component of profitability. Therefore, we are able to determine which components of profitability are most affected by unobserved temporary shocks and which ones are most affected by persistent unobserved variables.

Our analysis proceeds in five steps. In each, we use a different estimation procedure to estimate the effect of market share on the components of profitability. The first step is the “before” stage of our econometric experiment while the remaining steps are four “after” stages that differ in the specific biases they remove. Table 1 lists the specific equations that are estimated in each step as well as the biases that are removed.

In the first step, we estimate each of the component models using ordinary least squares (OLS). The OLS estimate of the effect of share on each component is the combination of (a) the causal effect of share, (b) the impact of temporary and persistent unobserved variables and (c) other biases in the OLS estimate. Therefore, if the OLS estimate of the market share coefficient is higher for certain components than for others, the combination of the causal effect, the influence of unobserved variables, and the other biases must be stronger for those components.

Second, we remove the effects of both types of unobserved variables with the use of an
appropriate estimator (instrumental variables for first differences). This estimation procedure also removes the other biases that exist in the OLS estimates. The difference between this set of "after" estimates and the "before" OLS estimates can be attributed to the influence of unobserved variables and/or the other biases that have been removed.

The next three steps remove the effects of different types of excluded variables, one at a time. Step 3 is a multiple regression that removes the bias due to key strategic variables that are observed but excluded from our bivariate model. Step 4 controls for temporary unobserved variables using lagged market share as an instrument. Step 5 controls for persistent, firm-specific unobserved variables, using a first difference estimation. A comparison of each of these estimates with the corresponding OLS estimates allows us to isolate the effect of each of the different types of excluded variables on the components of profitability.

Finally, we apply this knowledge of the components affected by unobserved variables to generate and test hypotheses about some specific unobserved factors that allow market share leaders to have higher profitability than their low-share counterparts.

2.4 Data

Our analysis is based on the PIMS (Profit Impact of Marketing Strategy) SPIYR annual database. We examine strategic business units in seven different industry types covered by the database: (i) consumer durables, (ii) consumer non-durables, (iii) capital goods, (iv) raw or semi-finished materials, (v) components for incorporation into finished products, (vi) supplies or other consumable products, and (vii) services. Since our analyses require lagged variables, we exclude businesses that have fewer than five years of complete data. We also exclude the first four years of data for each remaining business after computing all the lags. This procedure ensures that the 3820
observations remaining in our final sample contain valid values of all the lagged variables.

Descriptive statistics for key variables are provided in Table 2 and their definitions can be found in Buzzell and Gale (1987).

3. COMPONENT LEVEL ANALYSIS OF MARKET SHARE-ROI RELATIONSHIP

3.1 OLS Estimates: Including All Sources of Bias

OLS estimates of the model in equation (6) serve as the starting point of our analyses. The bias in the OLS estimate for the j'th component is given by:

\[ \text{bias}_{ij}^{\text{ols}} = E[(X' \ X)^{-1} \ X' \ \alpha_j + (X' \ X)^{-1} \ X' \ \eta_j - (X' \ X)^{-1} \ X' \ \tilde{\delta}] \]  \hspace{1cm} (7)

where X represents the vector of explanatory variables (only the constant term and share in our case) and the remaining elements are as defined in Section 2. The first term in equation (7) contains the effects of unobserved persisting variables as well as those observed strategic variables, excluded from our bivariate model, that persist over time. The second term contains the effects of temporary unobserved shocks, observed strategic variables that change from year to year, reverse causality, and any spurious ratio correlation between market share and the component of profitability (see Schuessler 1974). The third term is due to measurement error in market share.

Although OLS estimates are biased, they are important to our analyses because, as we have noted in the previous section, all the other sets of estimates will be compared to these biased OLS estimates to isolate the effect of unobserved variables on the components of profitability. Table 3 presents these OLS estimates of the component models in equation (6), with unit market share as
the independent variable in each regression equation.²

Three points should be noted from Table 3. First, market share is not significantly related to the S/I ratio. The observed association of market share with ROI occurs mainly through ROS. Second, the coefficients of market share in regressions of the components of ROS show that the relationship of market share with the purchase costs/sales ratio component is, by far, the strongest. None of the other costs/sales ratios have a systematically negative market share coefficient across

² We recognize that, given the multiplicative identity relating ROI to ROS and the S/I ratio, market share cannot have a linear relationship with all three variables. Since the literature does not provide guidance as to which specific relationships may or may not be linear, we follow other researchers who assume linear models for both ROI and ROS (e.g., Buzzell and Gale 1987). To ensure that our conclusions are not invalidated by possible functional form mis-specification, we also conducted another set of analyses that does not impose a linear relationship between market share and the components of ROI. Specifically, we divided the sample into low, medium, and high market share groups and compared mean values of each component of ROI for these three groups. The results of this analysis were consistent with the regression results we report in this paper. For instance, there was no significant difference in the mean value of the S/I ratio across the three groups while the purchase costs/sales ratio exhibited the largest difference in means across the three groups. Details of this analysis are available from the first author upon request.
the seven sub-samples. Either market share really does not have any effect on these other costs/sales ratios or the biases in the OLS estimates somehow offset the true effect. Third, these results hold not only for the pooled sample but also for each of the seven business types in the sample. Thus, whatever the combination of unobserved variables, the other aforementioned biases, and the true effect of market share these estimates might reflect, Table 3 shows that almost all of the positive association between ROS and market share occurs through lower purchase costs/sales ratios. But, is the link between the purchase costs/sales ratio and market share causal, is it the result of unobserved variables, or is it due to the other biases in OLS estimates?

### 3.2 First Difference-Instrumental Variable Estimates: The Causal Effect of Market Share

In order to determine whether the strong association between market share and the purchase costs/sales ratio that is revealed in the OLS analysis is "causal" or due to one or more biases, we remove the effects of unobserved factors and of other sources of bias in the OLS estimates. Following Boulding and Staelin (1990), we first-difference the data to remove the effect of persisting unobserved variables, and use instruments for the first-differenced share variable (market share lagged two and three periods) to remove the effect of temporary shocks.

---

3 One exception to this pattern is the raw material industry where the market share coefficient is strongest in the manufacturing costs/sales ratio regression although the coefficient in the purchase costs/sales ratio regression is a close second.

4 Correlations between market share and the components of ROI show the same pattern, confirming that the pattern of regression coefficients we obtain is not simply due to the high variation of the purchase costs/sales ratio in the sample.
This procedure also controls for simultaneity, measurement error, and spurious ratio correlation.

Insert Table 4 About Here

These instrumental variable-first difference (IV-FD) estimates for the pooled sample are reported in the second column of Table 4. As may be expected from existing research, the causal effect of market share on profitability, after removing all these biases, is not significantly greater than zero. Further, the IV-FD estimate of the market share coefficient is significantly positive in the S/I ratio regression as well as in the purchase costs/sales ratio regression, and insignificant in the other component regressions. This stark difference between the OLS and IV-FD estimates has to be due to the unobserved variables and/or other sources of bias that have been removed in the latter. Although the coefficients for all the components change, the difference is strongest for the purchase costs/sales ratio, followed by the S/I ratio. We must conclude that the unobserved variables and/or the other sources of bias removed in the IV-FD estimates significantly decrease

5 A significantly positive relationship may be found under certain environmental conditions (e.g., Prescott, Kohli and Venkatraman 1986, Boulding and Staelin 1990), but determining those conditions is not the objective of this paper.

6 This is also supported by a specification test that we conducted to compare the OLS and IV-FD coefficient estimates of market share for each component of profitability (Hausman 1978). The $\chi^2$ statistic was largest for the purchase costs/sales ratio regression, followed by the S/I ratio regression. Specification tests comparing OLS estimates with all the other estimates in this paper are available from the first author.
both the purchase costs/sales ratio and the S/I ratio.

Only those sources of bias that have a different impact in the purchase costs/sales ratio regression than in regressions of the other costs/sales ratios can possibly explain the pattern of results we obtain. This fact rules out both measurement error and spurious ratio correlation as potential explanations because neither of these two sources of bias can affect the market share estimate in the purchase costs/sales ratio regression more than the corresponding estimates in the regressions of the other costs/sales ratios. We therefore focus on the remaining explanations in the next section.

4. INVESTIGATING THE INFLUENCE OF EXCLUDED VARIABLES

Three other explanations remain for the OLS link between the purchase costs/sales ratio and market share: observed strategic factors excluded from the bivariate regressions, temporary and persistent unobserved variables, and reverse causality. We investigate each explanation in turn.

4.1 The Influence of Observed Strategic Variables

The third column of Table 4 provides OLS estimates of the market share coefficient, for the pooled sample, obtained in multivariate regression models using fifteen other strategic variables from Buzzell and Gale's (1987) PAR model, along with market share.7

A comparison of these estimates with the bivariate estimates of Table 3 shows that the pattern of OLS results remains unaffected by the addition of several other explanatory variables. Consistent with the bivariate results, the estimated effect of market share on the S/I ratio is not significantly

7 Coefficients of the other strategic variables in this multivariate model are not listed due to lack of space. They are available from the first author.
greater than zero. Further, the purchase costs/sales ratio continues to be the major link between high market share and high profitability. Although one can never claim to have removed bias due to all possible observable variables, it is clear that the exclusion of these key strategic factors is not responsible for the large OLS estimate of the effect of share on the purchase costs/sales ratio.

4.2 Instrumental Variable (IV) Estimates: The Influence of Temporary Shocks

We repeat the component level analysis using market share lagged one year as an instrument for market share in a 2SLS estimation to remove the impact of unobserved temporary shocks that only exhibit themselves for a one-year period. This estimation procedure also controls for reverse causality, measurement error in market share, and spurious ratio correlation. The bias remaining in this set of estimates is from the firm-specific part of the error term:

$$E[(X_i'X_i)^{-1}X_i'\alpha_i]$$

since $$E(X_i'\eta_i) = E(X_i'\tilde{\delta}) = 0$$ (8)

where $$X_i$$ is the instrument for $$X$$

The market share estimates for the pooled sample, obtained in these instrumental variable (IV) regressions, are presented in column 4 of Table 4. A comparison of the OLS and IV estimates shows that the relative extent to which each component contributes to the total market share effect is the same. Even when the effects of temporary shocks are removed, the purchase costs/sales ratio remains the key link to higher profitability for market share leaders. We find no evidence of supply side luck or shocks that might specifically lower the purchase costs/sales ratio. This analysis also rules out reverse causality as an explanation for the link between market share and the purchase costs/sales ratio.

4.3 First Difference (FD) Estimates: Influence of Firm-Specific Unobserved Variables
To remove the impact of persisting unobserved variables, we first-difference the original data and then estimate OLS coefficients. The first-differencing is represented by a transformation matrix $P$ in the following expression for the remaining bias:

$$E[(X'P'PX)'X'P'(P \eta_j - P \tilde{\delta})]$$

$$\therefore P \alpha_j = 0 \quad (9)$$

Equation (9) shows that two sources of bias may be exacerbated due to first differencing— temporary shocks and measurement error. The exacerbation occurs to the extent that market share covaries positively with its lagged value. But this exacerbation occurs in all the component regressions, and we already know that neither of these two sources of bias affects the relative size of the market share coefficient in the component regressions. Therefore we can still ascribe any changes in the pattern of coefficient estimates across components to persisting unobserved variables.

These first-difference (FD) estimates, listed in the last column of Table 4, show some very striking contrasts with the OLS and IV estimates. First, the estimated effect of share on the S/I ratio is now significantly positive. Second, the market share coefficient in the purchase costs/sales ratio regression is not significantly negative. Third, the market share coefficient is significantly negative.

---

For instance, the bias due to measurement error in the bivariate OLS estimates is

$$-\gamma_{j1} \frac{\sigma^2_{\delta}}{\sigma^2_{\text{Share}_t}}$$

whereas, if the variance of market share is constant over time, the corresponding bias in the first difference regression is

$$-\gamma_{j1} \frac{\sigma^2_{\nu}}{\sigma^2_{\text{Share}_t} - \sigma_{\text{Share}_t \text{Share}_{t+1}}}.$$
in the most of the other component regressions. These differences between the OLS and FD estimates must be attributed to the persisting unobserved variables whose effects have been removed in the FD estimates. Therefore, we conclude that the persisting unobserved factors whose effects have been removed in this step greatly decrease the purchase costs/sales ratio for market share leaders. They also decrease the S/I ratio and increase the other components, e.g., the manufacturing costs/sales ratio, the R&D costs/sales ratio, and the depreciation/sales ratio, though to a lesser extent.

4.4 Industry or Firm Effects?

Our analysis has established that the significantly higher profitability of market share leaders is mainly due to their lower purchase costs/sales ratios. This association is not causal—high market share does not, by itself, decrease the purchase costs/sales ratio. Rather, the low purchase costs/sales ratios of market share leaders are a consequence of firm-specific unobserved variables whose effects persist over time. This importance of firm-specific unobserved factors is consistent with the resource-based view of the firm proposed by Wernerfelt (1984) as well as the findings of Rumelt (1991). The persisting unobserved variables whose effects we have removed through first differencing are generally labeled "management skill" in the marketing literature. But, first differencing also removes the impact of industry-specific characteristics, which are known to play a critical role in explaining variation in performance across businesses (e.g., Schmalensee 1985, Montgomery and Wernerfelt 1991).

To determine whether the association between the purchase costs/sales ratio and market share is due to industry-specific rather than firm-specific characteristics, we separately analyzed each of seven business types and obtained similar results for all of them. We also conducted a similar
analysis separately for 3 or 4 digit SIC codes within which we had enough observations. This analysis, too, showed the same pattern, with just two exceptions. Thus, industry-specific characteristics do not explain our findings. We are left with firm-specific management skill. The skillful actions taken by high share businesses must reduce their purchase costs/sales and S/I ratios while increasing the other components to a smaller extent.

These findings provide the direction needed to identify skills that are as yet unobserved but perhaps not unobservable. Researchers will now know what types of variables to focus on in their search for the skills that make market share leaders profitable. Potential candidates for these unobserved skills must lower the purchase costs/sales ratio and the S/I ratio significantly for high market share businesses and somewhat increase the other components.

5. UNOBSERVED MANAGEMENT SKILL

The next step is to identify specific skill factors that enable market share leaders to lower their purchase costs/sales ratios and therefore improve profitability. This entails (1) developing hypotheses about possible factors; (2) obtaining data on each of them; and (3) including them in the component models along with market share to confirm their impact. In this section, we develop hypotheses about three specific skills and test for the existence of one factor for which data is available in PIMS.

5.1 Unobserved Management Skills: Some Hypotheses

In order to develop hypotheses about specific unobserved skills, we decompose the purchase costs/sales ratio further as shown below:

9 Details of this analysis are available from the first author.
The decomposition in (10) shows that the purchase costs/sales ratio can be lowered through (1) higher selling prices; (2) fewer purchased inputs per unit sold; and (3) lower purchase prices. Actions through which high market share firms can influence each of these components may be potential candidates for "unobserved management skills." Although the market power gained by high-market share businesses can enable them to charge higher prices, this would affect all the costs/sales ratios. Therefore, selling prices cannot explain our results and we focus on the other two components of the purchase costs/sales ratio.

High share firms may be in a better position to exploit product and process efficiencies that require fewer and less expensive inputs, thus allowing them to reduce the amount of purchased inputs per unit sold as well as the prices of these purchased inputs. Such purchase costs/sales ratio lowering arrangements often require close alliances or other long-term relationships with suppliers and stay in place over time.

The monopsony power over suppliers that market share leadership brings can also enhance the ability of firms to negotiate better discounts from suppliers and lower their purchase prices. Such discounts are often implemented with multi-year contracts (e.g., Rajagopal and Bernard 1993).

Finally, high share firms may reduce their purchased inputs through backward vertical integration. When firms vertically integrate, they buy less and make more. However, high share firms may be able to do the latter more efficiently because of the economies that accompany their high share. Other options on the make-buy continuum that decrease purchase costs, such as long-
term strategic alliances with suppliers, may also be more feasible and more rewarding for market share leaders. Vertical integration and strategic alliance decisions, too, are made once in a while and stay in place for a long time.

Thus, we have hypothesized three skillful actions that can be taken by market share leaders to decrease their purchase costs/sales ratios: product/process efficiencies, supplier discounts, and vertical integration or strategic alliances with suppliers. Since these actions occur only once in a while and/or stay in place over time, their effects are attenuated in the analysis of first differences. Further, some of these actions, especially vertical integration, not only lower purchase costs but also increase other costs like manufacturing, depreciation and total investment, that would otherwise stay relatively fixed from year to year. Thus, these actions are also consistent with our empirical finding that persistent unobserved variables decrease the S/I ratio (by increasing its denominator), and increase some of the other costs/sales ratios, especially manufacturing costs/sales (by increasing their numerators).

Unfortunately, lack of suitable data in the PIMS database prevents us from directly testing all these hypotheses (this may be partly why these skills have remained unobserved so far). However, the PIMS database does contain a judgement-based index of vertical integration that can be used to test the vertical integration hypothesis.

5.2 A Test of the Vertical Integration Hypothesis

Hypotheses:

Theory suggests that high market share businesses are more likely to benefit from vertical integration than low share firms (e.g., Pennings, Hambrick, and MacMillan 1984, Harrigan 1984). The “buy less” part of the vertical integration decision reduces the purchase costs/sales ratio while
the “make more” part of the vertical integration decision increases the manufacturing costs/sales ratio. However, the manufacturing costs/sales ratio does not necessarily increase proportionally for high share firms since these firms are able to obtain and exploit scale economies and product/process efficiencies. The vertical integration decision may therefore be more profitable for high share firms. To reflect this, our model of profitability (and its components) should include not just the main effects of market share and of vertical integration, but also an interaction between market share and vertical integration:

\[ \text{Component}_{jit} = \gamma_{j0} + \gamma_{j1}\text{Share}_{it} + \gamma_{j2}\text{Share}_{it} \times \text{VIntegration}_i + \gamma_{j3} \text{VIntegration}_i + \epsilon_{jit} \] (11)

Our interest, of course, is in the coefficients of share and the interaction term. If our hypothesis about the vertical integration decisions of high share businesses is correct, then the additional variables included in model (11) should reconcile some of the differences between the OLS and FD estimates. Specifically:

H1: The coefficient of market share in the purchase costs/sales ratio regression should be less negative than in Table 3, since we have now included one skill factor in the model that was previously “unobserved”, i.e., the moderating "buy less" effect of high vertical integration.

H2: By the same token, the coefficient of market share in the manufacturing costs/sales regression should now be more negative than in Table 3 to reflect scale economies and efficiencies.

H3: Similarly, the coefficient of market share in the S/I ratio regression should be more positive than in Table 3, to reflect the spreading of higher sales over a fixed investment base.

H4: The coefficient of the interaction term should be negative in the purchase costs/sales ratio

---

10 We note that OLS estimates of this model are still biased due to the other sources discussed earlier in the paper. However, our interest here is in examining the impact of removing one source of bias -- the moderating effect of vertical integration.
regression, since market share leaders who employ a higher level of vertical integration will buy less.

H5: Similarly, the coefficient of the interaction term in the manufacturing costs/sales ratio regression should be positive since market share leaders who employ a higher level of vertical integration will make more.

H6: Finally, the coefficient of the interaction term in the S/I ratio regression should be negative, since investment levels will increase for market share leaders who employ vertical integration.

Results:

The PIMS vertical integration index takes the value 1 for integration levels less than competition, the value 2 for levels about the same as competition, and the value 3 for levels greater than competition. Since this index is a categorical variable, we recode it into a dummy variable that takes the value 0 if the original index is 1 or 2 and the value 1 if the original index is 3. Table 5 summarizes estimates of equation (11) for the pooled sample.

Insert Table 5 About Here

The evidence in Table 5 supports all our hypotheses. First, the market share coefficient in the purchase costs/sales ratio regression, while still strongly negative, is less so than in the original OLS analysis. Vertical integration does not completely account for the negative relationship of market share with the purchase costs/sales ratio, but it does account for a significant part of that relationship. Second, the market share coefficient in the manufacturing costs/sales ratio regression is now significantly negative. As expected, once the vertical integration effect is separated out, what remains is the spreading of relatively fixed manufacturing costs over a larger sales base. Third, the market share coefficient in the S/I ratio regression is now significantly positive. Again, as
expected, once the vertical integration effect is separated out, the S/I ratio increases with market share because a higher sales level is being derived from a relatively fixed investment base. Fourth, the coefficient of the interaction term in the purchase costs/sales ratio regression is strongly negative. As expected, the results confirm that high market share businesses that are vertically integrated have lower purchase costs/sales ratios than their less integrated counterparts. Fifth, the coefficient of the interaction term is significantly positive in the manufacturing costs/sales ratio regression. Again, consistent with our hypothesis, market share leaders who are vertically integrated have higher manufacturing costs/sales ratios than those who are not. Finally, the coefficient of the interaction term is significantly negative in the S/I ratio regression since integrated market share leaders make higher investments, and therefore have lower S/I ratios than their less integrated counterparts.

Thus, incorporating the moderating effect of vertical integration does reconcile many of the differences in patterns that we observed between the OLS and first difference analyses. It would seem that vertical integration is indeed one of the skillful actions undertaken by profitable market share leaders in the PIMS database. However, the other factors such as supplier discounts and productive partnerships with suppliers may also play a significant role, as the market share coefficient in the purchase costs/sales regression remains negative even for less integrated businesses.

6. CONCLUSION

In recent years, researchers have developed several sophisticated econometric models of the market share - profitability relationship. Most of these models have used PIMS data and they have focused on removing the "bias" due to unobserved shocks and skills in order to obtain the true effect
of market share on profitability. Once the impact of these unobserved factors is econometrically removed, the remaining effect of market share on profitability is quite small. In this paper, we have shifted attention from the small causal effect of market share on profitability to the unobserved skills that make the "biased" effect large and therefore very interesting. Although high market share, by itself, does not increase profitability, it does enable high share firms to take certain profitable actions that may not be feasible or profitable for low share firms.

6.1 Summary of Findings

We have utilized the simple yet powerful notion of decomposing profitability into its definitional components to "observe" the effect of the unobserved variables. We have unambiguously identified the components through which these unobserved variables influence profitability, and we have used this information to identify at least some of the unobserved variables.

Our analysis has shown that the purchase costs/sales ratio is the key link between market share and profitability. We have traced this link to the impact of persisting unobserved variables that are correlated with market share, while ruling out several other possible explanations. We have isolated three specific factors from the general label of "Management Skill" given to persisting unobserved variables. Our conclusion is that reaping the full benefit of market share requires skillful actions such as: (i) exploiting product/process efficiencies; (ii) negotiating better supplier discounts; and (iii) vertically integrating or developing strategic partnerships with key suppliers.

Are purchasing agents "luckier" than their counterparts in marketing, R&D, manufacturing, and administration? Not surprisingly, we have found that they are not! Are they more "skillful"? Perhaps. But, their skill lies in recognizing and exploiting the opportunities for lowering purchase
costs that are opened up by a high market share position. Given the enormous leverage that purchase costs can offer, we believe more field research is warranted to examine the extent to which firms with high market shares are able to forge more enduring and rewarding partnerships with suppliers and/or obtain lower purchase prices.

But, we have also found that purchasing skill alone is not sufficient to reap the benefits of high market share, even if those benefits do exhibit themselves mainly in the purchasing department. For instance, product and process efficiencies in manufacturing must be carefully planned and exploited, if the "Make More" portion of the "Buy Less Make More" vertical integration decision is not to completely offset the "Buy Less" portion. Equally important is our finding that management skill does not provide much leverage for market share leaders in certain areas, e.g., marketing and R&D costs.

6.2 Implications for Further Research

We have hypothesized some skills that are correlated with market share and affect the profitability components of firms in the specific ways revealed by our research. PIMS data have only permitted us to test one of these hypotheses directly. This suggests an immediate avenue for further research – primary data should be obtained on the all variables we have identified and they should be included in models of profitability to test their impact.

Although our analyses have led us to identify three skill factors, there may be other unobserved skills that play a role in the profitability of market share leaders. A second result of our work is the establishment of a criterion for evaluating other unobserved skills hypothesized in future research. Not only must such hypothesized variables be correlated with market share, but, they should be able to explain the specific pattern of effects across components that we observe.
Specifically, any unobserved factors, be they at the firm or industry level, must lower the purchase costs/sales and S/I ratios, and increase the other components, especially the manufacturing costs/sales ratio, albeit to a lesser extent.

More generally, our findings underscore the importance of research in supplier-vendor relationships. We believe that research aimed at understanding the role of trust, commitment, and other factors in forging beneficial channel partnerships is well directed and should be expanded to study how factors like market share position may facilitate the development and success of such strategic partnerships. For instance, our findings are consistent with the notion of calculative commitments proposed by Geyskens, Steenkamp, Scheer, and Kumar (1996). Suppliers may "calculate" the importance of investing in a long-term partnership with high share firms.

Methodologically, our work shows the value of the decomposition approach we have used here in studies of profitability as well as other marketing phenomena. As long as component level data are available, such decomposition comes at no additional cost, yet, it has the potential for offering insights into the phenomenon being studied that are not readily available from analyses of the composite variables alone.

6.3 Implications for Managers

Our research clearly underscores the key role that the purchase costs/sales ratio plays in the financial success of a firm. Market share leaders should recognize and exploit the leverage that various forms of strategic alliances with suppliers, supplier discounts, vertical integration and manufacturing efficiencies can offer. In recent years, the strategic role of purchases has been highly visible in the automobile industry. Industry observers note that the greatest leverage on profits is being exerted through purchases. According to ex Vice President of International Purchasing for
General Motors, Ignacio Lopez, "...we are making all these productivity improvements inside our company, but it is only 7% of the total cost of the car and 72% comes from outside suppliers. I want to apply the same methods we are using in our plants with our suppliers" (McElroy 1993, p48).

Vertical integration may afford increased control over key supplies and bring economies for high share firms, but the reverse may also be true -- low share firms need to “de-integrate”. As an example, Ford Motor Company has cut its operations back in recent years, relying less on its own manufacturing and more on its suppliers. Suppliers were encouraged to add more value at their stage in the value chain, allowing Ford to close unprofitable operations and reduce reliance on higher-cost labor. Market-place pressures have forced Ford to put together a strategy that will be profitable at market share levels that are lower than the company enjoyed in the past.

This points to a potential disadvantage of vertical integration – a loss of flexibility in some situations (e.g., Anderson and Weitz 1986). Vertical integration is a good strategy for businesses such as those in the PIMS database that predominantly belong to large, well-established companies in stable environments (e.g., Lambkin 1992). However, more flexible approaches, such as closer, long-term alliances with suppliers, may be appropriate for firms that operate in volatile competitive environments, face uncertain demand, or are exposed to fast-changing technologies (e.g., Harrigan 1984, 1986).

The message of this paper to managers is not that they should integrate vertically to benefit from high share. Rather, they should recognize that the biggest source of market share leverage lies in lower purchase costs and efficiencies, and exploit this leverage in ways that are best suited for their business environment, through long-term strategic alliances with key suppliers, by integrating
vertically, or simply by negotiating volume discounts on their purchases.
<table>
<thead>
<tr>
<th>STEP</th>
<th>ESTIMATION</th>
<th>ESTIMATED EQUATIONS</th>
<th>BIASES REMOVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Bivariate OLS</td>
<td>( \hat{y}<em>{j0} + \hat{y}</em>{j1}\text{Share}_a )</td>
<td>None</td>
</tr>
<tr>
<td>II</td>
<td>First Differences Instrumental Variables (IV-FD)</td>
<td>( \hat{\text{Share}}<em>n - \hat{\text{Share}}</em>{n-1} = \hat{\beta}<em>{j0} + \hat{\beta}</em>{j1}\text{Share}<em>{n-2} + \hat{\beta}</em>{j2}\text{Share}<em>{n-3} ) &lt;br&gt; ( \text{Component}</em>{jn} = \text{Component}<em>{jn-1} = \hat{y}</em>{j0} + \hat{y}_{j1} (\hat{\text{Share}}<em>n - \hat{\text{Share}}</em>{n-1}) )</td>
<td>Measurement error &lt;br&gt; Spurious ratio correlation &lt;br&gt; Omitted strategic factors &lt;br&gt; Reverse causality &lt;br&gt; Unobserved temporary shocks &lt;br&gt; Unobserved persisting factors</td>
</tr>
<tr>
<td>III</td>
<td>Multivariate OLS</td>
<td>( \hat{\text{Component}}<em>n = \hat{y}</em>{j0} + \hat{y}_{j1}\text{Share}<em>n + \hat{y}</em>{j1}\text{Growth}_n + \ldots )</td>
<td>Omitted strategic factors</td>
</tr>
<tr>
<td>IV</td>
<td>Instrumental Variable (IV)</td>
<td>( \hat{\text{Share}}<em>n = \hat{\beta}</em>{j0} + \hat{\beta}<em>{j1}\text{Share}</em>{n-1} ) &lt;br&gt; ( \text{Component}<em>{jn} = \hat{y}</em>{j0} + \hat{y}_{j1}\text{Share}_a )</td>
<td>Unobserved temporary shocks &lt;br&gt; Measurement error &lt;br&gt; Spurious ratio correlation &lt;br&gt; Reverse causality</td>
</tr>
<tr>
<td>V</td>
<td>First Differences (FD)</td>
<td>( \text{Component}<em>{jn} = \text{Component}</em>{jn-1} = \hat{y}<em>{j0} + \hat{y}</em>{j1} (\text{Share}<em>a - \text{Share}</em>{a-1}) )</td>
<td>Unobserved persisting factors</td>
</tr>
</tbody>
</table>
**TABLE 2**

DESCRIPTIVE STATISTICS

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Observations</th>
<th>Pooled</th>
<th>Durables</th>
<th>Non Durables</th>
<th>Capital Goods</th>
<th>Raw Material</th>
<th>Components</th>
<th>Supplies</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(3820)</td>
<td>(506)</td>
<td>(537)</td>
<td>(636)</td>
<td>(558)</td>
<td>(967)</td>
<td>(541)</td>
<td>(75)</td>
<td></td>
</tr>
<tr>
<td>ROI</td>
<td>24.67 (27.24)</td>
<td>19.94 (23.93)</td>
<td>22.93 (29.30)</td>
<td>24.71 (25.96)</td>
<td>19.59 (25.58)</td>
<td>27.25 (26.83)</td>
<td>27.85 (27.93)</td>
<td>50.12 (33.24)</td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>9.29 (10.77)</td>
<td>7.38 (9.36)</td>
<td>7.63 (11.20)</td>
<td>9.74 (10.13)</td>
<td>8.32 (11.91)</td>
<td>10.00 (10.43)</td>
<td>11.16 (10.98)</td>
<td>14.70 (10.36)</td>
<td></td>
</tr>
<tr>
<td>Sales/Investment Ratio</td>
<td>2.59 (1.59)</td>
<td>2.45 (1.03)</td>
<td>3.01 (2.08)</td>
<td>2.50 (1.36)</td>
<td>2.08 (1.01)</td>
<td>2.78 (1.86)</td>
<td>2.44 (1.08)</td>
<td>3.99 (2.87)</td>
<td></td>
</tr>
<tr>
<td>Purchase Costs/Sales Ratio</td>
<td>44.81 (16.28)</td>
<td>46.78 (13.22)</td>
<td>43.36 (16.23)</td>
<td>41.36 (15.26)</td>
<td>55.73 (14.50)</td>
<td>44.18 (15.87)</td>
<td>40.14 (16.41)</td>
<td>31.79 (18.54)</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Costs/Sales Ratio</td>
<td>27.48 (12.05)</td>
<td>27.17 (11.17)</td>
<td>26.16 (12.43)</td>
<td>27.05 (10.65)</td>
<td>25.13 (11.51)</td>
<td>28.55 (12.09)</td>
<td>28.88 (13.03)</td>
<td>36.48 (14.83)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D Costs/Sales Ratio</td>
<td>1.87 (2.34)</td>
<td>1.43 (1.44)</td>
<td>0.93 (1.31)</td>
<td>2.84 (2.67)</td>
<td>1.46 (2.14)</td>
<td>2.45 (2.79)</td>
<td>1.69 (2.16)</td>
<td>0.25 (0.60)</td>
<td></td>
</tr>
<tr>
<td>Marketing Costs/Sales Ratio</td>
<td>8.50 (7.17)</td>
<td>9.58 (5.44)</td>
<td>14.25 (10.38)</td>
<td>10.25 (7.33)</td>
<td>3.13 (2.73)</td>
<td>6.09 (4.08)</td>
<td>9.72 (6.48)</td>
<td>7.13 (7.05)</td>
<td></td>
</tr>
<tr>
<td>Depreciation/Sales Ratio</td>
<td>2.30 (1.90)</td>
<td>2.10 (1.24)</td>
<td>2.12 (1.50)</td>
<td>1.81 (2.24)</td>
<td>2.55 (2.07)</td>
<td>2.57 (1.75)</td>
<td>2.47 (2.01)</td>
<td>2.68 (3.16)</td>
<td></td>
</tr>
<tr>
<td>Other Costs/Sales Ratio</td>
<td>5.75 (5.84)</td>
<td>5.55 (4.41)</td>
<td>5.55 (7.99)</td>
<td>6.94 (5.50)</td>
<td>3.69 (5.67)</td>
<td>6.16 (5.36)</td>
<td>5.94 (4.54)</td>
<td>6.97 (9.35)</td>
<td></td>
</tr>
<tr>
<td>Unit Market Share</td>
<td>24.00 (16.78)</td>
<td>18.79 (14.45)</td>
<td>23.70 (17.21)</td>
<td>26.64 (16.73)</td>
<td>24.07 (15.46)</td>
<td>25.59 (17.41)</td>
<td>22.71 (16.83)</td>
<td>25.74 (20.73)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses.
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Pooled</th>
<th>Durables</th>
<th>Non Durables</th>
<th>Capital Goods</th>
<th>Raw Mater.</th>
<th>Components</th>
<th>Supply</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI</td>
<td>0.537*</td>
<td>0.648*</td>
<td>0.739*</td>
<td>0.501*</td>
<td>0.331*</td>
<td>0.406*</td>
<td>0.661*</td>
<td>0.629*</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.068)</td>
<td>(0.066)</td>
<td>(0.058)</td>
<td>(0.069)</td>
<td>(0.048)</td>
<td>(0.066)</td>
<td>(0.173)</td>
</tr>
<tr>
<td>ROS</td>
<td>0.230*</td>
<td>0.242*</td>
<td>0.262*</td>
<td>0.221*</td>
<td>0.214*</td>
<td>0.177*</td>
<td>0.312*</td>
<td>0.217*</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.027)</td>
<td>(0.026)</td>
<td>(0.022)</td>
<td>(0.031)</td>
<td>(0.018)</td>
<td>(0.025)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>Sales/Investment Ratio</td>
<td>0.001</td>
<td>0.013*</td>
<td>0.006</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.016</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.005)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Purchase Costs/Sales Ratio</td>
<td>-0.207*</td>
<td>-0.249*</td>
<td>-0.330*</td>
<td>-0.233*</td>
<td>-0.118*</td>
<td>-0.127*</td>
<td>-0.219*</td>
<td>-0.206**</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.039)</td>
<td>(0.038)</td>
<td>(0.035)</td>
<td>(0.040)</td>
<td>(0.029)</td>
<td>(0.041)</td>
<td>(0.102)</td>
</tr>
<tr>
<td>Manufacturing Costs/Sales Ratio</td>
<td>-0.016</td>
<td>0.010</td>
<td>0.088*</td>
<td>0.001</td>
<td>-0.161*</td>
<td>-0.060*</td>
<td>-0.021</td>
<td>0.236*</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.034)</td>
<td>(0.031)</td>
<td>(0.025)</td>
<td>(0.031)</td>
<td>(0.022)</td>
<td>(0.033)</td>
<td>(0.079)</td>
</tr>
<tr>
<td>R&amp;D Costs/Sales Ratio</td>
<td>0.017*</td>
<td>0.004</td>
<td>0.007**</td>
<td>0.017*</td>
<td>0.027*</td>
<td>0.024*</td>
<td>-0.001</td>
<td>-0.007*</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Marketing Costs/Sales Ratio</td>
<td>-0.026*</td>
<td>-0.012</td>
<td>-0.025</td>
<td>0.012</td>
<td>-0.006</td>
<td>-0.026*</td>
<td>-0.045*</td>
<td>-0.100*</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.017)</td>
<td>(0.026)</td>
<td>(0.017)</td>
<td>(0.007)</td>
<td>(0.008)</td>
<td>(0.017)</td>
<td>(0.038)</td>
</tr>
<tr>
<td>Depreciation/Sales Ratio</td>
<td>-0.001</td>
<td>0.003</td>
<td>0.009**</td>
<td>-0.006</td>
<td>0.018*</td>
<td>-0.002</td>
<td>-0.015*</td>
<td>-0.045*</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.003)</td>
<td>(0.005)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Other Costs/Sales Ratio</td>
<td>0.002</td>
<td>0.003</td>
<td>-0.010</td>
<td>-0.012</td>
<td>0.027</td>
<td>0.015</td>
<td>-0.015</td>
<td>-0.096</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.014)</td>
<td>(0.020)</td>
<td>(0.013)</td>
<td>(0.016)</td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.052)</td>
</tr>
</tbody>
</table>

Note: Standard errors are in parentheses
*p < 0.01; **p < 0.05
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Estimate of Market Share Coefficient in</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IV-FD</td>
<td>IV</td>
<td>FD</td>
<td></td>
</tr>
<tr>
<td>ROI</td>
<td>-0.272 (0.553)</td>
<td>0.347* (0.023)</td>
<td>0.498* (0.025)</td>
<td>0.846* (0.075)</td>
</tr>
<tr>
<td>ROS</td>
<td>-0.238 (0.219)</td>
<td>0.167* (0.009)</td>
<td>0.216* (0.010)</td>
<td>0.286* (0.030)</td>
</tr>
<tr>
<td>Sales/Investment Ratio</td>
<td>0.074* (0.029)</td>
<td>-0.005* (0.001)</td>
<td>0.000 (0.002)</td>
<td>0.032* (0.004)</td>
</tr>
<tr>
<td>Purchase Costs/Sales Ratio</td>
<td>0.630* (0.167)</td>
<td>-0.210* (0.016)</td>
<td>-0.210* (0.016)</td>
<td>0.017 (0.021)</td>
</tr>
<tr>
<td>Manufacturing Costs/Sales Ratio</td>
<td>-0.189 (0.145)</td>
<td>0.028* (0.012)</td>
<td>-0.010 (0.012)</td>
<td>-0.098* (0.021)</td>
</tr>
<tr>
<td>R&amp;D/Sales Ratio</td>
<td>-0.004 (0.029)</td>
<td>0.022* (0.002)</td>
<td>0.019* (0.002)</td>
<td>-0.029* (0.004)</td>
</tr>
<tr>
<td>Marketing Costs/Sales Ratio</td>
<td>-0.036 (0.060)</td>
<td>-0.010 (0.006)</td>
<td>-0.021* (0.007)</td>
<td>-0.064* (0.008)</td>
</tr>
<tr>
<td>Depreciation/Sales Ratio</td>
<td>-0.011 (0.033)</td>
<td>0.002 (0.002)</td>
<td>-0.001 (0.002)</td>
<td>-0.032* (0.005)</td>
</tr>
<tr>
<td>Other Costs/Sales Ratio</td>
<td>-0.153 (0.120)</td>
<td>0.001 (0.006)</td>
<td>0.007 (0.006)</td>
<td>-0.079* (0.017)</td>
</tr>
</tbody>
</table>

Note: Standard errors are in parentheses
* p < 0.01
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>OLS Coefficient Estimate of</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Share</td>
<td>Share*VInteg.</td>
<td>VInteg.</td>
<td></td>
</tr>
<tr>
<td>ROI</td>
<td>0.483* (0.027)</td>
<td>0.262* (0.066)</td>
<td>-3.025* (2.208)</td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>0.221* (0.011)</td>
<td>0.039 (0.026)</td>
<td>0.354 (0.865)</td>
<td></td>
</tr>
<tr>
<td>Sales/Investment Ratio</td>
<td>0.000 (0.002)</td>
<td>0.007* (0.004)</td>
<td>-0.239* (0.137)</td>
<td></td>
</tr>
<tr>
<td>Purchase Costs/Sales Ratio</td>
<td>-0.167* (0.017)</td>
<td>-0.206* (0.041)</td>
<td>3.114* (1.364)</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Costs/Sales Ratio</td>
<td>-0.038* (0.013)</td>
<td>0.110* (0.031)</td>
<td>-1.456 (1.035)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D Costs/Sales Ratio</td>
<td>0.018* (0.003)</td>
<td>0.001 (0.006)</td>
<td>-0.269 (0.200)</td>
<td></td>
</tr>
<tr>
<td>Marketing Costs/Sales Ratio</td>
<td>-0.035* (0.008)</td>
<td>0.063* (0.019)</td>
<td>-2.301* (0.616)</td>
<td></td>
</tr>
<tr>
<td>Depreciation/Sales Ratio</td>
<td>-0.001 (0.002)</td>
<td>0.001 (0.005)</td>
<td>-0.160 (0.164)</td>
<td></td>
</tr>
<tr>
<td>Other Costs/Sales Ratio</td>
<td>0.003 (0.006)</td>
<td>-0.008 (0.015)</td>
<td>0.717 (0.504)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Standard errors are in parentheses

* p<0.01
ACKNOWLEDGEMENTS

Special thanks are due to Scott Neslin, Don Lehmann, Jan-Benedict Steenkamp, and two anonymous reviewers for their many valuable suggestions on this paper. We also thank Bill Boulding, Bob Jacobson, Vithala Rao, Dave Reibstein, Al Silk, Rick Staelin, Fred Webster, Birger Wernerfelt, and participants of the Tuck Faculty Research Seminar Series, the North East Faculty Marketing Consortium, and the Marketing Science Conference for several helpful comments. We are grateful to the Strategic Planning Institute for providing access to the PIMS database, and especially appreciate the assistance of Julie Takahashi. The first author gratefully acknowledges support from the Tuck Associates Program.
REFERENCES


Jacobson, Robert, and David A. Aaker, 1985. Is Market Share All That It's Cracked Up To Be?
Journal of Marketing 49, 11-22.


